

# **CHAPTER 1:**

## **THE MACROENVIRONMENT AFFECTING THE BIODIVERSITY CONSERVATION SECTOR**

## INTRODUCTION

“It is becoming clear that stopping the extinction of the species is not merely a romantic notion, but is actually crucial for human survival” (Helmholtz Association of German Research Centres, 25 May 2008).

In May 2008, the 9<sup>th</sup> United Nations’ Convention on Biological Diversity considered the first results of an ambitious research project that attempts to measure the “value of nature”, and in so doing make an “economic case for the conservation of ecosystems and biodiversity (Sukhdev, 2008:4). It is widely accepted that there is a social, human, economic and developmental value attached to the loss of ecosystems, terrestrial and aquatic species, as a result of human activity to meet developmental needs by the increased and often unsustainable use of natural resources.

It is therefore appropriate that a sector dedicated to the preservation of natural species, the biodiversity conservation sector, is now also aiming to attract, develop and retain “human capital” through a concerted investment in appropriate human capacity, skills and knowledge for effective institutional governance, the effective delivery of its mandatory responsibilities and the transformation of its workforce (DEAT, 2005). The preservation of natural species is inextricably linked to the preservation of human livelihood and survival; in turn a sustained investment in human capacity may unlock the institutional (and sectoral) capacity to anticipate, adjust and respond innovatively in order to prevent or mitigate losses in natural resources.

The proposed human capital development strategy (HCDS) is part of a broader government and national endeavour which places “investment in quality education ... and in skills development ... [as the] bedrock of the government’s approach” in developing a more competitive and knowledge-based economy (The Presidency, 2009a:9).

Earlier on in 2009, the South African National Biodiversity Institute (SANBI), in cooperation with the Tony & Lissette Lewis Foundation (from here on referred to as the Lewis Foundation), appointed the Human Sciences Research Council (HSRC) to conduct background research that would contribute guidelines for the development of

an HCDS and implementation plan for the biodiversity sector. The proposed HCDS is aimed at the development of a more diverse professional and managerial workforce, and addresses the challenge of scarce skills through the recruitment, development and retention of qualified scientists and managers at NQF (National Qualifications Framework) level 5 and higher. These twin challenges were in response to a lack of success in recruiting black scientists into the workforce, and the perception that the pool of qualified and experienced scientists and managers was not growing at a rate sufficient to meet the operational requirements as dictated by policy and legislative changes in the biodiversity mandate.

It was agreed that the research be implemented within a developmental conceptual framework or a “cradle-to-grave” approach that sought to interrogate the education-skills training-labour market dynamic through an investigation of the key supply-side factors, the skills retention environment as well as demand-side factors in the biodiversity conservation sector.

The research aimed to provide a comprehensive statistical and contextual picture of the key trends in human capital development (HCD) in the biodiversity sector, as well as best practice lessons from selected interventions while outlining key challenges for the way forward.

The research process was subject to a number of specific objectives, which are summarised here and reported on in more detail in separate chapters of this report.

Firstly, a scoping exercise of the sector was conducted in order to establish a broadly acceptable definition of the sector, nature, size, key stakeholders (public, private and nongovernmental organisations [NGOs]), and a definition and profile of the key occupations and professions associated with it. Key sources of data were identified, both official and independent sources. A key requirement of this phase was the alignment of the SANBI-driven process with that of the development of an Environmental Sector Skills Plan (ESSP) driven by the former Department of Environmental Affairs and Tourism (DEAT), now renamed the Department of Water and Environmental Affairs.

Secondly, to conduct a desktop analysis of both the demand- and supply-side factors influencing employment and retention, as well as education provision at secondary and higher education level.

Thirdly, to conduct an analysis of contextual push and pull factors that affect the entry into, retention and exit from the sector of a range of appropriately qualified and skilled professionals and conservation managers, among others.

Fourthly, to present a comprehensive set of strategic recommendations to guide the development of a draft HCDS to SANBI and foreground broad implications for monitoring and evaluation to be considered during the strategic planning process. The proposed HCDS will be developed, implemented and evaluated against a contextual background that may change over time.

This chapter provides an overview of the key factors and dynamics of the present contextual background. It starts off with a consideration of human capital theory (HCT), its definition and critiques with specific reference to its relevance; then follows an analysis of the macroenvironment in terms of the implications of macroeconomic, industrial and innovation policies, as well as key aspects of the National Skills Development Strategy (NSDS). The chapter concludes with a consideration of the nature of the knowledge workforce and implications for mobility and transformation.

## **HUMAN CAPITAL THEORY AND CONTEXT**

Fundamental to the HCDS is a definition of human capital in relation to the policy and legislative frameworks in the biodiversity conservation sector, other policy frameworks in the external environment, and the human resources management and human capital literature. Table 1.1 provides an overview of the approaches to a definition of human capital based on relevant policy frameworks.

This overview shows that there was no specific definition emerging from any of the policy frameworks considered. However, there were a number of common trends emerging to infer the meaning of human capital. Firstly, the terms “human capital” and “human capacity” were used interchangeably across most of the policy frameworks. External policy frameworks differed slightly in that they often used the term “human resources development” interchangeably with “human capital”, or made more specific reference to formal education. Secondly, almost all frameworks referred to the creation or building of “capacity” within the workforce or the sector as a key requirement. Thirdly, whichever terms were used, whether “capacity”, “capital” or “education”, the common interpretation appeared to be the possession of

“knowledge”, “skills”, “expertise” and/or “education”. Finally, the policy frameworks suggested that a particular type of capacity was needed in terms of transformation (black professionals and managers), as well as in (unnamed) occupations or skill areas that were scarce. This overall review suggests the following in terms of a human capital or human capacity building strategy:

“A capacity building strategy aimed at developing the knowledge, skills and expertise in the biodiversity conservation sector in a manner that will transform the profile of the professional and managerial workforce by recruiting, developing and retaining those who are black and those who have the necessary skills and qualifications that are in demand in the sector.”

Capacity and capital were often used to refer to more specific terms such as “knowledge”, “skills” and “expertise”.

**Table 1.1: Overview of the definition of human capital in biodiversity and external policy frameworks**

	Definition	Perceived challenges	Indicators
Biodiversity Policy Frameworks:			
NBSAP  National Biodiversity Framework (NBF)	No definition of human capital.  Under Strategic Objective 2: Enhanced institutional effectiveness and efficiency and top priority actions for 2007– 2012: it refers to a “capacity building programme to address transformation” (DEAT, 2007: 24) and scarce skills.	PDA South Africans do not perceive career opportunities or career paths in the sector.  Identifies shortage of skilled professionals & conservation managers	By 2012 a national biodiversity conservation capacity building programme  Specific EE targets for all research agencies and implementing agencies set and implemented
4 <sup>th</sup> National Report to the Convention on Biological Diversity	No definition of human capital Interchangeable use of human capital and human capacity Reference made to “knowledge and skills’ and professional standards (DEAT, 2009:132)  Reference made to challenges in attracting and retaining skilled staff, and quality of Mathematics and Science in education system (Ibid: x)	HCD strategy aimed at “transformation and scarce skills” (2009: 132)	None identified.
Biodiversity Research Reports:			
National Capacity Self-Assessment	No definition of human capital; Interchangeable use of individual capacity and human capital.	Transformation and scarce skills  Lack of resource economics capacity  Capacity to implement, enforce & monitor regulations	None identified.
Foresight Biodiversity R&D Report	No clear definition. Refers to “human capacity”, “knowledge and expertise”		None identified.

	Definition	Perceived challenges	Indicators
	(DACST, 2000: 47).		
External environment:			
R& D strategy (DST, 2002)	<p>No clear definition</p> <p>Interchangeable use of human capital, human resources development and capacity, applicable to the SET sector (p51, 55)</p> <p>Takes it lead from the 2001 National HRD strategy:</p> <p>General education</p> <p>Supply side: FET &amp; HET</p> <p>Demand side (systematic integration of employers' requirements into formal education)</p> <p>The NSI (National System of Innovation) – articulation of HE research and innovation requirements of society and economy</p>	<p>“market principle” Increase the SET workforce:</p> <p>Attract more learners and students through mentoring, funding bursaries</p> <p>Centres of Excellence etc.</p> <p>Scientific career paths – development of a public understanding of science” (DST: 16)</p> <p>Focus on transformation</p> <p>Focus on excellence</p>	<p>SET human capital:</p> <p>Researchers per 1000 of workforce</p> <p>SET demographic profile</p>
Ten-year National Innovation Plan	<p>Human capital development – one of three pillars in developing a functional knowledge economy</p> <p>SA ranking dropped from 52 to 58 out of 132 countries on global index</p> <p>Education identified as one of the 4 pillars of a knowledge-based economy, the others being innovation, economic &amp; institutional regime and information infrastructure</p>	<p>“Labour and capital are factors of production” (DST, 2007: 6)</p> <p>“Technology and the knowledge to exploit labour and capital are crucial”</p>	

Sources: Various (author's own analysis)

This definition is underpinned by the assumption that two types of professionals and managers were regarded as scarce or difficult to find:

- Professionals and managers who were scarce, that is, a “shortage”
- Professionals and managers who were black<sup>1</sup> (African, coloured and Indian) if based on the transformation provisions of the Employment Equity (EE) Act, although this is never clarified

Table 1.1 further suggests that the sector was not attractive to those it wished to recruit (previously disadvantaged groups) and/or those who were in demand, based on the perception that the sector lacked career opportunities and career paths. This implies that the capacity of the existing workforce, as well as the pool of potential recruits (learners, students, experienced professionals and managers), needed to be increased. Thus, implicit in the proposed HCDS was the notion that the public image of the career potential of the sector (for new black recruits, learners, students and experienced professionals and managers) was closely linked to its ability to address scarcity and transformation.

### **Evolution of the term “human capital”**

The analysis shown previously indicates that, in South Africa, there was often a conflation of terms when referring to human capital, and that the term itself was often not clearly defined. Thus, as shown in Table 1.1, a definition may be inferred from references to other words or phrases, including capacity, knowledge, skills and so forth. When used in the popular domain by South African government officials, business and labour as well as academics, there is a lack of a standardised definition or usage, although it is assumed that there is a common understanding. However, the particular meaning is often driven by the particular perspective or priorities of the user or the document in which it is used. For instance, in the National Poverty Strategy (The Presidency, 2008:5–6), human capital (“providing health care, education and training”) and human resource development (“education and skills development”) were used interchangeably. A human resources (HR) manager might refer to an assortment of human resource management (HRM) policies and practices aimed at the management of staff. An economist, on the other hand, might refer to the number of years in formal education. Thus, the approach to human capital and



HCT is not uncontested terrain, with supporters as well as detractors, a situation often not portrayed in the South African literature. The next section provides a short overview and critique of historical and contemporary HCT and contextualises its relevance within the biodiversity conservation sector.

The term “human capital” had its roots in the Economics discipline in the post-Second World War period, and its contemporary definition (in economics) was further developed by Becker (1964) in his seminal thesis entitled *Human capital*. Historically, human capital was used to explain post-war increases in productivity in the reconstruction of Western economies that could not be accounted for by the effects of the traditional forms of physical capital (land, equipment and money) and labour (Becker, 1964). Thus, human capital may be defined as any economic investment in the “ability and potential” and “knowledge” of a people from which an economic rate of return or profitability may be garnered. Becker’s thesis focused more specifically on the economic importance of education in terms of returns to the individual, to companies and to post-war American society. Thus, Becker (1964:153) refers to an investment of resources (money, time etc.) in

- formal education, which may be obtainable at a formal institution
- on-the-job training, which may be technical or specific to a company, or general to all companies
- migration.

While Becker largely focused on the economic effects of investment in education and training, investment in the health of individuals and a nation was also regarded as an investment in human capital, given the possibilities for increased rates of return from a healthier and therefore potentially more productive populace.

Fundamental to HCT was the economic “rate of return”, whether to the individual (through increased income and wages/salaries), the organisation or firm (increased productivity) or to society (social gains). The implication was that in the absence of a profitable rate of return on an investment in education and training, employers would not invest. This principle was illustrated in Becker’s (1964:24) analysis of the importance of prospective “turnover” of employees as a factor that employers consider in factoring in the types of training chosen for investment. He argued that

“specific” training (training that is only relevant to a particular organisation or context) may result in reduced employee turnover, as the individual’s skills and knowledge were not applicable to other employers and might stop employees from leaving. It was assumed that “specific” rather than “general” training might increase potential gains to the employing organisation, as the cost of the investment might be recovered since employees remained in the organisation. On the other hand, the economic value of an investment in general skills training may be reduced, as the individual was very mobile, since their skills were applicable to other contexts as well, thus increasing their potential turnover rate. This apparent interrelationship between investment in particular types of training and its impact on turnover is particularly appropriate in the biodiversity conservation sector, given the perception that skilled staff are scarce and more difficult to retain, largely due to their mobility.

The final element important to HCT was the notion that human capital is developed over time, that is, the life cycle of the individual. Thus, more contemporary versions of HCT focused on the acquisition of human capital over a lifetime, based on the theory of lifelong learning for the development of productive employees (Livingstone, 1997:9). However, the theory of lifelong learning did not originate in either the discipline of Economics or HCT, but was borrowed from theories of education.

Lin (1999:29) argues that the original meaning of capital did not only imply the capturing of surplus value by owners of capital, but also an “... investment (in the production and circulation of commodities) with expected returns in the market place”. This investment potential of the definition of capital, she argued, was the basis for the refinements of HCT, that is, capital as an investment in education with expected returns through earnings.

