

**A SYSTEMS APPROACH TO MAINSTREAMING
ENVIRONMENT AND SUSTAINABILITY
IN UNIVERSITIES:
THE CASE OF RHODES UNIVERSITY,
SOUTH AFRICA**

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ABSTRACT

This study is influenced by the objectives of the Mainstreaming Environment and Sustainability in African Universities Partnership which aims to enhance the quality and relevance of university education through implementation of Environmental Education and sustainability across university functions and operations. It contributes to Education for Sustainable Development through the development of tools to assess sustainability in higher education, investigating sustainability practices in universities and proposing strategies for improving mainstreaming of sustainability. It also contributes to systems approaches in mainstreaming contextual sustainability challenges in university functions and operations. The aim of the study was to investigate how universities can mainstream sustainability in their functions and operations in response to contextual sustainability challenges in a changing environment using a systems approach.

The research was a case study of Rhodes University in South Africa, which is situated in the impoverished Eastern Cape Province. The study involved 12 teaching departments (representing all faculties at the university), four research units and institutes, five managements units, the Estates Division and the Student Representative Council. The theoretical framework of the study draws from a critical realist ontology and systems thinking epistemology. Systems thinking emphasises the interdependencies of phenomena, thus providing the methodology and tools for a systems view of relationships between education and the environmental context in which it is embedded. Critical realism was employed as an underlabourer to systems thinking as it provides for some of the dimensions absent in systems thinking including its depth ontology which facilitates isolating causal factors influencing empirical reality. It recognises that explanation of phenomena can be embedded in history and acknowledges the fallibility of knowledge.

The data collection methods employed in the study include a sustainability assessment using a Unit-based Sustainability Assessment Tool developed as part of the study, interviews, content analyses and observations. Data analyses were performed through employing morphogenetic analysis, and inductive, abductive and retroductive modes of inference. The morphogenetic analysis of social transformation/reproduction was employed to trace the historical emergence of sustainability initiatives at Rhodes University. Induction facilitated reorganisation of the data into themes which particularly represent the main sustainability activities at

Rhodes University. Abduction, through recontextualising data in a systems thinking framework, enabled further insights into the phenomena. In the study, it enabled use of systems lenses as a framework and led to identification of systemic issues affecting mainstreaming and later, the development of systems thinking approaches in mainstreaming sustainability. Retroduction enabled identification of causal mechanisms which influenced the emergence of sustainability initiatives at the university.

The study established that the emergence of sustainability initiatives at Rhodes University followed the 1990 Talloires Declaration and paralleled international institutional developments in relation to environmental and sustainability challenges. Since then, sustainability initiatives have continuously been emerging in various operational dimensions of the university in line with emerging sustainability challenges which resulted in a morphogenetic cycle. The study revealed that Rhodes University has mainstreamed sustainability across the functions and operations of most of the departments/divisions/units forming part of the study, especially in functions like teaching, research, community engagement and operations. There were a few exceptions like the Human Resources Division and to an extent the Research Office/Management Division which are not yet considering sustainability in their operations. While most of the teaching departments had sustainability initiatives in teaching, research and community engagement, there was diversity in the dimension(s) of sustainable development that the departments addressed and this seemed to relate to the disciplinary content of their subjects. In the Estates Division sustainability initiatives included sustainable landscaping, campus environmental management, water and energy conservation initiatives, waste recycling, use of bio-diesel, to mention a few. Students were also involved in various sustainability activities especially through voluntary community engagement initiatives. Sustainability initiatives at the university were also discovered to be embedded within and responding to sustainability challenges of the immediate university environment of Makana District.

The study unearthed the causal mechanisms enabling and constraining mainstreaming activities at the university. These were found to be embedded in the history and context within which the university is operating, and other factors related to university structures and agency of lecturers, other employees and students. Examples of these factors are unsustainable patterns in society, policies and the need to redress past inequalities. The study noted the existence of systemic issues

at the university which need to be addressed to enable and enhance the promotion of a systems approach to mainstreaming: notably, complexity owing to diversity of approaches employed in mainstreaming, the absence of clearly defined university sustainability goals, problems of institutional support and in some cases, disciplinary governing rules which do not leave room for mainstreaming sustainability.