Over time, the notion of human capital and HCT has developed and has become associated with a range of disciplines within Economics, as well as in the human resources management context. In Economics, the notion of human capital is increasingly being associated with the shift of industrialised economies to becoming more knowledge-based and the rising dominance of information and communications technologies (ICT). Thus, increasingly, human capital, knowledge and skills embedded in a workforce or population, are being perceived to be the differentiating factor (or competitive advantage) and driver of growth among successful economies,

as was the case for financial capital in the past (Ederer, 2007:44). The most recent recession, however, driven by the collapse of financial capital and related institutions, raised questions as to the veracity of an apparent decline in the importance of financial capital relative to human capital. South African policymakers have adopted the term often in close association with the drive towards a more knowledge-based economy and with reference to the Science, Engineering and Technology (SET) fields. Prior to this, “human resources development” was the more popular term.

As noted before, human capital is often used in reference to human resource development; the theory is referred to extensively in human resource management practice (Nafukho, Hairston & Brooks, 2004). A particular variant focuses on a financial accounting approach to human capital.

### **Human capital in the HR management context**

The global human resource management (HRM) discipline is underpinned by economic, psychological and/or organisational theories on individual and organisational behaviours. Internationally, human capital management is most often underpinned by the HCT itself especially in terms of human capital accounting and the measurement of productivity. In South Africa, while there is very little academic literature available, human capital management in practice appears to involve the application of HR policies traditionally aimed at managing staff, but now re-engineered to fit within the language of human capital. Thus, the use of phrases such as talent management, succession planning” and so forth are all really traditional HR techniques aimed at improving recruitment, retention and the development of staff.

This is reminiscent of an approach to human capital management outlined by Clark (2008) that leveraged HR policies to increase revenue and profits per employee including, among other things:

- Career development plans
- Human asset profiles
- Performance management
- Selection
- Recruitment and hiring strategies

- Succession planning and plans for emerging management
- Coaching, training and mentoring plans
- Development of core organisational values
- Core competencies
- Performance improvements calculated on the basis of the revenue generated per employee, cost per employee and profit per employee

It is not clear whether South African companies, or indeed organisations in the biodiversity sector, currently leverage the abovementioned HR policies in a manner such that performance improvements (or financial returns on investment) are measurable in terms of cost, revenue and profits per employee, *a la* traditional HCT. This embrace of the form, and not necessarily the substance, of HCT is especially evident when the human capital accounting approach, as promoted in the international human capital literature, is considered.

### **The human capital accounting approach**

The accounting approach to HCT is a growing area of interest and Ederer (2007) cites the possibility of the development of human capital indices in OECD (Organisation for Economic Cooperation and Development) economies, that is, an index that ranks the financial returns on investment in human capital towards economic growth. It is a data-driven cost-benefit analysis where the cost of education and training (formal and informal) is calculated over the life cycle of the individual and adjusted for opportunity costs (e.g. earnings foregone while studying or in training) and depreciation costs (declines in human capital over time similar to that of physical capital such as machinery) (Ederer, 2007). For instance, in this accounting model, depreciation in human capital relates to

- forgetting knowledge and skills as individuals grow older
- obsolescence of knowledge and skills (possibly with technological changes)
- redundancy of knowledge and skills (Ederer, 2007:46).

Based on the financial accounting model, implementation of HCT may become extremely complex as, in common with physical assets, depreciation in value has to

be measured over time. It is an extremely sophisticated model, taxing even the most advanced HR practitioners in the developed world. On this basis alone, its applicability to a developing economy such as South Africa and the biodiversity sector in particular, is questionable, given the immense challenges in the quality and quantity of HR data sources as well as capacity among HR staff.

Further, human capital management has been applied most often in the private sector and for profit organisations, where investment in individuals is regarded as a key means to profitability. However, biodiversity conservation is an overwhelmingly not-for-profit sector, employing large numbers in the public sector, public research institutes and NGOs, and a relatively minute private sector. Thus, there are generic human resource management policies (such as succession planning, recruitment, training, talent management etc.) that may be used and reconfigured by any organisation in order to address the issues of development and retention of staff more effectively. However, whether these can be used in a manner that is geared towards greater profitability and productivity, accompanied by sophisticated accounting tools, in a predominantly public sector and NGO environment is questionable. The issue of relevance is expanded on in the next section.

### **Relevance of human capital theory**

The relevance of HCT has been questioned, mostly in the context of developed economies, as much less has been written on its application in developing economies. In developed economies it is often argued that the economic benefits accruing from educational investments are no longer as evident through improved average incomes, especially given higher levels of unemployment and under-employment despite increased levels of education and informal learning (Livingstone, 1997:9). However, in the East Asian Tigers, increased levels of education were often regarded as the key driver of economic growth in the 60s.

Despite a dramatic drop to 3.1% in real gross domestic product (GDP) owing to the global recession in 2008, until recently South Africa had improvements in growth from 3.7% to 5.1% in 2002 and 2007 respectively (The Presidency, 2009a:5). In contrast, after 12 years of increased investment in education, Treasury (2008:7) acknowledged that there had not been concomitant improvements in educational

outcomes. Table 1.2 shows that, since 2003/04, state expenditure on education in real terms (adjusted for the effects of inflation) remained at about 5% as a proportion of GDP, just below the OECD benchmark of 6% (Treasury, 2009a:9). Grade 12 mathematics passes (very relevant to the biodiversity conservation sector) as a proportion of all those who wrote mathematics declined over the period. The same declining trend applied to the number of Mathematics passes at a higher grade level, one of the entry requirements for Science degree studies (Table 1.3). Percentage improvements (Table 1.4) in the average, annual university endorsements (entry level requirement for degree studies) were reversed in 2006 (16.3%) to lower than those for 2002 (16.9%) (Treasury, 2009b).

**Table 1.2: Actual and estimated trends in expenditure on education (2003/04–2009/10) (rands)(%)**

	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
	Outcome			Preliminary outcome	Medium-term estimates		
R million							
<b>Education</b>	<b>70764</b>	<b>76269</b>	<b>84432</b>	<b>94979</b>	<b>104672</b>	<b>117177</b>	<b>129170</b>
of which							
Higher education	8953	9911	10647	11938	13331	14921	16684
Primary and secondary school education	50627	54474	60387	66305	73518	81502	89452
Further education and training (FET)	1282	1472	1717	2196	2659	2981	3006
Adult basic education and training (ABET)	537	536	716	718	908	993	1067
Early childhood development (ECD)	377	446	448	546	983	1201	1253
<b>Percentage share of total education</b>							
Higher education	12.7%	13.0%	12.6%	12.6%	12.7%	12.7%	12.9%
Primary and secondary school education	71.5%	71.4%	71.5%	69.8%	70.2%	69.6%	69.3%
Further education and training (FET)	1.8%	1.9%	2.0%	2.3%	2.5%	2.5%	2.3%
Adult basic education and training (ABET)	0.8%	0.7%	0.8%	0.8%	0.9%	0.8%	0.8%
Early childhood and development (ECD)	0.5%	0.6%	0.5%	0.6%	0.9%	1.0%	1.0%
<b>GDP (R billion)</b>	<b>1289.0</b>	<b>1430.7</b>	<b>1580.1</b>	<b>1755.3</b>	<b>1938.9</b>	<b>2141.7</b>	<b>2379.3</b>
Education total as % of GDP	5.5%	5.3%	5.3%	5.4%	5.4%	5.5%	5.4%

Source: Treasury, 2008:9

**Table 1.3: Trends in the number of mathematics passes by province (2004–2006)**

	2004			2005			2006		
	Learners who wrote mathematics exams	% who passed mathematics	Learners passing HG	Learners who wrote mathematics exams	% who passed mathematics	Learners passing HG	Learners who wrote mathematics exams	% who passed mathematics	Learners passing HG
Eastern Cape	39958	53.6%	1535	44387	55.1%	1765	45146	53.9%	1957
Free State	12206	72.8%	1355	12895	72.9%	1440	15393	67.1%	1499
Gauteng	44821	65.9%	6604	49555	66.1%	7377	48257	63.4%	6894
KwaZulu-Natal	74932	52.6%	5356	81405	50.7%	5365	84926	46.3%	4726
Limpopo	39228	45.1%	2046	46944	42.0%	2802	53908	37.1%	2653
Mpumalanga	19334	51.0%	1283	20818	50.6%	1456	21391	51.1%	1392
Northern Cape	2767	80.6%	382	3363	70.8%	413	3345	71.0%	416
North West	20822	50.9%	1314	21319	51.8%	1444	22070	50.3%	1543
Western Cape	22026	77.8%	4268	22466	77.5%	4321	23206	72.6%	4137
<b>Total</b>	<b>276094</b>	<b>56.8%</b>	<b>24143</b>	<b>303152</b>	<b>55.7%</b>	<b>26383</b>	<b>317642</b>	<b>52.2%</b>	<b>25217</b>

Source: Treasury, 2008:28

**Table 1.4: Trends in the average annual university endorsements (matric exemptions) by province (2004–2006)**

	2002	2003	2004	2005	2006
Eastern Cape	8.1%	9.5%	8.8%	8.8%	10.1%
Free State	18.8%	22.8%	22.2%	21.9%	19.7%
Gauteng	21.7%	23.3%	22.1%	21.1%	23.2%
KwaZulu-Natal	18.1%	20.5%	18.9%	17.4%	15.2%
Limpopo	17.5%	18.9%	20.9%	17.7%	13.3%
Mpumalanga	10.8%	12.4%	12.5%	12.7%	14.0%
Northern Cape	18.3%	19.6%	18.7%	15.3%	15.5%
North West	14.5%	15.3%	12.4%	12.1%	14.6%
Western Cape	26.5%	26.6%	27.1%	26.9%	26.6%
<b>National average</b>	<b>16.9%</b>	<b>18.6%</b>	<b>18.2%</b>	<b>17.0%</b>	<b>16.3%</b>

Source: Treasury, 2008: 27

Another possible indicator of the relevance of HCT includes the incidence of individual and economic returns on higher education, constituting the second largest proportion of education expenditure (see Table 1.2). Pauw, Oosthuizen and van der Westhuizen (2006:8) found that between 1995 and 2005 the actual unemployment rate among those with a tertiary qualification (post-school qualification) increased from 6.6 to 9.7%, the largest single increase compared to those with lower levels of education. While most of the tertiary unemployed were those with a diploma or a certificate, it showed that even those with tertiary qualifications were not immune from the structural nature of unemployment. At the same time, individual returns on education, or earnings, still remained the highest for those with a degree. However, if improvements in the individual returns on education only accrued at degree level, the

question arises as to the utility of the massive investment in primary and secondary education (71.5% of total education expenditures in 2005/06, see Table 1.2) in driving economic growth in South Africa. In fact, Van Zyl and Bonga-Bonga (2007), on the basis of econometric modelling, argue that increased state expenditure on education does not result in increased technological changes and higher economic growth rates as often posited. While this study focused only on government expenditure (excluding private sector expenditure on skills development for instance), the authors argue that the low pass rates among Grade 12 learners with Mathematics and the misallocation of education resources are underpinning the mismatch between education investment and economic outcomes. In conclusion, these results show that improvements in economic outcomes may not be attributed to improvements in educational outcomes, contrary to the predictions of HCT.

A further critique of HCT is that it assumes that labour markets operate perfectly where employees and employers make rational economic decisions based on sufficient information about skills and qualifications required, and employers can predict the productivity of new recruits (Dobbs, Sun, & Roberts, 2008:791–792). However, in South Africa, students often make subject and career choices at university level, based on little or even no information as shown in the fieldwork. Nor are employers able to predict with certainty that employment of candidates with particular qualifications will result in future productivity. This latter factor is illustrated by the role of non-economic factors, including discrimination, in graduate employment patterns in South Africa. Thus, Moleke (2005) found that among Natural Science graduates, Africans had a lower employment rate (45.9%) immediately after graduation compared to that of whites who had the highest (59.9%) and coloureds (52.5%). While this is a rather outdated study (graduations between 1990 and 1998 and in the absence of more recent statistics), it remains indicative of the impact of race. The same study showed that even in the humanities and the arts, a study field traditionally dominated by Africans, they continue to have a lower employment rate (38.7%) compared to that of whites (56.4%). Pauw *et al* (2006:18) argue that employers often tended to employ graduates with qualifications from historically white universities rather than those from historically black universities, the implication being that the choice of university was a proxy for the quality of a qualification.

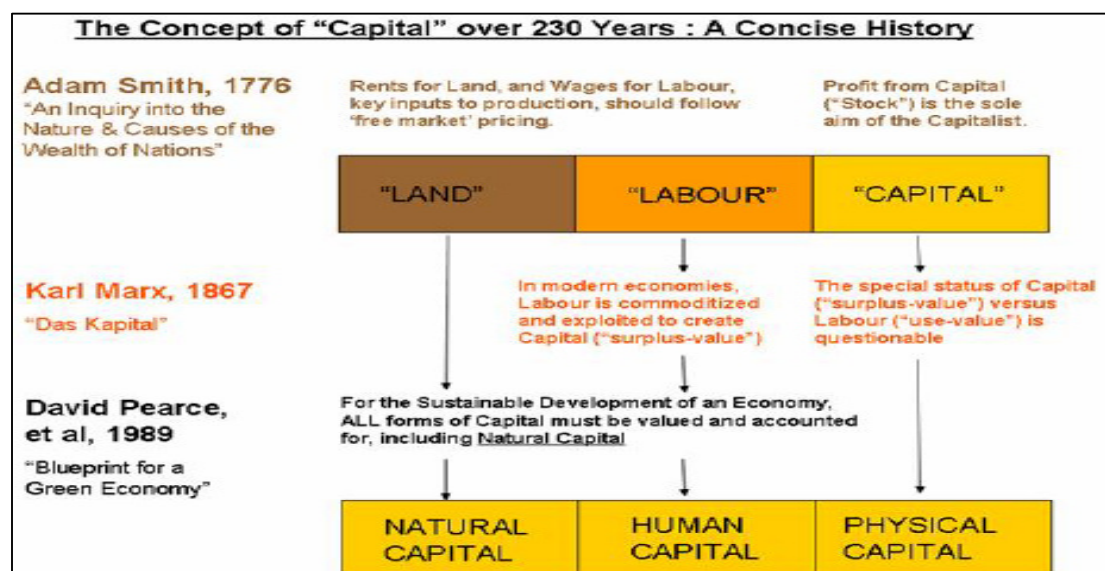


Thus, contrary to the predictions of HCT and declines in the quantity (and some would argue the quality) of key educational indicators, there were improvements in average annual economic growth between 2002 to 2007 prior to the start of the recession at the end of 2008, and which continued into 2009. Further, labour markets, especially at the tertiary level, are often influenced by factors other than economic information, reducing the capacity of potential employees and employers to make rational decisions about investments in education and employment. Finally, there is a consideration of the normative meanings attached to the term “capital”.

### **The normative meaning of capital as in “human” and “natural” capital**

The term “human capital” is imbued with normative meanings and cannot be regarded as value-free, especially given the origins of its root, that is, “capital”. Capital underpins the system of capitalism and with it comes normative values, flowing from the phenomenon of commoditisation and the profit-making motive. Thus, the original meaning of “capital” in capitalist economies largely meant the extraction of “surplus value” or profit (the basis for wealth) from the exploitation or utilisation of the means of production, which included land (and/or other natural resources including biodiversity), machinery, technology, labour and finance, among others. Thus, all means of production were regarded as commodities, that is, they could be bought and sold on a market for profit.

The historical interpretation of capital (as a means to extract profit) has gradually shifted to apply to other branches of Economics as well as other academic disciplines. For instance, in arguing their case for an economic or a systematic valuation of “nature”, the authors in Figure 1.1 attempt to illustrate the evolution in the conceptual understanding of capital (Sukhdev, 2008). Thus, it referred to the evolution of capital as interpreted by Adam Smith (the “father of modern capitalism”) in the late 18<sup>th</sup> century; the interpretation by Karl Marx, the 19<sup>th</sup> century’s fiercest critic of modern capitalism, who brought in the notion of the commoditisation of labour in order to extract “surplus value” or profit; to the contemporary usage of capital by those, who in the name of sustainable development, argue that natural (biodiversity heritage, including land) capital and human (human resources and capacity) capital can be equated to the traditional forms of physical capital (land, money, machinery).



**Figure 1.1: The concept of “capital” over 230 years**

Source: Sukhdev, 2008

This argument for natural capital was framed within the context of illustrating the importance and relevance of sustainable economic development in terms of its economic value and contribution, terms assumed to be better understood by the broader society, political and economic leadership. The valuation of ecosystem services as a tool for communicating the importance of biodiversity conservation to policymakers is an opinion also held in South Africa (DEAT, 2006; De Wit & Blignaut, 2006). The latter study (De Wit & Blignaut, 2006:5) took a rather cautionary approach in that it acknowledged the “reductionist” nature of economic valuation techniques owing to the fact that the latter cannot fully capture the societal value of ecosystem goods and services. It argues that, instead of focusing on a “highest returns” interpretation, an ecosystem approach, as in measuring the impact of environmental changes on people, be adopted in managing environmental–development tradeoffs with policymakers (De Wit & Blignaut, 2006:13). However, economic valuation is one tool in an array of tools towards sustainable development. In fact, there are protective mechanisms and tools flowing from an improved legislative framework that, if enforced appropriately through well-trained and knowledgeable professionals and managers, may provide an alternative and more attainable means to argue for and implement the sustainable development of biodiversity among communities and policymakers.

The danger of the commoditisation or commercialisation of either human or natural resources continues to be a factor in the development–environment tradeoff in a context of increased income poverty, growing income inequalities (The Presidency, 2009) and the impact of the recession. The term “capital” (whether attached to human or natural) is not value-free and has particular philosophical underpinnings in terms of a worldview of the free market, the role of the state and the private sector in modern and globalised capitalist economies.

A further aspect to consider relates to the structure of the biodiversity conservation sector, and the nature of the goods and services it provides to society. The sector is located largely in the public or government sector, including all the national and provincial government departments, the state-based parks boards, conservation parks, state research entities, botanical gardens, NGOs and nonprofit organisations (NPOs), and state-funded higher education departments. It has a small private sector, consisting largely of consultant agencies in the environmental impact assessment sector and privately owned wildlife reserves. Further, the sector provides goods and services that are mostly of a public good nature. Accordingly, the consumption of biodiversity goods and services by one individual should not deprive consumption by another. Thus, in the production of goods and services the larger proportion of the sector is not driven by the principles of profitability or pure economic or commercial returns on any investment in the development and preservation of both natural and human resources.

In conclusion, this section argued that the adoption of the term “human capital” especially in the context of the sustainable development of natural resources or natural capital is not without complexity. The term “capital” in its complex form, and as applied to either natural or human capital, has normative value, as it concerns commoditisation and the profit-making motive under capitalism. While it is true that the term has been used very loosely in South African parlance, in the Economics discipline it is not always clear whether it has sufficient relevance, given the poor relationship between the outcomes of the SA educational and training system and the economic returns for companies and individuals. Adopting techniques to establish the economic value of natural resources in order to argue for their importance vis-à-vis other economic priorities and long-term sustainable social and economic

development does not imply the untrammelled exploitation of natural resources; it does, however, imply that economic valuation techniques be used very judiciously, as a means of justifying sustainable development, but not the ultimate representation of natural resources.

In addition, this section also argued that the usage of the term “human capital” is mostly in terms of form rather than the substance of HCT. While there are useful aspects to HCT, its substantive relevance to the South African context is questionable, given the disconnect between education and economic growth, the lack of capacity to measure productivity gains (through HR at an organisational level) and the highly controversial normative meanings for both natural and human capital. HCT in its totality may not be applicable to the current SA organisational context, or the biodiversity sector in particular. Instead, terms such as “human capacity” or even “human resource development” are less controversial in their normative meanings, and may equally well refer to a long-term approach in the development of knowledge, skills and expertise among the existing and future professional and managerial workforce in the biodiversity conservation sector.

## **THE MACROENVIRONMENT**

Fifteen years into democracy and South Africa’s biodiversity is declining at an alarming rate while the UN Convention on Biological Diversity (CBD) targets for the country are not being met at the required rate (DEAT, 2006a). Despite some progress, much of the biodiversity losses continue despite an enabling legislative and policy environment, more positive regard for biodiversity issues and a growing economy in the post-2004 period. In light of the current economic downturn and its adverse effect on meeting developmental goals, the potential exists that the space within which to build closer alignment between policy intent and policy outcomes, that is, to stem and even reverse biodiversity degradation while contributing to socioeconomic development, may be shrinking.

In this section, the implications of strategic macro-policy frameworks are considered in terms of the space they provide for accommodating the leading principle of biodiversity conservation – keeping the balance between development *and* biodiversity conservation, rather than placing development *versus* biodiversity

conservation (Raven et al., 2008). The proposed HCDS will have to be dynamic as it will be formulated and implemented in the face of continual changes and imperatives arising from the macroenvironment.

## **Strategic policy frameworks in the macroenvironment**

There are a number of strategic policy and legislative frameworks that will continue to influence the HCDS over its lifespan, given changes and refinements over time. This section considers frameworks preceding the April 2009 elections as well as proposed changes such as the proposed Vision 2025 contained in the recently released Green Paper on National Strategic Planning (The Presidency, 2009c).

The **Medium-term Strategic Framework (MTSF)** is a five-yearly guide that coordinates planning and resource allocation across national, provincial and local government. Based on the newly released Green Paper: Strategic Planning (The Presidency, 2009c:4), the revamped MTSF will provide detailed outcomes and targets based on which implementing agencies will be evaluated. The MTSF will be reviewed on an annual basis factoring in ongoing changes in the global and national environments (The Presidency, 2009b).

The government **Programme of Action** is an annual plan based on the MTSF from 2009 onwards (The Presidency, 2009c:4).

The **Accelerated and Shared Growth Initiative for South Africa (ASGISA)** is the macroeconomic framework for the country, including specific goals for economic growth.

The **National Industrial Policy Framework (NIPF)** provides strategic direction on industrial development based on the macroeconomic goals contained in ASGISA. It is reviewed every three years based on the Medium-term Expenditure Framework (MTEF).

The **Industrial Policy Action Plan (IPAP)** contains the implementation plan for industrial development.

The **Emerging Anti-Poverty Strategy** is a more recent approach to coordinate efforts to reduce the impact of intergenerational poverty.

The **Technology and Innovation Strategy** provides an approach to the development of a knowledge economy based on technology and innovation.

The renewed focus on the **National Rural Development Strategy** has to be considered given the role of protected areas in the generation of socioeconomic benefits and rural livelihoods.

Among all of these, if the recommendations of the Green Paper on Strategic Planning were accepted, after public consultation, the key planning framework will be the MTSF, as it sets out a hierarchy of priorities, shaping all other policy frameworks, under the auspices of the Presidency: Planning, a strategic institution in the future. It is also the framework within which tradeoffs may be negotiated, and thus presents both risks and opportunities for the HCDS and biodiversity in general within its five-year term. More detailed consideration of the MTSF, NIPF and NIP follows later.

The strategic frameworks on education and training include:

- The National Skills Development Strategy (NSDS), 2005–2010, including the National Scarce Skills List
- The Basic Education Strategic Plans (ECD, Schooling, ABET)
- The Further Education and Training (FET) Strategic Framework
- The Higher Education (HE) Strategic Framework
- The National Curriculum Statements
- The HRD Strategy for the Public Sector

This chapter does not provide an exhaustive analysis of the key implications of each of the educational frameworks, but includes overviews of selected and strategic issues and dynamics that are important for consideration. Other chapters may refer in slightly more detail to these frameworks. Given the recent changes in the educational landscape, including the new Department of Basic Education and the Department of Higher Education (DoHET), policy changes are likely to occur. Recent announcements on the suspension of aspects of outcomes-based education attests to this fluid situation. Over the life of the HCDS, a closer analysis of specific and updated frameworks may be required, especially with regard to joining up with

strategic interventions and the curricular and quality assurance implications of proposed HCDS interventions.

### **Guiding principles for interaction with the macroenvironment**

In considering the macroenvironment, the underlying mandate guiding the biodiversity conservation sector is to maintain the balance between development and biodiversity in a transformative manner. Thus, the National Biodiversity Strategy and Action Plan (NBSAP) (DEAT, 2005) defines its overall goal as the conservation and management of South Africa's biodiversity (on land and in water) to ensure sustainable and equitable benefits for the South African population in the short and long term. This transformative approach may manifest itself in three ways, as summarised in internal sector discussions on capacity development (Raven, 2008).

Firstly, the workforce in biodiversity conservation institutions has to become more diverse and representative of the SA population. Secondly, the culture of biodiversity conservation should shift from being exclusionary and sanction-based, that is, from "fences and fines" to being inclusive of the whole population, integrated and people-centred. Thirdly, in order to develop a common vision of biodiversity conservation, collaboration and inter-institutional relationships should be encouraged. It is this transformative vision that should be kept upfront when considering the diverse challenges and tradeoffs presented by the macroenvironment. One of the first impacts to consider is the slowdown in the local and global economies.

### **Implications of the slowdown in macroeconomic growth**

The economy entered a recession in the first quarter of 2009 for the first time in the last 17 years. Under the macroeconomic policies of GEAR and later ASGISA, South Africa's real GDP grew slowly at an average of 3% per annum between 1994 and 2003 (The Presidency, 2009b:10). Prior to the economic downturn the economy was much improved, growing steadily at an average annual rate of 5% for 2004 to 2007 and was projected to stay at this rate between 2009 and 2014. At the same time, GDP per capita grew from 1% to 4% for the respective periods as a result of certain gains (albeit limited) in employment. These economic gains were in line with addressing social and development challenges, including targets of halving poverty and unemployment by 2014, based on the Millennium Development Goals (MDGs).



However, the Presidency is now anticipating a reversal in growth and employment fortunes, as the average annual GDP for 2009 to 2014 is now projected to be much lower (The Presidency, 2009b:4). Growth in 2009 is expected to be disappointingly low at 1.2% (Treasury, 2009a:6) and 500 000 jobs were lost in the first six months of the year.

While there is talk of local “green shoots”, a quick reversal of national growth to pre-recessionary rates does not look likely in the short term. The risk for the HCDS is that public-sector funding budgets will be reduced, as the expansion in state expenditure slows down. Less money may be available for implementation of the HCDS, as government departments reprioritise expenditure. NGOs in the biodiversity sector may also experience further cuts to grant, government and other funding. The shrinking fiscal context implies that the “political” space to make tradeoffs for the sector will also begin to shrink with regard to the prioritisation of economic, social and developmental priorities. Therefore, the period represents a major challenge for the biodiversity conservation sector. The implications of the MTSF, government’s five-yearly strategic plan, are discussed in slightly more detail in the next section.

### **The Medium-Term Strategic Framework (MTSF)**

The MTSF, 2009 to 2014 has ten strategic priorities, including sustainable resource management use, which is low down the list at number 9 (Ibid: 7-8). While this position is not necessarily an indicator of relative importance, the potential for downgrading is clearly to be anticipated. This is largely due to the fact that, while acknowledging the importance of each strategic priority, the MTSF anticipates that “... sacrifice[s] may be required ... especially in the initial phase [of the MTSF] which demands more defensive interventions”. Thus, there is the potential that the gap between policy intent and policy outcomes on environmental sustainability and natural resource management use may continue to grow under the current MTSF. More positively, though, is an upfront commitment by government to an “investment in quality education for all young people and in skills development” as the “bedrock of the government’s approach” (Ibid:9). This represents a clear window of opportunity for the biodiversity sector to foreground its proposed HCDS as part of the national education and skills agenda, as a strategic means of increasing the space for tradeoffs between development AND biodiversity conservation in a more sustainable



manner. For the HCDS this means that the way that the sector strategy is framed and presented should illustrate very clearly the tangible benefits of the HCDS for the national agenda. The following section provides a more detailed analysis of key aspects of the MTSF and some implications for the sector.