The study established the possibility of improving mainstreaming of sustainability through the adoption of more explicit systems approaches. It suggests use of systems models including the systems-environment model, the functions/structure model and the motion picture model in the process. It recommends making the goal of mainstreaming more upfront, developing a shared understanding of sustainability and mapping out/defining contextual sustainable development issues to grapple with. The study also recommends adopting a holistic approach in mainstreaming, making it a campus-wide initiative, involving all students and developing interdisciplinary curricula. It suggests setting up of supporting mechanisms to strengthen, extend and spearhead mainstreaming and enhancement of collaborative work in sustainable development issues.

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LIST OF ACRONYMS

AISHE	Auditing Instrument for Sustainability in Higher Education
Biochemistry	Department of Biochemistry, Microbiology and Biotechnology
DEAT	Department of Environment and Tourism
DIFS/Ichthyology	Department of Ichthyology and Fisheries Science
DoE	Department of Education
EBRU	Environmental Biotechnology Research Unit
EESU	Environmental Education and Sustainability Unit
EMSU	Environmental Management for Sustainable Universities
ESD	Education for Sustainable Development
GASU	Graphical Assessment of Sustainability in Universities
GHESP	Global Higher Education for Sustainability Partnership
IGAD ICPAC	Intergovernmental Authority on Development Climate Prediction and Applications Centre
ISER	Institute for Social and Economic Research
IWR	Institute for Water Research
LEAP	Local Environmental Action Plan
MESA	Mainstreaming Environment and Sustainability in African Universities
NEPAD	New Partnership for Africa's Development
NGOs	non-governmental organisations
RCE	Regional Centres of Expertise
RU	Rhodes University
SAIAB	Southern African Institute for Aquatic Biodiversity
SAQ	Sustainability Assessment Questionnaire
ST ² EEP	Secondary Teacher Training Environmental Education Programme
ULSF	University Leaders for a Sustainable Future
UNEP	United Nations Environmental Programme
UNESCO	United Nations Educational, Scientific and Cultural Organisation
USAT	Unit-based Sustainability Assessment Tool
WCED	World Commission on Environment and Development.
WSSD	World Summit on Sustainable Development

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1 BACKGROUND TO THE STUDY

1.1 INTRODUCTION

This chapter discusses the setting of Rhodes University (RU) with reference to the socio-economic, socio-ecological and socio-political context and briefly outlines the history of the institution. It goes on to discuss the environmental and sustainability initiatives at RU and outlines the goals of the study. It briefly discusses the methodology used in the study and ends by providing an outline of chapters in this thesis.

1.2 SETTING

RU is located in Grahamstown, a small town in the Makana Municipal District. The Makana District lies in the Eastern Cape Province of South Africa (Figure 1.1); the poorest and second largest province in the country. Most of its population live in rural areas (Lotz-Sisitka and Wilmot, 2007). The Makana District is the seat of the Makana Municipality. The district's local language is *isiXhosa*.

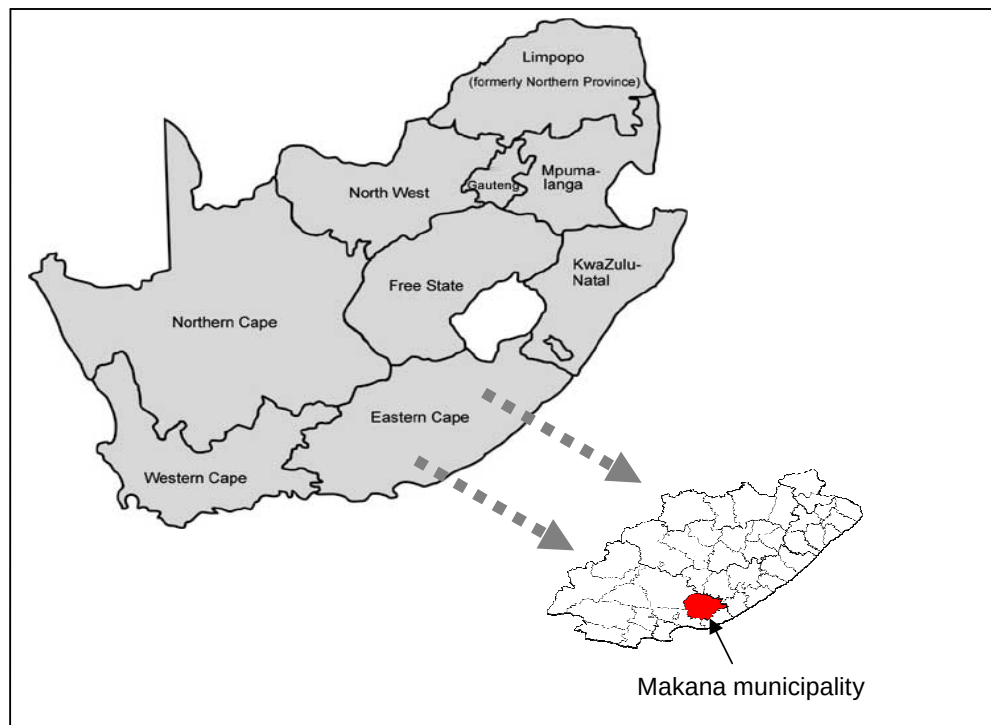


Figure 1.1 Map of South Africa showing the location of the Eastern Cape Province in South Africa and Makana Municipal District in the Eastern Cape (insert)

The study is situated within a society still grappling to recover from a troubled history. The ills of the colonial period and the apartheid¹ regime are still visible 14 years after independence. Apartheid destroyed the social fabric of society in South Africa and resulted in a segmented society along racial lines. During the apartheid era, interracial marriages were forbidden and racial segregation was introduced in all public institutions including education, transport, toilets and cafés to mention a few (Valin, 2003; The apartheid era, n.d.). This segregation permeated all spheres of life and higher education was not spared. According to Badat (2007a, p. 6), “all higher education institutions were profoundly shaped by apartheid planning and by the respective functions assigned to them in relation to the reproduction of the apartheid social order”. The low standard Bantu Education meant for the black population and a history of segregated universities with differential standards has been detrimental to the country owing to long term consequences (The apartheid era, n.d.).

Towns and cities were segregated along racial lines. Townships for blacks, coloureds and Indians were located on urban fringes. Rhodes University is positioned adjacent to Grahamstown’s business district, next to premium suburban settlements in the western part of the town, a former white area. To the east is an impoverished former black township area. Separated by a stream, these two major areas historically represented the divide between the white population in the west and the black population in the east (Figure 1.2).

¹ Apartheid was an invention of the South African National Party aimed at maintaining white domination in terms of control of the economic and social systems (The history of apartheid in South Africa, n.d.). Valin (2003) defined apartheid as a policy of segregation based on the colour of skin which resulted in territorial segregation and ensured the monopoly for Europeans of economic, political and social power.