### **The Public Infrastructure Investment Programme (PIIP)**

The most immediate focus of the MTSF is to contain the adverse effects of the recession on growth and poverty reduction, and to fast track new areas of economic growth (Ibid:7). Thus, the first strategic priority is to stimulate economic growth for decent employment and livelihoods by increased investment and expanding the industrial base (The Presidency, 2009b:10). The reversal of the adverse effects of the economic recession is anticipated to be kick-started by government expenditure on the massive social, logistical and economic infrastructure investment programme (R787 billion) for the three-year MTEF period, 2009 to 2012, for investment in infrastructure and training (The Presidency, 2009b: 5). The MTSF anticipates the development of an “integrated [social and economic] infrastructure” programme (including logistics, public transport, water, electricity, ICT, housing and rural physical infrastructure) in the 12 months from July 2009 (Ibid, 16). The potentially harmful effects of the infrastructural programme on ecosystems are mitigated by the commitment under the MTSF to undertake such expansion while “considering environmental sustainability” and “pursuing maximum employment impact” (Ibid, 16). Therefore, the challenge is to propose a short-term programme of skills development to top up and enhance monitoring capacity, as well as capacity to conduct environmental impact assessments.

In the long run, the MTSF looks towards the full-scale implementation of the IPAP, focusing on increased industrialisation, “... advanced manufacturing”, “cleaner low-energy technologies and green jobs” (The Presidency, 2009b:11–12). In his speech presenting the key features of the MTSF (The Presidency, 2009b:38), the Minister in the Presidency for Planning emphasised government’s commitment to encouraging sustainable resource management use through the following programmes:

- Diversification of energy sources including renewable energy alternatives and energy efficiency

- Enforcing a zero-tolerance approach to illegal and unsustainable exploitation of natural resources
- Support of local and sustainable food production
- Promotion of sustainable water use

More specific interventions to combat biodiversity losses and environmental protection include the finalisation of the development of market-based instruments, including taxes, charges and incentives. With regard to the creation of “green jobs”, the MTSF looks to labour-intensive natural resource management practices in marine aqua culture, wildlife management, waste services and ecosystems rehabilitation (The Presidency, 2009b:39). All of these efforts have inherent risks and opportunities.

The key risk is that the technical and knowledge capacity to develop green technologies, labour-intensive production techniques and market-based instruments are non-existent or scarce and/or the financial costs of the development thereof may be prohibitive in the short run, marginalising it on the government agenda. The main opportunity is the commitment to a sustainable approach in combination with other environmental subsectors to jointly consider approaches to technology and knowledge development. A determination of the types of capacity and skills required will be essential, including policy, research, technological and implementation capacity within the biodiversity conservation sector. A biodiversity research policy will be key to scanning local and international best practice on technologies, techniques and partnerships for knowledge and innovation transfers with relevant countries.

A key factor to keep in mind is that, during a period of recovery and economic growth (post-1994), biodiversity losses continued. Progress was made, especially in the legislative and policy framework, but the following losses were recorded:

- Land-based protected area at 6.5% was still only half way to its 20-year target of 12%.
- The “no-take” marine protected areas were at 9%, well below its 15% target.
- Ten species of line fish have “collapsed”.

- Illegal poaching or threatened plant (cycads), marine (abalone) and animal (rhino) species continued.
- Pressure on water supply and freshwater systems continued due to high mean annual runoff caused by invasive alien species (DEAT, 2009:x).

Finally, ecosystem services are currently valued at about R73 billion per annum (citing Turpie *et al*, 2008 in DEAT, 2009:xi), excluding marine services, constituting about 7% of the annual GDP. However, the same report found that the “under-appreciation” of the economic and social importance of biodiversity conservation by both the policy makers and the private sector was a key obstacle. Thus, under adverse economic conditions the balance between sustainable *vis-à-vis* the exploitative use of biodiversity resources may become even more precarious.

## **Vision 2025 and biodiversity**

The key opportunity lies in Vision 2025, a national plan envisaged by the Presidency and important over the life of the proposed HCDS. It is proposed to run for 15 years from 2010 and sets out the development path for the country, that is, “where South Africa wants to be as a society in 2025”. This plan envisages a national strategic planning process to integrate and build policy articulation among the various departments, sectors and government (The Presidency, 2009c:14).

The following issues in the current planning system have been identified:

- The need to set an “end-state” or ideal objective linked to mechanisms for tracking progress
- The need to guard against voluntarism and short-termism
- The need to build in articulation between the plans and strategies of the various partners through a national strategic plan (The Presidency, 2009c: 14)
- The need to deal effectively with problems in intergovernmental coordination as a priority
- The need to create an agency to drive the planning, monitoring and evaluation and institutional improvements (the proposed National Planning Commission [NPC])

- The need to develop a mechanism to make the “hard choices” and weigh up options given fiscal constraints and contested policies (ibid: 15)

All of these are important for the biodiversity conservation sector to improve planning capacity in the system. If implemented this implies a more proactive approach to dealing with contestations about the conservation implications of industrialisation and so forth. The Green Paper envisages the development of the following:

- The National Plan, Vision 2025, the 15-year development path
- The MTSF (5-year plan) and the government plan of action (1-year plan)
- Policy research on national planning issues that are “key drivers of the nation’s development trajectory” that have macrosocial implications and are important for long-term planning (Ibid:19)
- Monitoring trends, coordinate and provide leadership in the following national planning issues (Ibid:20):
  - Long-term macrosocial and demographic trends
  - Long-term availability of water
  - Energy consumption and production
  - Conservation, biodiversity and climate change mitigation and adaptation
  - Local economic development and spatial settlement trends
  - Food security and sustainable rural development
  - Innovation, technology and equitable economic growth
  - Public transport: medium and long-term choices
  - Poverty, inequality and the challenge of social cohesion
  - National health profile and developmental healthcare strategies
  - Defence industry and long-term defence capabilities
  - Regional, continental and global dynamics and their long-term implications

- Industrial development trends and the changing structure of the economy
- Capability and performance of the public service
- Advancing human resources for national development

The biodiversity sector research policy will guide responses in terms of research content. If endorsed, Vision 2025 may provide more opportunity for policy articulation, both in policy development and policy implementation. At this point, engagement of the proposals in the Green Paper, and eventually the White paper, will be essential. It is also proposed that spatial planning be centralised under the NPC. This will have implications for biodiversity in terms of spatial expansion of protected areas and will also require input from the sector on how national spatial guidelines should guide private sector investment and public sector social spending and infrastructure planning and so forth. The next section provides an overview of the challenges emanating from the industrial policy framework under the NIPF and the IPAP.

## **Industrial policy and biodiversity**

Recently, through the NIPF and implemented through the IPAP, South Africa has made a more concerted effort to develop a coordinated industrial policy to drive economic growth in a coordinated and comprehensive manner. In light of the potentially adverse effect of industrial activity on biodiversity, it is important to consider the extent to which the conservation and biodiversity mandate is considered at all. A key objective of the new industrial trajectory is to diversify the economy further towards labour-absorbing industries (given high levels of unemployment and low skill levels of population) that will foster employment creation and new enterprises. Also, industrialisation is aimed at diversification into value-adding activities to compete against imports, increase exports and to build a knowledge economy beyond 2014 (DTI, 2007a). An analysis of the NIPF (DTI, 2007b) shows that in its efforts towards the “intensification of industrialisation”, no reference is made to sustainable resource management use, or the potential impact on biodiversity conservation.

Unlike the MTSF, which has a fairly nuanced take on the connection between sustainable natural resource management use and industrialisation, the NIPF does not factor in the environmental implications of deepening industrialisation, except insofar as it promotes its commercial use. It should be noted that the NIPF and IPAP were developed in 2007, whereas the MTSF was developed just recently. Given the strategic and overarching importance of the MTSF, it is to be anticipated that all other major policy frameworks will take their lead from the spirit and the priorities of the MTSF. Similarly, if the Green Paper on National Strategic Planning is accepted, policy articulation among the biodiversity strategic plans, NIPF, IPAP and NIP, will have to be more overt than has been the case thus far. This does illustrate the disjointed nature of government strategic planning; an area the Green Paper seeks to correct with greater articulation and tradeoffs.

A rather superficial illustration of this oversight is that in its consideration of intra-government coordination in implementing the NIPF priorities, the former DEAT, the reporting department for the biodiversity sector, is listed last on the list of participating institutions (DTI, 2007b:13). Despite a growing awareness of the so-called “green economy” and sustainable resource management principles, there are no such reflections in the NIPF. Any reference to biodiversity has been captured in a single paragraph on growth and employment opportunities for the industrial economy.

South Africa has a wide range of natural resources that can form the basis of a more labour intensive and value-adding industrial trajectory. This includes major deposits of a wide range of minerals, the continued ability to produce relatively cheap electricity [see coal mining], a wide range of agricultural possibilities, large landmass, and its inherent biodiversity (DTI, 2007b:27).

How the above may represent value-added potential based on a consideration of “the actual or potential cost advantages, existing capabilities and removal of market failures” is explored. Whether intended or not, these stated intentions put the biodiversity conservation sector on guard in terms of its response to the policy intent of “an intensification of industrialisation”. Despite efforts to move towards a more knowledge-based economy, natural resources remain the basis for the comparative advantage of the South African economy. On the one hand, the sector has been appointed as the guardian of natural heritage, and on the other hand it may be

regarded as the gatekeepers to development. If the sector's role is to be confined to being a regulatory body for the implementation of sanctions, it will not be regarded as a key player in the development-industrialisation process. The relegation of the sector may not have been intended, but what it shows is the real challenge involved in placing conservation in the middle of industrialisation. The sector has to decide whether the apparent disjuncture between the MTSF and the NIPF reflects an incoherent policy position, or whether there is policy catch-up in the offing by the DTI. The extent to which the NIPF represents a greater challenge to the biodiversity sector has to be determined (if it has not already been done) in terms of the nature and size of it.

This is particularly important given the fact that manmade industrialisation (anthropogenic measures) has had the most impact on biodiversity degradation than any other factors. The ASGI-SA programme has identified a number of priority economic sectors marketed for investment opportunities (DTI, 2007b):

The agro-processing sector is promoted as being key to adding value to agricultural commodities, including

- fisheries, freshwater aquaculture and mariculture
- meat processing – of indigenous and exotic meats (crocodile, venison)
- indigenous teas and herbs
- other sectors that may have an impact on the biodiversity sector and which featured strongly in the NIPF include:
  - chemical and allied industries
  - mining and metal-based industries
  - advanced manufacturing for, for example, the titanium industry development programme
  - fluoro-chemicals' effects on effluence in water
  - rail – specifically infrastructure development of tracks and the like

- tourism and related ecotourism and trans-frontier conservation areas that have been specifically identified among the normal tourism activities.

With regard to energy generation, Eskom is the fifth largest electricity utility in the world (OECD, 2008:33), and the Build programme represents a major shift from maintenance to new generation. This major increase in generation, to catch up on nearly 10 years during which there was a lack of generation, has major implications in terms of impact on biodiversity conservation, since 90% of South Africa's electricity is derived from coal mining. The intention is to raise the system's capacity by 45% by 2015 compared to 2008, that is, by about 14 000 megawatts (OECD, 2008:98).

The biodiversity conservation sector has developed capacity in terms of dealing with the impact of mining and nuclear power, but the increased rollout inherent in the BUILD programme will require research input that models the projected impact in terms of geographical spread (and spatial impact), water usage, wastage and so forth. The implications of these interventions, especially insofar as they impact on the monitoring and environmental impact assessment capacity in the sector, need to be factored into the proposed HCDS. The next section provides a short overview of the mandate arising from the Innovation Plan and the R&D strategies, both of which are geared towards value-added industrialisation in the development of a more knowledge-based economy.

## **The National Innovation Plan and R&D strategy**

Department of Science and Technology (DST) strategies for innovation, R&D and education (basic and higher education) involve both risks and opportunities. Both the National Research and Development strategy (R&D) and the Ten-Year National Innovation Plan (NIP) emphasise the importance of the biodiversity heritage as a foundation for improved scientific and commercial research, development and innovation (DST, 2002:52; DST, 2007).

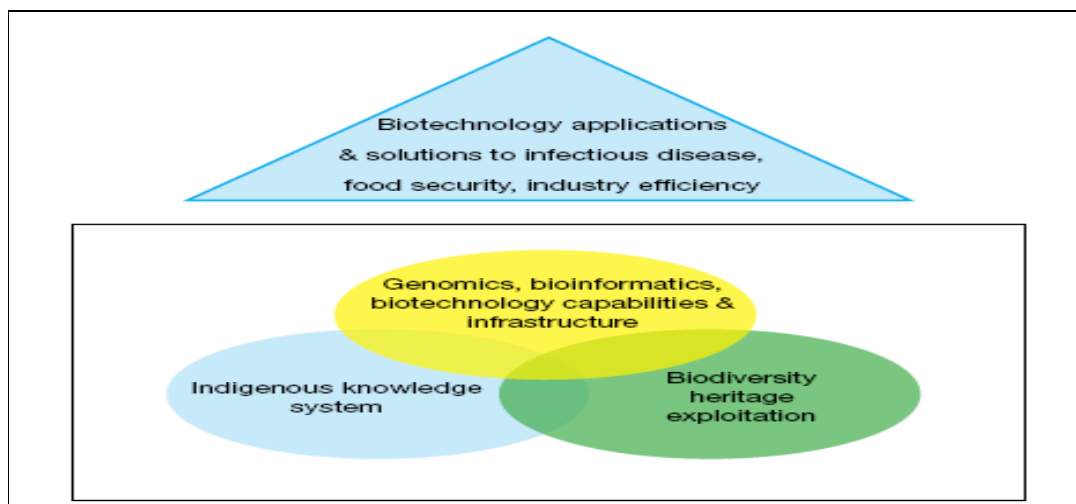
The NIP outlines five Grand Challenges all of which have implications for the biodiversity–development tradeoff in terms of the impact of commercialisation as well as research opportunities. The challenges include

- space science and technology



- farmer to pharma, including indigenous pharmaceuticals, biotechnology and bio-prospecting (four agreements thus far)
- energy security, including alternative energy technologies, Eskom's BUILD programme and the implications of increased coal-mining activity
- global change, including the impact of climate change on ecosystems
- human and social dynamics.

All of the Grand Challenges are important for the biodiversity conservation sector with regard to long-term research collaborations to develop alternative energy production technologies, indigenous pharmaceuticals and so forth. DST is on a quest to develop South Africa as one of the top three emerging economies in the global pharmaceutical industry. Figure 1.2 illustrates how the NIP interprets the exploitation of biodiversity, indigenous knowledge systems (IKS), bio-informatics and genomics for the application of biotechnology in the health sector (DST, 2007:4).



**Figure 1.2: Interface between biodiversity heritage, IKS and genomics**

Source: DST, 2007:11

The commercialisation of biodiversity species, including the conclusion of four bio-prospecting agreements, is aimed at investigating the commercial potential and value of plant species (DACST, 2000:18). Two areas of advanced commercialisation include hunting and commercial fishing. The Foresight Biodiversity report indicates

that there is much less understanding of subsistence fishing (DACST, 2000: 19). All of these areas represent opportunities for the development of the so-called “green economy” including research collaboration on the development of sustainable production techniques, guidelines for sustainable use and monitoring and enforcement. Bio-prospecting is clearly key to the HCDS and an assessment of existing capacity and future research, policy development, production techniques, legal knowledge are important to determine.

The R&D plan identifies biodiversity (and the diverse Cape Floral Kingdom) as a key geographical advantage for the development of a scientific focus area in South Africa. The DST is developing a National Science and Technology Expenditure plan (DST, 2009a) which will shape state investment in science and technology (S&T). Its R&D budget is close to 1% of GDP and it intends increasing it: the extent to which funding for the HCDS could be drawn from this plan needs to be investigated.

A DST cooperation initiative may manifest itself at several levels. On the one hand, the innovation programmes on IKS, indigenous pharmaceuticals and bio-technology may have potentially harmful effects on biodiversity. Biodiversity impact assessments need to be conducted as part of cooperative work with the relevant sections of the DST in this regard. Secondly, DST has allocated R150 million for the next three years to a South African Research Chairs Initiative. The HCDS should assess how research chairs could promote the development of transdisciplinary research on new and emerging research areas such as ecological-economic modelling for instance. Thirdly, DST is a strategic partner in collaborative work in basic and higher education. The DST bursary and internship programmes to support young graduates to gain work experience and postgraduate qualifications, especially the doctoral programme, are well-known. These are all strategic initiatives that could be supported by the biodiversity conservation sector by negotiating for a biodiversity component, or to extend some of these initiatives by replicating them in the biodiversity sector.

Chapter 3 looks at the Youth into Science Strategy (YiSS) programme focused on increasing the number of mathematics and science learners and teacher support, and considers the strategic value of partnering with the DST or running similar student support programmes independently.

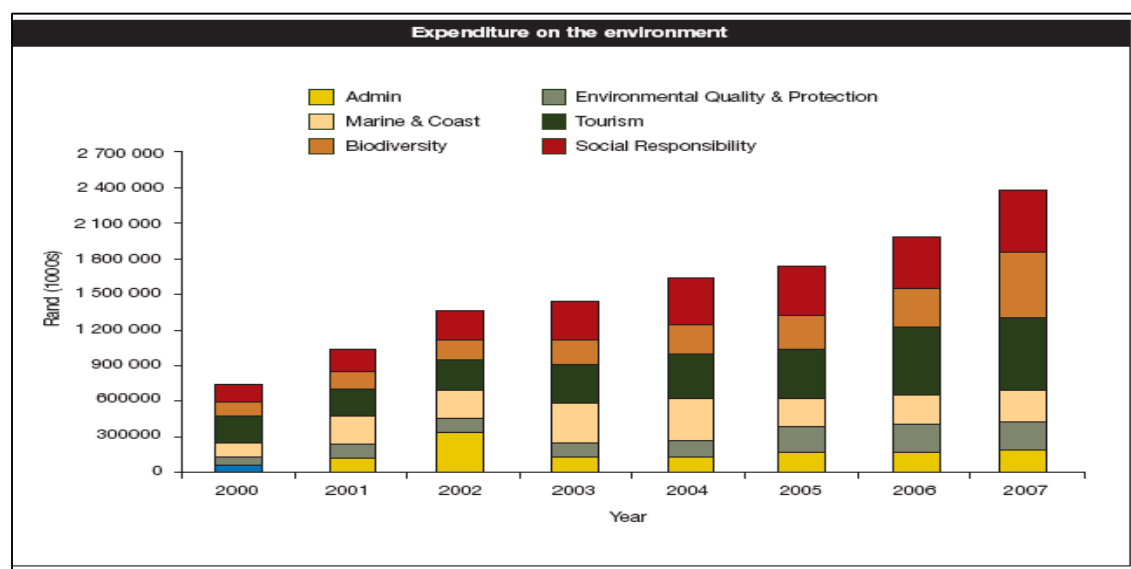
In terms of building a public appreciation of the relevance of science and innovation, the SAASTA (South African Agency for Science & Technology Advancement) has commissioned research on science and the public (Reddy, Juan & Gastrow, 2009). The study found that public awareness programmes on climate change biotechnology exist, but noted that very little is known about science communication and awareness strategies. This is an area that may be important in terms of the development of a public awareness programme “to make biodiversity conservation visible”.

In conclusion, South Africa is entering a new phase in terms of the challenges of an economic downturn and the adverse effects on fiscal expenditure. At the same time the sector has a massive agenda in terms of its mandate, much of which will require shifting into a higher gear with regard to human capacity needs. How it negotiates the fiscal and political space will to a large extent determine how well the HCDS is supported and funded as part of the national agenda.

### **Funding of biodiversity**

As indicated previously, reduction in both state and grant funding for biodiversity conservation is a clear possibility and is anticipated in the MTSF (The Presidency, 2009a). In his national budget speech in February 2009, the former Minister of Finance indicated that “the next few years are going to be tougher” (Treasury, 2009a:17), and proposed that a comprehensive expenditure review be instituted by the incoming government to ensure “efficiency savings”. Government revenue has already declined, as the 2008/09 revenue estimate was R14.2 billion less and for 2009/10 it was estimated to be R50 billion lower (Treasury, 2009a:17). Thus, departmental budgets will be cut. In such circumstances, the first budget items to be reprioritised are the so-called non-essential items, often research and skills development.

As shown in Figure 1.3 (DEAT, 2006: 21) and Table 1.5 (Treasury, 2009b), there has been steady growth in state expenditure on biodiversity and related environmental sectors. Overall environmental expenditure (DEAT budget) increased from R1.4 billion in 2002/03 to an adjusted estimate of R3.2 billion in 2008/09.



**Figure 1.3: Expenditure on the environment (2000–2007)**

National Treasury (2006). National Medium Term Budget Policy Statement and Adjusted Estimates of National Expenditure 2006. Vote 27: Environmental Affairs and Tourism. <http://www.treasury.gov.za/documents/budget/2006>

Table 1.5 shows that tourism was the largest source of fiscal expenditure until about 2006/07. Between 2006/07 and 2007/08, the allocation for the biodiversity and conservation sector increased by 28.7%, but declined by 10.2% in 2008/09. The projected estimates for 2009/10 to 2011/12 are smaller and more erratic, ranging from 4 to 6.8% over the period. This expenditure trend is anticipated to continue until 2011/12. Over the period, overall expenditure is anticipated to grow at an average annual rate of 5.4% (Treasury, 2009a: 583). These estimates were done early on in 2009, and given the delayed effect of the economic recession may be affected more adversely further into the MTEF period.

Biodiversity conservation as a share of total environmental expenditure dropped from third largest in 2007/08 to fourth largest by 2008/09, after marine and coastal management.<sup>2</sup> The MTEF estimates showed that, by 2011/12, marine and coastal management will be second only to sector services and international relations, even edging out tourism. The near doubling of the allocation to sector services and international relations relates largely to infrastructure upgrading of tourism and accommodation facilities in the parks (in anticipation of the 2010 FIFA Soccer World

Cup), the Weather Service and poverty-relief projects (Treasury, 2009a:568). Their allocation is projected to stay the same in absolute numbers over the MTEF period.

**Table 1.5: Audited and estimated expenditure for DEAT sectors (2005/06–2011/12) (rands) ('000)**

Programme	Audited outcome			Adjusted appro- priation	Revised estimate	Medium-term expenditure estimate		
	2005/06	2006/07	2007/08	2008/09		2009/10	2010/11	2011/12
<b>R million</b>								
1. Administration	144.2	167.3	193.1	194.1	194.1	217.5	246.7	286.6
2. Environmental Quality and Protection	185.3	199.2	241.5	270.1	270.1	293.9	313.2	347.1
3. Marine and Coastal Management	262.4	324.0	349.3	429.0	429.0	583.6	933.5	987.5
4. Tourism	427.2	547.2	612.5	690.8	690.8	750.3	753.9	780.7
5. Biodiversity and Conservation	283.2	279.6	359.8	396.6	396.6	413.3	434.4	463.9
6. Sector Services and International Relations	473.3	542.3	1032.5	1226.0	1226.0	1222.1	1202.3	1281.6
<b>Total</b>	<b>1775.6</b>	<b>2059.6</b>	<b>2788.7</b>	<b>3206.6</b>	<b>3206.6</b>	<b>3480.7</b>	<b>3884.0</b>	<b>4147.4</b>
Change to 2008 Budget estimate				144.9	144.9	33.9	121.4	533.3

Source: Treasury (2009: 566)

Table 1.6 illustrates expenditure on biodiversity conservation programmes. It shows increasing growth trends for the period up to 2011/12. Substantial increases are anticipated in the trans-frontier and protected areas, emphasising their status as a growth area in the sector. Capacity building suitable for the needs of these areas is obviously a priority and is explored later on in the report. Further, determination of employment demand in this occupation is vital in order to determine the viability of developing a marketing and recruitment campaign to increase the available pool of conservation scientists and managers. A scan of education and training providers who train conservation managers need to be conducted in order to determine supply capacity in the sector.

**Table 1.6: Audited and estimated expenditure for the biodiversity sectors (2005/06–2011/12)**

Subprogramme	Audited outcome			Adjusted appropriation	Medium-term expenditure estimate		
	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12
<b>R million</b>							
Biodiversity and Conservation Management	3.4	2.2	3.2	4.4	4.6	5.1	5.4
Biodiversity and Heritage	14.4	11.9	18.5	16.7	17.1	18.6	19.6
Transfrontier Conservation and Protected Areas	29.1	16.2	17.8	21.2	31.6	37.8	46.2
iSimangaliso Wetland Park Authority	12.1	12.4	18.2	18.7	20.7	21.4	22.3
South African National Parks	143.8	151.9	191.5	202.3	205.4	214.0	227.0
South African National Biodiversity Institute	80.4	85.0	110.7	128.8	133.8	137.6	143.4
Management of Blyde National Park	-	-	-	4.5	-	-	-
<b>Total</b>	<b>283.2</b>	<b>279.6</b>	<b>359.9</b>	<b>396.6</b>	<b>413.2</b>	<b>434.5</b>	<b>463.9</b>
Change to 2008 Budget estimate				0.2	3.4	10.8	14.9

Source: Treasury (2009b:582)

It is of concern is that DEAT expenditure over the period 2005/06 to 2008/09 shows increasing expenditure on consultants and professional services. The DEAT attributed this to support for the trans-frontier areas. This highlights the capacity problem within the sector as expenditure on consultants and professional services (excluding DEAT staff) for the biodiversity sector in DEAT was at its height (21.9 million) in 2005/06 declining to R9 million in 2008/09, but anticipated to increase steadily to R19.3 million by 2011/12 (Treasury, 2009a:583). Such expenditure in the face of claims of high vacancy rates is very contradictory and highlights the need for a considered approach to internal capacity development in the government sector in the HCDS.

Table 1.7 projects expenditure in SANParks with particular reference to the proportion of income from commercial activities. While there was a near doubling of total commercial revenue between 2007/08 and 2008/09, future growth is expected to remain at about 10 to 11%. With regard to learners attending environmental education programmes, the numbers is anticipated to remain fairly modest, below or at 2007/08 levels by 2011/12. As a key stakeholder in the proposed HCDS, SANParks' environmental education programme may play a key role in terms of shaping the subject and career choices of learners and students. It would be useful

to find out the extent to which such programmes have utility in terms of shaping subject and career choices.

**Table 1.7: Trends in expenditure in South African National Parks (SANParks)**

Indicator	Past			Current	Projections		
	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12
Percentage increase in revenue from commercial activities per year (Total revenue in 2006/07 R458 million)	-	-	8 % (R36.6 million)	11% (R63.9 million)	10.5% (R67.4 million)	11% (R78.4 million)	11% (R87 million)
Percentage increase in the number of black visitors to the parks per year (255 829 in 2006/07)	-	-	21.4 % (310 488)	10% (341 537)	10% (375 690)	10% (413 259)	10% (454 585)
Hectares of new land acquired for the national parks system	-	-	13 462 Ha	12 800 Ha	13 000 Ha	10 000 Ha	5 000 Ha
Number of learners that go through environmental education programmes	-	-	139 424	110 000	120 000	130 000	140 000

Source: Treasury (2009b:584)

Table 1.8 shows that conservation constituted about 40 to 41% of all programme expenditure over the period. Tourism constituted between 57 and 59% of all expenditure over the period. The significant share of tourism confirms that for the foreseeable future, the complexity of the skills profile of conservation managers and conservation scientists will be sustained.