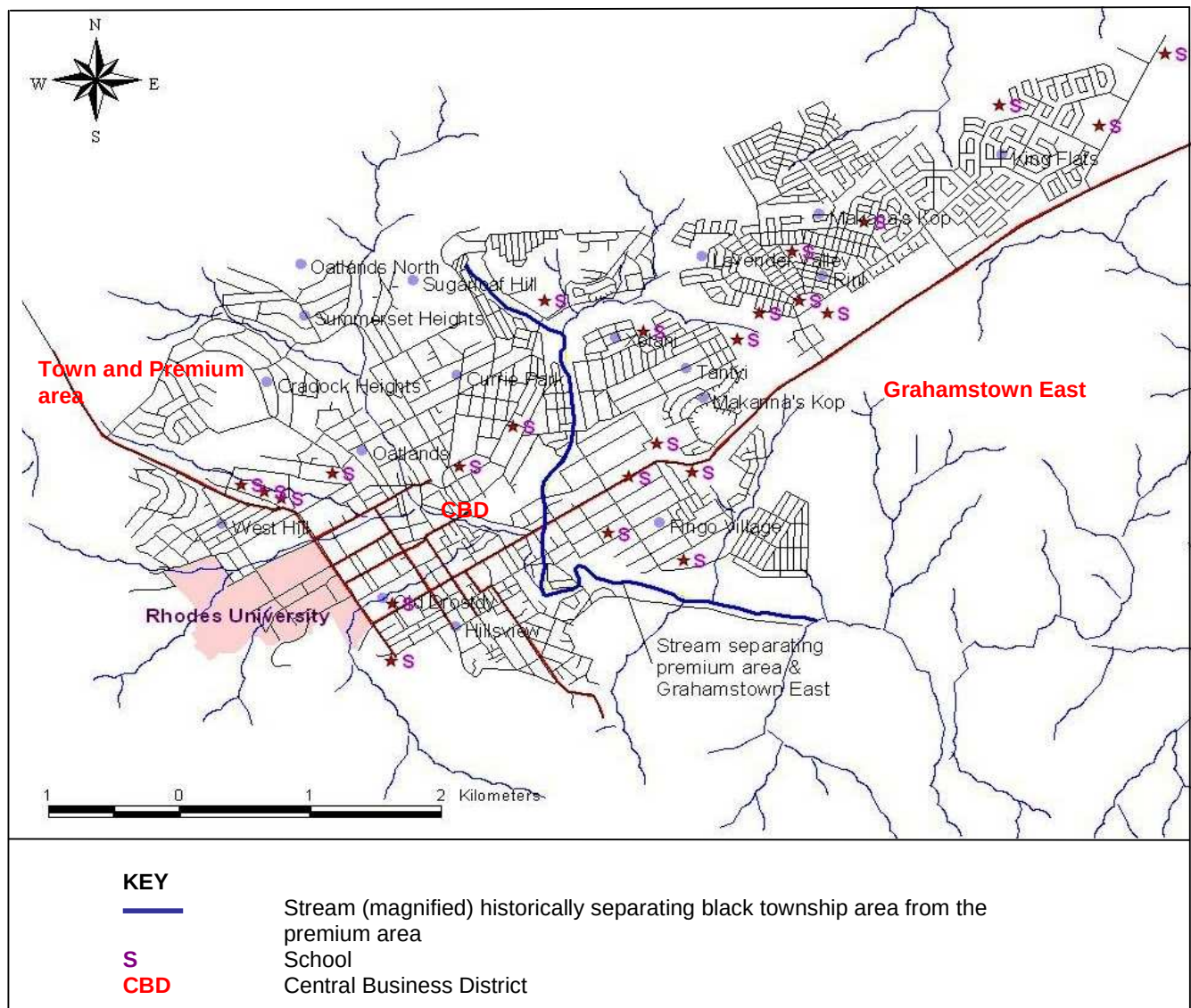


Figure 1.2 Map of Grahamstown showing the location of Rhodes University

This divide is still significant today. The west, though now characterised by a mix of races, remains privileged in terms of wealth, urban infrastructure, services, education and accommodation. The east is still predominantly black and is disadvantaged in terms of lack of commercial activities, poor housing, services, infrastructure and education facilities. In view of continued inequalities in South Africa after independence, Bond (2004) argued that the 1994 election of the African National Congress majority has not changed the structural gap in wealth between blacks and whites but instead, set in motion neo-liberal policies that promote issues of class,

race and gender inequality. Bond (2004) went on to argue that racial apartheid in South Africa has thus been replaced with class apartheid.

The greater Makana District has about 124 000 people (Lotz-Sisitka and Wilmot, 2007) while Grahamstown has approximately 62 000 people (Kelly and Ntlabati, 2007). More people are, however, moving into urban townships from rural areas due to changes in land-use patterns in the Makana District and this is increasing the demand in these townships for basic services like housing (Lotz-Sisitka and Wilmot, 2007).

A Regional Centres of Expertise² (RCE) consultation process in Makana identified a number of sustainable development challenges in the district. Unemployment rates were said to be between 60-70% while the average incomes were found to be roughly between R201-R500 (less than US\$50 according to November 2008 exchange rates) per month against a poverty datum line of R350 (less than US\$35 according to November 2008 exchange rates). The Grahamstown youth have little work experience with many lacking the necessary qualifications and language skills for the current job market. Many households lack access to basic services like electricity, toilets, running water and face problems of malnutrition and food insecurity (Lotz-Sisitka and Wilmot, 2007). A study on HIV/AIDS revealed that HIV prevalence was in the region of 11% in Makana Municipality, with the overwhelming majority of those seeking support coming from Grahamstown East (Kelly and Ntlabati, 2007).