**Table 1.8: Trends in expenditure in SANParks on tourism, conservation and other programmes (2005/06–2011/12)**

R million	Audited income			Revised estimate	Medium-term estimate		
	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12
Tourism	445.8	536.2	252.2	554.1	590.2	639.3	694.5
Conservation	312.1	372.6	365.0	385.0	410.1	444.2	482.6
Other programmes	-	30.8	33.3	-	-	-	-
<b>Total expense</b>	<b>757.9</b>	<b>939.6</b>	<b>650.5</b>	<b>939.1</b>	<b>1000.3</b>	<b>1083.5</b>	<b>1177.1</b>

Source: Treasury (2009b:585)

One of the key challenges to the fulfilment of South Africa's commitment to its obligations under the United Nations Convention on Biodiversity relates to the fact that of the R7.6 billion required to implement the 33 priority actions of the NBF only half of the cost had been budgeted (DEAT, 2009: x). Thus, R3.4 billion is still needed

for the five-year period of implementation. Budget cuts and reduced grant funding are likely to impair local systemic and institutional capacity to fully implement its objectives. While there is talk of “green shoots of hope” in the global economy, recent poor employment figures in the US have dashed hopes. Thus, a widespread global recovery does not appear to have solidified, and given the lag time its positive effect will take a while before it reaches our shores.

At a global level one of the consequences of the global financial collapse has been an apparent search for new sources of growth, especially renewable energy. This so-called “Green Deal” is aimed at greening existing forms of industrialisation, such as clean coal technology, carbon capture and less reliance on fossil fuels, crude oil in particular. Of course, the receptiveness to greener alternatives may end as soon as the economic recovery is established.

In conclusion, funding trends show that government funding is anticipated to increase over the period to 2011/12, especially in the trans-frontier and protected areas. However, during the MTEF period anticipated budget cuts are likely to affect recruitment demand negatively. The HCDS may have to prioritise the scope of its short to medium term priorities to bring the most efficient interventions to scale. Chapter two analyses employment demand in the sector.



## **The National Skills Development Strategy (NSDS)**

This section provides an overview of key issues and opportunities for cooperation in the broader skills development arena, including the NQF, the quality councils, the organising framework of occupations (OFO) and the Sector Education and Training Authorities (SETAs) among others. The Scarce Skills Framework and public sector expenditure on skills development are dealt with in Chapter 6.

The Skills Development Act of 2000 and the Skills Development Levies Act, No.9 of 1999 provide the policy, institutions and funding underpinning skills development among the employed and the unemployed in the country. The formation of the SETAs in 2000 provided the institutional base, based on the cooperation of business and labour, in 23 sectors. Skills planning occurs (at least in theory) through the development of a sector skills plan (SSP), and workplace skills plans (WSPs) at workplace level. The NSDS is funded by the skills levy, 1% of the payroll of companies with a payroll of R500 000 and more. The specific objectives and performance indicators of the SETAs are driven by the NSDS. The NSDS outlines the national skills development priorities over a five-year period and is implemented under the auspices of the National Skills Authority (NSA), a constituency-based formation (government, business, labour and civil society) and the Department of Labour. The first phase occurred during April 2000 to March 2005, with the establishment of the SETAs. The second phase took place over the period April 2005 to March 2010. The NSDS II had a projected income of R21.9 billion based on the skills levy. Of this, 80% goes to the SETAs for administration and disbursement to companies on skills development implementation. Twenty per cent is allocated to the National Skills Fund (NSF), administered by the NSA for social development projects in the provinces and building links with Further Education (FE) and High Education (HE).

On 10 May 2009, just after the elections, the cabinet announced that the skills development function and the SETAs would move from the Department of Labour to the Department of Higher Education and Training (DoHET). On the face of it the joining together of workplace-based skills development and HE should increase the chances of articulation between the systems. Although it is still early days yet, this is one of the key inter-institutional relationships (DoHET and the SETAs) that will be

important for the development and implementation of the HCDS. Thus, there is now an opportunity to build sector partnerships with both the relevant SETA and HE at NQF levels 5 and higher.

Research shows that while the SETAs have not enjoyed a good reputation in the biodiversity sector, they do command over R21 billion per annum. Among others, the SETAs fund work experience grants which could support existing initiatives in the biodiversity sector where funding has reportedly been an issue. Most biodiversity organisations belong to a SETA, but there appears to be under-utilisation of those services and funding that are available.

### **The National Skills Fund (NSF)**

The NSF is a fund established under the NSDS and receives 20% of all levy income. It is a key source of funding for social development programmes in the provinces, for unemployed people and for training in scarce skill areas at FE and HE levels. Plant and animal sciences have been recognised as scarce skills. For the period 2007 to 2009, the NSF allocated R886 million to the provinces for strategic projects focusing on sectors related to biodiversity, including agriculture and tourism. By March 2008, only R141 million of the original allocation had been spent (DOL, 2008:32). Thus, the most recent window period of the NSF was advertised recently, and ways to access funding through provincial government departments for biodiversity-related areas are worth exploring.

### **The National Qualifications Framework (NQF)**

The South African landscape of education and training and skills development is standardised and aligned through the provisions of the National Qualifications Framework (NQF), co-signed by the Ministers of the Department of Labour and Education in September 2007. The NQF provides for an integrated qualification framework to ensure progression and portability of all qualifications (whether attained at school, university, college or in the workplace). NQF levels now extend from 1 to 10 as outlined in the table below. The HCDS of the biodiversity sector, NQF 5–10, is mostly situated on the Higher Education and Training band. This means that learnerships may be registered at higher NQF levels, as has been the case with

candidate attorneys in the SASSETA, accountants in FASSET, both professionally trained personnel.

**Table 1.9: National Qualifications Framework**

Education Band	NQF	Skill band	Qualification type
Higher Education & Training	10	High skills	Doctorate
	9		Masters degree
	8		Postgraduate diploma/honours
	7		Bachelors degree/advanced diploma
	6	Intermediate Skills	Diploma/advanced certificate
	5		Higher certificate or advanced national certificate (vocational)
Further Education & Training	4		National Senior Certificate or College national Certificate 3 (Vocational)
	3		College National Certificate 3 (Vocational) Or Grade 11
	2		College National Certificate 2 (Vocational) or Grade 10
General Education & Training	1	Entry level skills	Grade 1-9

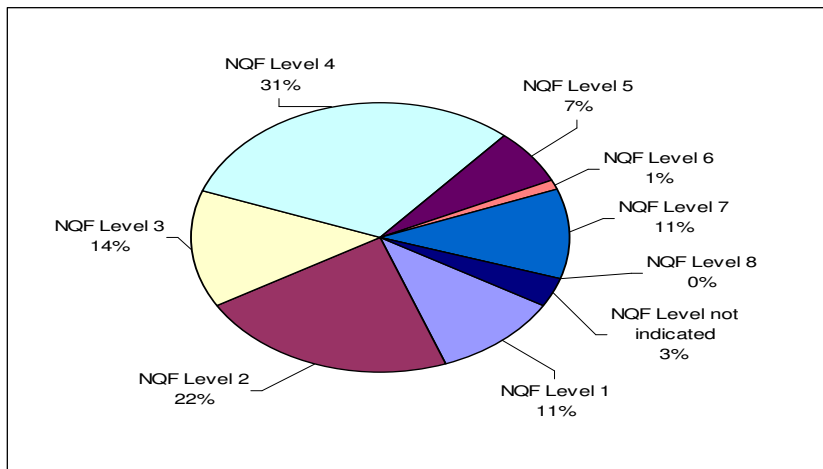
Source: Kraak, 2008:5 (with revisions); DOL, 2008a

## Learnerships

A learnership is a work-based programme for learning and gaining qualifications in NQF levels 1–10, and includes both structured work experience (practical) and knowledge-based (theoretical) learning (Paterson, 2005:340). A scan of learnerships shows that there are very few learnerships registered in the biodiversity sector (see Chapter 4). This is largely due to the fact that most of the biodiversity-related learnerships are below NQF level 5. Thus, although the SETAs do register learnerships at above NQF level 5, including the banking and financial sector, this has not been the case in the biodiversity conservation sector, except for one learnership registered with the ETDP-SETA.

An impact assessment by the HSRC (Du Toit *et al*, 2008) showed that over the first six years since 2000, 243 729 learners registered for learnerships. The race and

gender equity targets were met, as well as targets for the unemployed. However, most learnerships were still at NQF level 4 and below. Close to half of all enrolments were on the low skill band (NQF 1-3), while one-third was at NQF 4 or Grade 12. The remainder was at higher skill levels, where scarce skill categories are generally located. Thus, this is an area (fulfilling scarce skill needs) where the SETAs still fall short. This study was done in 2007 prior to the extension of the NQF level from 7 to 10. This means that more high skill learnerships may be registered. SETAs such as FASSET (which employs large numbers of professionals) have registered high skill learnerships, while candidate attorneys have learnerships registered with the SASSETA. There have been some improvements in the SETA learnership system. In year one of the NSDS II (April 2005–March 2006) a survey of learners showed that 66% completed their learnerships, 15% terminated and 20% were still registered (Ibid., 2008).



**Figure 1.4: Distribution of learnership registration by NQF level (April 2000–March 2006)**

Source: Ibid, 2008.

## The Quality Councils

An important new development is the establishment of three quality councils: General and Further Education (Umalusi), Higher Education (Council for Higher Education [CHE]) and the newly promulgated council for occupation-specific qualifications, the Quality Council for Trade and Occupations (QCTO). The tasks of these bodies are to quality assure all qualifications in line with the NQF and to ensure standards of

occupational and professional competence. The biodiversity HCDS is likely to remain under the auspices of the CHE, which quality assures professional qualifications (NQF 7–10).

The key objective is to obtain occupational competence (DOL, 2008) specific to an occupational skill set. The extent to which this may be applicable to the HCDS has to be considered. There is a more determined effort to develop qualifications that are more demand-driven. Both the SETAs and HE have often been accused of not being sufficiently responsive to the needs of employers and the economy in general. The new QCTO has an occupational framework, which includes a combination of

- knowledge and theory
- a practical skills component
- a work experience component.

However, the QCTO will also register qualifications which were obtained in another qualifications framework (such as HE for e.g.), but “... competence has to be demonstrated against specialised and occupational knowledge, practical skills and work experience components” (DOL, 2008:6). This may allow for the inclusion of a work experience component in the acquisition of science-related qualifications, a post-degree qualification for instance. This may be an opportunity for education and training providers in the biodiversity sector to register for qualifications that are more occupationally directed than is currently the case. The viability of such an approach may be an area to be explored in the proposed HCDS.

The QCTO will register two types of qualification: a National Occupational Award and a National Skills Certificate. The types of National Skills Certificate are outlined below. Such a certificate has to include the three learning components (theory, practical skills and work experience) and the obtaining at least 20 credits, and has to be assessed by a registered assessor in the sector.

**Table 1.10: National Skills Certificates and Occupational Awards under the QCTO**

Type	Notes
1. Part of an award	• linked to a role in the occupation
	• a narrow set of tasks that comprise a distinct component of an occupational profile
	• it could stretch over multiple NQF levels, in the same way as an occupation does
	• assesses one or more occupational tasks
	Example: 552101 Bank Worker - <u>Teller</u>
2. Specialisation within an occupation	• adds on to an occupational award and qualifies a person to perform a specialised task/s related to the occupation
	Example: 221204 Internal auditor - <u>Customs Auditor</u>

Source: DOL, 2008:8

The establishment of the new QCTO will ensure that all qualifications are vetted and registered based on agreed standards in cooperation with the CHE. It will also allow for progression within and articulation between occupation-based skills development, FE and HE to a much higher level. Many HE professional qualifications (degrees) related to the biodiversity sector will still be quality assured and registered by the HEQC. The QCTO and CHE are two institutions that will be essential in developing partnerships over the next five years in order to begin to shape the type and quality of the qualifications that are produced in the education and skills development systems.

## The Organising Framework of Occupations (OFO)

One of the key limitations in the measurement of occupation-based skills gaps and skills availability is the nonstandardisation of occupational descriptions and job titles in official statistics, organisational grading structures, WSPs and the like. This makes it extremely difficult to develop coherent comparisons across different datasets, to track changes in occupational demand or to verify claims of skills shortages in the labour market.

The OFO is an attempt to standardise occupational information and to provide more comprehensive information than is currently the case. For instance, occupations can be captured at a much lower level of detail, the six-digit level. Currently, official statistics (Labour Force Survey) only capture at the four-digit level. The OFO has its

basis in the South African Classification of Occupations (SASCO), which has 625 occupations, but provides very little detail on specific occupational levels. For instance, in SOC 2211: Botanist, zoologist, bacteriologist, the Labour Force Survey (LFS) clusters two occupations that are biodiversity-related with one that is not, making it very difficult to separate the one from the other in data analysis. In the OFO, occupations are clustered into five broader categories in terms of their

- skills specialisation
- skill levels.

Articulation will be possible with the education and training system in that each of the five levels will be linked to the 10 NQF levels, and the type and amount of work experience required will also be specified. Many SETAs have already adopted the OFO and companies are beginning to submit their WSPs using this system.

The next figure provides an overview of major groups, managers, professionals and technicians & trade workers, disaggregated at the six-digit level, as envisaged by the conservation chamber in the Tourism, Hospitality Education & Training Authority (THETA).