Regarding educational quality and access, previously white schools are still advantaged in terms of quality of education and former black schools have very low success rates. Van der Berg's 2007 paper *Apartheid's enduring legacy: Inequalities*

² The RCE concept is a brainchild of the United Nations University. An RCE is "a network of existing local-regional institutions mobilised to jointly promote all types of learning for a sustainable future", examples being schools, universities, non-governmental organisations, local enterprises, media, local governments, community leadership, scientific organisations and nature parks to mention a few (Mochizuki and Fadeeva, 2008, p. 369). RCEs are meant to deliver Education for Sustainable Development to local and regional communities. They aspire to achieve the goals of the Decade of Education for Sustainable Development (2005-2014) by translating its global objectives into the context of the local communities in which they operate. Key elements of an RCE include governance; collaboration; research and development; and transformative education (Mochizuki and Fadeeva, 2008; Regional Centres of Expertise, n.d.). Rhodes University provides a hub for the Makana RCE.

in education, based on matriculation outcomes, shows that “race, and the race-based former school systems, still remain the most pervasive determinants of educational outcomes” (p. 850). Through voicing the concerns of RU’s Vice Chancellor, Dr Badat, the African National Congress daily news briefing (2007) revealed that 10% of former white schools produce 60% of university candidates, while 10% of black schools produce 20%, with 80% of township schools only producing 20%. Thus, as a result of continued weak performance of black schools, the school system is failing to enhance the upward mobility of black children.

Lam, Ardington and Leibrandt (2008) argued that while the post-apartheid government has made progress in increasing black enrolment and budget equalisation, this has not led to equalisation of outcomes. Disparities in school fees enable certain schools to be better placed in terms of pupil-teacher ratio and other school inputs. The same sentiments were expressed by Van der Berg (2007) who argued that the legacy of apartheid education in terms of racial segregation of schools and under-resourcing of black schools was still evident. Lam et al. (2008) also mentioned high teacher absenteeism, spending teaching time on non-teaching functions and the absence of a culture of learning (which is exemplified by instances of violence and sexual abuse in some schools) as some of the contributory factors to poor performance in former black schools. Van der Berg (2007) suggested that improving the quality of education for the poor in South Africa may help in addressing the situation.

The RCE consultation process also identified water and sanitation as critical basic needs with an “unacceptably high number” of households still using the bucket sanitation system³ (Lotz-Sisitka and Wilmot, 2007, p. 6). Even though there are other stakeholders currently involved in remedying this situation, the government target of eradicating the bucket system by the end of 2007 was not met and about 6% of households still rely on it (Møller, 2008). At the same time, the waste management approaches were said to be creating public health problems (Lotz-Sisitka and Wilmot, 2007).

³ The bucket sanitation system involves collection of human excreta in a bucket, the contents of which are emptied daily, usually at night hence the use of the term “night soil” (Cotton and Saywell, 1998). It is the simplest form of latrine which is low cost but unhygienic (Depledge, 1997).

Biodiversity in Makana is under threat due to agricultural expansion, urban encroachment and invasive alien species (Lotz-Sisitka and Wilmot, 2007). Apartheid policies, through concentrating people in confined areas and depressing wages, helped in promoting poor management of resources. According to a special report published in 1990 by the Worldwatch Institute, a Washington-based research group, apartheid turned the "homelands"⁴ where black people were forced to live into "ecological wastelands" (Worldwatch Institute, 1990). In the Eastern Cape, two such homelands were created: the former Ciskei and the former Transkei (Lotz-Sisitka and Wilmot, 2007).

The Local Environmental Action Plan⁵ (LEAP) process of the Makana Municipality (supported by Rhodes University), involved an environmental audit which culminated in reports highlighting the major areas of concern (Makana LEAP, 2005). Table 1.1 outlines and briefly describes these areas.

⁴ The apartheid regime wanted black people to live separately from white people. Certain areas (homelands) were thus set apart for them. The homelands were like countries where black people could live and vote for their own governments, led by chiefs controlled by the apartheid state (South African history online, n.d.).

⁵ LEAPs were developed as an Environmental Management tool for the improvement of degraded local environments especially where serious environmental challenges are faced, without central government capacity to address local concerns. While most LEAPs are said to have occurred in Eastern Europe in the context of emerging democracies, the LEAP model was considered an important tool to help improve the local environment in South Africa as the country faces similar challenges (Makana LEAP, 2005).