**Table 1.11: Overview of the OFO in the THETA conservation chamber at NQF 5 and higher**

Number	OFO code	Existing title
<b>Managers</b>		
1111	111101	CEO / COO/ Managing Director/Directors
1112	111201	Corporate General Manager
1311	131102	Sales / Marketing Manager
1322	132201	Finance Manager
1323	132301	Personnel/HR Manager
1399	139902	Environmental Manager
<b>Professionals</b>		
2312	231207	Marine Safety Officer
2343	234301	Conservation Officer
2343	234302	Environmental Consultant
2343	234303	Environmental Research Scientist
2343	234304	Park Ranger
2344	234401	Geologist
2344	234402	Geophysicist
2344	234403	Earth Scientist (Soil Conservationist)
2345	234506	Marine Biologist
2349	234901	Conservator
<b>Technicians and Trade Workers</b>		
3119	311903	Environmental Science Technician

Source: THETA, 2009

This is not the final version, as new occupational titles will still have to be agreed upon. The HCDS should keep itself abreast of this process of developing more detailed job descriptors based on skill and skill levels, as this will improve the current system that only provides occupational information at the four-digit level and will make more detailed information-gathering possible with greater standardisation across organisations within the sector.

### **The SETAs and skills delivery performance**

The public perception that the SETA system has been a failure is widespread, especially given public disclosures of financial mismanagement and poor delivery of skills development. There are instances of failure, but it is often unevenly spread across the SETA system, as some SETAs are delivering on their objectives more effectively and efficiently than others. The successes are often dismissed, with a disproportionate focus on the failures of a system that has been only ten years in the making – a much shorter period than the HE system for instance. Thus, while it is true that there have been cases of corruption and financial mismanagement among a few SETAs, audit reports have found that the SETAs have not performed any worse than comparable government departments (The Presidency, 2007). As shown in the table below, the proportion of SETAs with a clean audit over both periods was higher than national departments. The number of qualified audits declined, compared to an increase for national departments. In contrast though was an increase in the number of disclaimers compared to none in the national line departments, but from a very low base. There are clearly problems, but these are not necessarily substantially worse than are found among the government departments to which SETAs are comparable.



**Table 1.12: Audit outcomes for national departments, national public entities and SETAs for 2004/05 and 2005/06**

	Clean report (%)		Unqualified, emphasis of matter (%)		Qualified, emphasis of matter (%)		Disclaimed (%)	
	04/05	05/06	04/05	05/06	04/05	05/06	04/05	05/06
National departments	6	12	74	56	21	32	0	0
All public national entities	38	32	44	42	16	16	0	0
All SETAs	54	42	25	38	17	12	4	8

Source: Presidency (2007:72)

### The supply-driven nature of skills provision

A study assessing the functioning of the SETAs found that the current system of establishing NSDS targets failed to take into consideration sectoral priorities and was based on the proportional (“and mechanical”) distribution of national targets among the SETAs (The Presidency, 2007:24). This often meant that the provision of skills training was not responsive to the specific needs and requirements of industry and employers. Instead, training was supply-driven, determined by the priorities of training providers. It also found that despite the development of elaborate Sector Skills Plans (SSP) at a SETA level, as well as an extensive skills reporting framework including the submission of WSPs, there remained a serious gap in skills provision. The review found that the NSDS targets were based on generic targets across the entire country, instead of being specific to a particular sector or subsector (The Presidency, 2007). Thus, the capacity to customise SSPs for the specific conditions and requirements of a sector was not necessarily provided for, given the current format of the NSDS targets.

Another take on the lack of sector responsiveness is based on an analysis of the skills requirements of fourteen ASGI-SA priority sectors by the HSRC. In this study, Kraak (2009) argues against a “one size fits all” skills development policy like the NSDS, but instead for greater alignment between specific industrial and skills

development policies. He argues that skills formation is highly differentiated and that sector-based skills policies should be formulated by taking into consideration the complexities of sector-specific labour markets (or employment modes) and production regimes.

At a methodological level, the capacity to determine sector-based skills needs is sorely lacking. Contrary to the initial intention, the company reporting system on skills needs (WSPs) and actual training provision (ATRs) was found not to assist in the development of comprehensive and accurate SSPs. The SETA Review concluded that the completion and submission of the plans by companies was driven by financial incentives (mandatory grants) rather than training outputs. However, this does not imply that training did not occur, as the National Skills Survey 2007 (Patterson *et al*, 2008) shows that the training rate doubled, there were improvements in training expenditure and greater inclusivity and participation of small and medium enterprises in skills development.

Skills forecasting capacity is lacking across the NSDS, and this absence has affected the measurement of scarce skills for instance. In conclusion, the supply-driven nature of skills provision is partly due to the failure of sectors to measure, plan and forecast skills needs based on the specificities of their sector. The aggregate nature of the NSDS planning system has reinforced the lack of sector-specificity and is a key area to be addressed in the NSDS III. Therefore, the HCDS of the biodiversity conservation sector needs to put in place strategies to measure and report on the nature, size and trends of skills needs, including scarce skills needs on a regular basis.

## **The Human Resources Development Strategy-SA**

The development of the proposed HCDS has to be seen in the broader context of the Human Resources Development Strategy (HRDS-SA) (Department of Education, 2008), the second version of which was drafted at the end of 2008. Human capital theory is one of the economic theories underpinning HRD, a much broader term that often has a country perspective rather than a specific organisational perspective.

Kraak (2004:1), drawing on the life-cycle perspective of economic theory, defines HRD as the stages in the “life cycle of human development”, each stage occurring in particular institutional settings and subsystems including

- transition to school
- transition from school and entry into the world of work
- movements within and throughout the working life and the labour market
- exiting the labour market.

In 2001, the first Human Resource Development Strategy (HRDS) was launched in order to coordinate efforts to improve the knowledge and skills of the population. At the end of 2008, a review of the HRDS-SA 2008 was gazetted for public comment. The review was necessitated as a result of “challenges in the old HRDS-SA” (Department of Education, 2008). The purpose of the original HRDS-SA was:

“To maximise the potential of the people of South Africa, through the acquisition of knowledge and skills, to work productively and competitively in order to achieve a rising quality of life for all, and to set in place an operational plan, together with the necessary institutional arrangement, to achieve this.”

The revised HRDS-SA for 2009–2030 draft defined HRD as follows:

“In any country, human resources development refers to formal and explicit activities which will enhance the ability of all individuals to reach their full potential. By enhancing the skills, knowledge and abilities of individuals, HRD serves to improve the productivity of people in their areas of work, whether these are in formal or informal settings. Increased productivity and improvement to the skills base in a country supports economic development, as well as social development.”

Thus, the HRDS-SA is a coordinated effort cutting across all line departments, the education and skills system, the industrial, innovation and R&D systems, with a range of strategic priorities and objectives. It aims to create opportunities for coordination, sharing of best practices and institution-building. While the final HRDS-SA version was not yet available at the time of writing, it is understood to be implemented under the auspices of the newly created DoHET, and may focus on a smaller set of strategic priorities. This shift to a more focused approach and “strategic

choices” is also a common theme in the Green Paper on Strategic Planning recently issued by the Planning Commission in the Presidency (2009c:15) and the MTSF [The Presidency, 2009b], which highlights the imperatives of education and skills development as the foundation of economic growth.

The new HRDS-SA presents opportunities for inter-institutional building. The HCDS should attempt to function in conjunction with the HRDS-SA and complement it by developing cooperative relationships with key partners and government departments including the DoHET and the Presidency.

The HRD strategy for the public sector was approved in 2002 with particular emphasis on internship and mentorship programmes. The strategy also included a Scarce Skills Strategy driven by the Department of Public Service and Administration (DPSA) which, among other things, provides for the payment of scarce skill allowances. The internship programme, or the Public Service Graduate Work Experience Programme, aims to provide post-school exposure to the workplace, focusing on unemployed graduates. By 2004, government departments at national and provincial level recorded 2 963 internships, either in process or completed (Paterson, 2005:337). The internship programme aimed to provide workplace experience to a person who is studying towards, or has completed, a qualification. The mentorship programme is aimed at developing skills on the job and works on the assumption that there are experienced and skilled personnel available to act as mentors and to transfer skills in the workplace to an incoming graduate or employee. There is currently no comprehensive information available on the success of the public sector HRD strategy. However, given the large public sector component in the biodiversity conservation sector, it would be interesting to find out the extent to which the mentorship and internship programmes have been put into place, their success, and the capacity to extend it sector-wide.

## **KNOWLEDGE WORKERS, RETENTION AND TRANSFORMATION**

The biodiversity conservation sector forms part of the broader SET sector, which is at the centre of the drive towards a more knowledge-based economy. Science professionals and managers form part of the so-called “knowledge workforce”. Given the centrality of this workforce to the proposed HCDS, this section provides a short overview of key issues that affect the mobility and retention of professionals and managers. Key trends are drawn from the international literature to provide a more holistic context within which knowledge workers operate. This is partly because, in the South African context, the debate on retention and mobility trends takes on a particular hue, given controversies about transformation and employment equity. Trends in terms of transformation and diversity in the general South African workforce are considered as well, and implications for the biodiversity sector workforce, especially at managerial and professional levels, are derived.

Drucker (cited in Sutherland and Jordaan, 2004:55) defined knowledge workers as “employees who carry knowledge as a powerful resource which they, rather than the organisation, own”. In 1989, Drucker (ibid) further argued that this knowledge-holding capacity “... gives them [knowledge workers] freedom to move since everyone’s knowledge has a multitude of applications in the information or knowledge age”. This generalised applicability of such knowledge does not imply that the training is generic. For instance, in South Africa, engineering graduates are often in demand in the financial and banking sector, owing to the type of training they have received. In a study by Sutherland and Jordaan (2004) on factors affecting the retention of knowledge workers, the authors also argued that a key feature of South African knowledge workers was their mobility. This suggests that knowledge workers employed in the biodiversity conservation sector have a particular competitive advantage in the labour market, and not just as a result of their race or gender.

The sector also depends primarily on its knowledge base represented primarily by the managerial and scientific workforce for its continued survival and sustainability. This does not imply that gardeners, extension workers and field guides do not contribute towards the knowledge base. However, for the continued evolution of the sector, in its attempt to balance the trade off between biodiversity conservation *and* development, the research and managerial capacity of the middle to senior level

professionals will be the key knowledge producers. At the same time, conservation managers in local government or in a provincial park may not have as high a level of scientific input compared to those in a research institution, but their capacity to translate scientific knowledge for implementation purposes may make them highly sought after.

In their recommendations, Sutherland and Jordaan (2004) argue that organisations should not expect “long-term loyalty” but the “achievement of employee commitment” (Ibid:62). In support of this position, they cite Cappelli (2000:105) who states “you [the organisations] are managing a river, not a dam”. This refers to the expectation (perhaps outdated now) that individuals will stay permanently, contrary to expecting a “continual flow of people through the organisation” (Ibid:63). Finally, the authors of the study suggest that organisations should develop systems that provided “challenging work, career development opportunities ... [and] rewards based on individual performance” (Ibid).

Another interesting finding was that the knowledge workforce was not homogenous, but had many subgroups. Therefore, the authors suggest that addressing “unique and individual value systems” rather than focusing on “generic motivators” may be more useful in developing psycho-graphic profiles of the aspirations of knowledge workers. Thus, the idea of a generic approach to recruitment or even employment may not be the most effective manner in which to recruit or retain professionals and managers. One supposes that this is where the idea of talent management may have had its origin. However, the question arises as to whether such flexibility can be expected from a sector located largely in the public sector, where generic and standardised (one may argue bureaucratic) policies and approaches are the order of the day.

In South Africa, the issue of retention has attained a particular hue, partly derived from the nature of the “job-hopping” debate which often centres around the perception that employee turnover is particular to black professionals (Vass, 2009). In a case study of a major division in a South African banking group, a number of barriers to the implementation of employment equity (EE) and the retention of black managers were identified. The following factors, in line with similar findings in national and international research (Booyesen, 2007: 47), were identified:

- Lack of communication and shared understanding of EE
- White male-dominated organisational culture
- Low leadership commitment
- Inconsistency in EE implementation

In this study, new barriers to EE and retention included

- the role of white fear especially with regard to their jobs
- a lack of meaningful engagement of white male employees on the issue of transformation.

The implication is that a lack of communication may add to the complexities of addressing transformation in a manner that is inclusive. Thus, the manner in which the HCDS communicates its transformative objectives (with regard to the employment of black scientists) has to be aimed at all sections of the workforce, white and black.

Booyesen (2007) argues that legislative compliance is only the first step in employment equity, whereas an organisational cultural change is required for true diversity. She defined organisational transformation as a systemic change in employment practices to support EE implementation. This refers to "... human capital development, inclusive practices and organisational culture change" (Booyesen, 2007:48). Citing a number of research studies, including the Commission for Employment Equity (CEE) reports, 2002–2006, she (2007:50) argues that a declining retention rate is often closely associated with the "organisational climate and culture". These studies cited the following as contributory factors:

- Slow EE progress in management and other departments
- Low commitment to EE and lip service paid by top management
- Ineffective consultation and communication about EE progress and implementation
- A lack of cultural sensitivity where new recruits are expected to assimilate into the existing organisational culture
- An organisational culture that does not value diversity

- A white male dominant organisational culture that excludes black recruits (through informal and formal networks)
- The practice of “tokenism” and failure to devolve real responsibilities to black recruits
- A lack of systematic talent management of black staff
- A lack of black mentors and role models (Ibid:50–51)

In understanding the organisational paradigms within which organisational culture responds to diversity, a continuum of diversity paradigms was proposed (Table 1.13).

**Table 1.13: Thomas and Ely’s diversity paradigms as applied to South Africa**

	Discrimination-fairness	Access-legitimacy	Learning-effectiveness
Focus	Creating equal opportunity assuring fair treatment; compliance with equal opportunity laws	Match internal employee demographics to customer and marketplace served	Incorporate diversity into the heart and fabric of the mission, work and culture of the organisation.
HR practices	Recruitment of women and PDAs; mentoring and career development programmes for women and PDAs	Recruitment of diverse set of employees to match external demands.	Redesigned and transformed to enhance performance of all employees.
Effectiveness measures	Recruitment numbers; retention rates for women & PDAs	Niche markets captured; degree of diversity among employees	All employees feel respected, valued and included.
Weaknesses/strengths	Does not capitalise on diversity of all employees; Emphasis on assimilation	Does not affect mainstream of company business; diversity confined to specific market segments	All employees are respected, valued and included.

Source: Booysen & Ngambi (2004) as cited in Booysen, 2007:52

This model was derived from a 2002 study (Ngambi, cited in Booysen, 2007:52). This study found that most South African organisations were still in the first paradigm, “discrimination-fairness”. That is, transformation practices in HR are geared towards redressing past injustices by increasing the number of people from historically disadvantaged groups. At this level, the focus is on getting the numbers right or



employment quotas, and mostly legal compliance rather than substantive compliance. In this paradigm, the organisational culture is perceived by newcomers as one of assimilation. That is, outsiders have to fit into an existing way and culture of doing things.

The second paradigm of “access-legitimacy” represents a shift away from the numbers-only approach, and also moves from the assimilation approach to one of promoting the business case for diversity. In this paradigm, the demographics of the internal workforce are more in line with the demographic profile of the external market that the organisation served. However, this is still a lesser form of organisational integration, as differentiation may be located in specific segments of the organisation (such as HR for instance), whereas the mainstream (where the core business activity is located) of the organisation is still not very diverse.

The final “integrated” paradigm refers to the “learning-effectiveness” dynamic where the organisation is sufficiently transformed so that diversity becomes internalised and part of the fabric of the organisation, and clearly identifiable as a source from which to derive organisational benefit.

A very superficial application of these paradigms suggests that biodiversity conservation organisations, especially at the scientific and managerial level, may be located between the first and second paradigms. For instance, at managerial level, in government departments and parks boards, there may be a greater degree of diversity, as more black managers are employed. HR departments are generally more mixed for instance. However, within the scientific and professional workforce (the core of the biodiversity conservation workforce), all organisations may still at the first level – seeking to comply with the legislation by employing greater numbers of black scientists. Further, the culture remains predominantly one of assimilation where newcomers have to fit into existing ways of doing things. Booysen (2007: 51) argues that, based on studies, companies in the United States of America and South Africa are situated in the assimilation or differentiation mode; hardly any are at the third level. This is an important consideration for the HCDS, as the strategy may be aimed at transformation while the organisations in their internal organisational practices and cultures may not be ready to receive new black graduates or experienced professionals in a manner that is not alienating or one of assimilation.

A second area that needs to be considered in the recruitment and retention of knowledge workers are the employment modes in the sector. Lepak and Snell (2002:519) argue that the uniqueness of, or strategic value placed on “knowledge, skills and abilities with economic value to the firm” will determine the type of employment mode and human resource practices adopted. Organisations tend to value knowledge workers (those who use their heads more than their hands in the production of value) as strategic (Horibe, 1999:xi cited in Lepak & Snell, 2005:520). In that case, the employment mode or practice will focus on the “internal development and employee commitment to stay with the firm”, as opposed to other workers who have less strategic value and/or unique skills and are more likely to be offered contracts, or as part of alliances and partnerships.

Paradoxically, in their empirical research, Lepak and Snell (2005) found that firms differed in the employment modes applied to knowledge-based workers. In some firms productivity-based or output-driven systems were used to manage knowledge workers. This was contrary to the theorised expectation that firms would accord increased “discretion and latitude” to knowledge workers. Thus, different forms of employment modes, including job-based employment (emphasising productivity and investment recovery), collaborative-based partnerships, as well as commitment-based types of employment practice, were found in the management of knowledge workers (Lepak & Snell, 2002:537). The authors attribute this divergence to the fact that firms do not have the necessary resources to invest in a particular manner (to develop commitment) in knowledge-based workers.

This is an important dilemma faced in the biodiversity sector, in that, through the HCDS, it seeks to redress the lack of retention (and commitment) of existing, skilled professionals in the face of declining budgets. It also seeks to recruit new entrants by providing an attractive work environment conducive to long-term development. Thus, it needs to assess whether the types of employment practices and working cultures in the sector are effective mechanisms for building employee commitment and long-term development. While salary and other employment conditions are clearly elements of an employment mode, the duration of contracts, training offered, career paths, levels of discretion and development opportunities are substantial elements to consider as part of an overall package of opportunities for developing commitment.

Thus, contract- or productivity-based employment modes for workers with scarce skills may not be the ideal manner in which to attract or to retain such staff in the long term.

Finally, in terms of the Employment Equity Act, each eligible organisation should set itself an employment equity target as per the national requirements (as set out in Chapter 4 on supply of higher education). One of the issues to consider is whether a sectoral plan on EE targets should be developed, monitored and implemented at organisational level.

## CONCLUSION

This chapter sought to provide an overview of the key policies and factors in the macroenvironment, their implications for the HCDS, in terms of some of the risks and opportunities in a rapidly changing policy environment. The adverse effects of the recession are likely to reverberate in the sector's budgets, implying that, in order to accommodate the new demands of the HCDS, it situates itself very squarely within the national agenda of education and skills development.

## REFERENCES

- Becker, GS. (1964) *Human capital: A theoretical and empirical analysis with special reference to education*. New York and London: Columbia University Press.
- Booyesen, L (2007) Barriers to employment equity implementation and retention of blacks in management in South Africa. *South African Journal of Labour Relations*, 31(1).
- Clark, N. (2008) Human capital management and development. Powerpoint presentation.
- Department of Arts, Culture, Science and Technology (DACST). (2000) *National research and technology foresight project: biodiversity sector report*. Department of Arts, Culture, Science and Technology: Pretoria.
- Department of Education. (2007) Enhancing the efficacy and efficiency of the NQF. Joint Policy Statement by the Ministers of Education and Labour. DoE :Pretoria.
- Department of Education. (2008) *Draft revised HRDS-SA*. Government Gazette.

Department of Environmental Affairs and Tourism (DEAT). (2005) *South Africa's National Biodiversity Strategy and Action Plan*. Pretoria: DEAT.

Department of Environmental Affairs and Tourism. (DEAT). (2006a) *State of the environment*. Pretoria: DEAT.

Department of Environmental Affairs and Tourism (DEAT). (2006b) *Provisional Environmental Headline Indicators*. Pretoria: DEAT.

Department of Environmental Affairs and Tourism (DEAT). (2007) National Biodiversity Framework for South Africa. *Government Gazette* No. 30027. Pretoria: DEAT.

Department of Environmental Affairs and Tourism (DEAT). (2009) *Fourth National Report to the Convention on Biological Diversity*. Pretoria: DEAT.

Department of Labour (2007) *Draft framework for identifying and monitoring scarce and critical skills*. Pretoria: DoL.

Department of Labour (2008) *Occupational qualifications framework. Draft policy for the QCTO*. Pretoria: DOL.

Department of Science and Technology (DST). (2002) *Research and development Strategy*. Pretoria: DST.

Department of Science and Technology (DST). (2007) *Ten-year innovation plan*. Pretoria: DST.

Department of Science and Technology (DST). (2009a) *2010 MTEF framework for budget options*. Presentation. Pretoria: DST.

Department of Science and Technology (DST). (2009b) South Africa: Pandor: *Budget vote speech by the Minister of Science and Technology*. DST: Pretoria.

Department of Trade and Industry (DTI) (2007a) *South Africa geared for growth 2007*. DTI: Pretoria

Department of Trade and Industry (DTI). (2007b) *A national industrial policy framework*. DTI: Pretoria.

De Wit, MP & Blignaut, JN. (2006) Making the case for the value of ecosystem goods and services produced in the grassland biome. *Report No: SO 6002*. SANBI: Cape Town.

Dobbs, RL, Sun, JY & Roberts, PB. (2008) Human capital and screening theories: Implications for human resource development. *Advances in Developing Human Resources*, 10(6):788–801.

Du Toit, R, Kruss, G, Powell, L, Visser, M & Earle, N (2008) *Employment and learning pathways of learnership participants in the NSDS Phase II*. HSRC: Pretoria.

Ederer, P. (2007) Assessing human capital and skills for long-term economic growth prospects: documentation paper on financial measurement in human capital accounting for the Republic of South Africa. In South African Qualifications Authority (2007) *Proceedings of the 7<sup>th</sup> Q-Africa conference 2007*. Directorate: Strategic Support, SAQA: Pretoria.

Ehrenfield, D. (1988) Why put a value on biodiversity? *Biodiversity*. National Academy Press: Washington, DC.

Erasmus, J. (2008) A multiple source identification and verification of scarce and critical skills in the South African labour market. HSRC: Pretoria.

German Technical Co-operation (GTZ). (2007) *National Skills Authority – Briefing paper. First Economy*. Commissioned by the DoL and the German Technical Co-operation (GTZ).

Helmholtz Association of German Research Centres (2008) What is the value of biodiversity to our collective future? *Science Daily*. Retrieved May 26, 2009 from <http://www.sciencedaily.com/releases/2008/05/080521105713.htm>.

Institute for Democracy in South Africa (IDASA). (2009) *Considering the framework for policy and delivery in SA – the NPC and more*. Accessed September, 29, 2009. <http://www.polity.org.za/print-version/>

Joint Initiative on Priority Skills Acquisition (JIPSA) (2007) *JIPSA Progress Report*. Pretoria: The Presidency.

Kraak, A. (2004) *An overview of South African human resources development*. Cape Town: HSRC Press.

Kraak, A (ed). (2009) *Sectors and skills: The need for policy alignment*. HSRC: Cape Town.

Lepak, DP & Snell, SA (2002) Examining the Human Resource Architecture: The relationships among human capital, employment and HR configurations. *Journal of Management*, 28(14): 517-543.

Lewis, FM, Nyalashe, VH, Hartley, Z & Naicker, MS. (2008) *Reflections on the Human Capital Development Strategy: the second series of conceptual papers supporting the implementation of the HCDS*. WCED: Provincial Government of the Western Cape.

Lin, N. (1999) Building a network theory of social capital. *Connections*, 22(1):28–51.

Livingstone, DW. (1997) The limits of human capital theory: expanding knowledge, informal learning and underemployment, *Policy Options*, July/August.

Moleke, P. (2005) *Finding work: Employment experiences of South African graduates*. Employment and Economic Policy Research programme, HSRC: Pretoria.

Nafukho, F, Hairston, NR & Brooks, K. (2004) Human capital theory: Implications for human resource development. *Human Resource Development International*, 7(4): 545–551.

Organisation for Economic Co-operation and Development (OECD) (2008) *OECD economic surveys: South Africa economic assessment 2008*. OECD.

Paterson, A. (2005) Training in the South African public sector. In Kraak, A & Press, K. (eds) *HRD Review*. HSRC: Cape Town.

Paterson, A, Visser, M & Lorentzen, J. (2008) *National Skills Survey 2007*. HSRC: Pretoria.

Pauw, K, Oosthuizen, M & van der Westhuizen, C. (2006) *Graduate employment in the face of skill shortages: A labour market paradox*. Paper presented at the Accelerated and Shared Growth in South Africa: Determinants, Constraints and Opportunities, Conference 18–20 October 2006. Johannesburg.

Raven, G. (2008) Recommendations for taking forward the process of developing and implementing a human capital development strategy and action plan for the biodiversity sector. C.A.P.E & SANBI: Pretoria.

- Reddy, T. (2009) *Climate change crisis: Confronting development aspirations*. Institute for Security Studies. Pretoria.
- Reddy, V, Juan, A & Gastrow, M. (2009) *Science and publics: A review of public understanding of science studies*. Report commissioned by the SAASTA (unpublished).
- Sukhdev, P. (2008) *The economics of ecosystems and biodiversity*. Presentation at "Bridging the Gap", 15 May 2008, Portoroz.
- Sukhdev, P. (2008) *The economics of ecosystems and biodiversity (TEEB): An interim report*. Weltzel & Hard, Wesseling, Germany: European Communities.
- Sutherland, M & Jordaan, W (2004) Factors affecting the retention of knowledge workers. *SA Journal of Human Resource Management* 2(2):55-64.
- The Presidency. (2007) *SETA Review*. Report produced by Singizi Consulting.
- The Presidency. (2008a) *Towards an anti-poverty strategy for South Africa: A discussion document*. Pretoria: The Presidency.
- The Presidency. (2008b) *The framework for South Africa's response to the international economic crisis*. Pretoria: The Presidency.
- The Presidency. (2009a) *Development indicators 2009*. Pretoria: The Presidency.
- The Presidency. (2009b) *Together doing more and better: Medium-term Strategic Framework [MTSF]*. Pretoria: Minister in the Presidency: Planning.
- The Presidency. (2009c) *Green paper: National strategic planning*. Pretoria: The Presidency.
- Tourism, Hospitality and Sport Education & Training Authority (THETA) (2009) OFO\_version 8-THETA. <http://www.theta.org.za>.
- Treasury. (2008) *Provincial budgets and expenditure review: 2003/04 – 2009/10*. Pretoria: Treasury.
- Treasury. (2009a) *Budget speech 2009*. Minister of Finance. 11 February 2009.
- Treasury. (2009b) *Vote 25: Environmental Affairs and Tourism. National medium-term budget statement*. <http://www.treasury.gov.za/budget/2009>

Van Zyl, G & Bonga-Bonga, L. (2007) Fiscal stimulation of human capital and resultant economic growth in South Africa. *South African Journal of Human Resource Management*, 7(1):1–6.

Vass, JR. (2009) *The determinants of employee turnover and its implications for the “job-hopping” phenomenon: A literature review*. HSRC: Pretoria.

Wilson, R, Woolard, I & Lee, D. (2004) *Developing a national skills forecasting tool for South Africa*. Pretoria: HSRC.

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<sup>1</sup> In this research project the term “black” referred to Africans, Indians/Asians and coloureds. This is inline with the term designated group as per the EEA, but also because the numbers for blacks other than Africans were too small to be significant.

<sup>2</sup> The increases in the allocation of the MCM is ascribed to the Antarctic Vessel Supply sub-programme (Treasury, 2009: 574).