Table 1.1 Environmental issues in Makana (Table data from Makana LEAP, 2005)

Issue	Brief description
Air Quality	Not regarded a key area of concern. Investigation of sources and health impacts at household level may be necessary.
Biodiversity	The diverse and unique vegetation of Makana is under threat due to overgrazing, land development, collection for medicinal purposes, and encroachment of invasive alien plants.
Built Environment	Key challenges include storm water drainage, tree planting, recreational needs, sanitation access and sufficiency, water supply, waste management.
Energy needs	Fuel wood availability in poorer households, little scope for uptake of solar electric panels due to high costs.
Environmental management/ compliance	Industrial environmental management issues include rehabilitation of abandoned mines/quarries, consistent licensing for industries such as tanneries and abattoirs.
Freshwater	Water quantity issues, that is, over-abstraction and lack of collated data on water reserves and demands. Water quality issues, including poor ecological state of the Bloukrans river, no Department of Water Affairs and Forestry water quality monitoring data available for the river, salty water at various river sites, evidence of toxic salt levels at many Department of Water Affairs and Forestry water quality sites.

1.3 A BRIEF HISTORY OF THE UNIVERSITY

Rhodes University was established in 1904 as an English University. Its founding and early history reflects unfolding dominant political ideologies in South Africa. According to Maylam (2005, p. 14), the university was founded as part of a great project which was “to bolster the British imperial connection”. This was during a period following the South African war between the English and the Boers when Milner, the British high commissioner, was trying to rebuild the country along “English” lines so as to suppress the Dutch/Afrikaner culture in the Western Cape which was viewed to be threatening British supremacy (ibid.).

When apartheid segregationist policies were introduced, the university was supposed to conform to them. However, the United Nations Environmental Programme (UNEP) (2006) pointed out that RU started operating as a segregated university even before it was legally bound to do so. According to Maylam (2005, p. 18), research suggests that RU's response to these policies in 1959 “did not really challenge apartheid” and cited a number of occurrences to support his description of the university as “acquiescent” and “accommodating” towards apartheid. RU is also said to have been slow to open its doors to black students (UNEP, 2006). Several academics and students within the university however spoke out and acted against

discrimination (Maylam, 2005) and the university by 1980 had an open admissions policy (UNEP, 2006). Since then, academic programmes at the university started to reflect the socio-political situation of the country and to respond to national developmental issues (ibid.).

Due to the fact that the legacy of apartheid policies still endures (Assié-Lumumba, 2006) and inequalities of the past are said to have continued to shape South African higher education in the post apartheid era (as discussed in section 1.2), the new South African democratic government has dedicated itself to transforming higher education as well as “the inherited apartheid social and economic structure” (Badat, 2008, p. 2). While Badat does not mention environmental sustainability, this has emerged to be one of the challenges that universities worldwide have to grapple with in addition to other national and regional needs.

This study is therefore unfolding during a period of transformation in higher education in South Africa to redress past inequalities. At the same time, higher education institutions in the context of developing nations are expected to address a myriad of other national developmental needs. This attempt to transform higher education is, according to Badat (2007a, p. 7), taking place “within the context of a formidable overall challenge of pursuing economic development ..., social equity and the extension and deepening of democracy *simultaneously*” (emphasis in original).

1.4 SUSTAINABILITY INITIATIVES AT RHODES UNIVERSITY⁶

Rhodes University has a long history of science and environmental research in mainstream science faculties. In 1990, it established the Murray and Roberts Chair of Environmental Education, the only Environmental Education Chair in Africa. Rhodes University also launched the first coursework masters’ degree in Environmental Education in Africa. The university signed the Talloires Declaration in 1998. The declaration was created following a conference in Talloires in France (1990) where university rectors, presidents and vice chancellors convened to discuss the role of universities in environmental management and sustainable development. The meeting discussed issues including the state of the environment and human impact on the environment and concluded that “Universities must play a strong role

⁶ Chapter 4, section 4.2 provides a more in-depth discussion of sustainability initiatives at the university.

in the education, research, policy development, information exchange, and community outreach to help create an equitable and sustainable future” (University Leaders for a Sustainable Future (ULSF), 1990). Being a signatory implies commitment to the recommendations of the declaration which emphasise issues like awareness raising, research and teaching on environmental topics, interdisciplinary programmes, establishing Environmental Policy, developing partnerships among others (ULSF, 1990).

Following the signing of the Talloires Declaration in 1998, the university established an Environmental Policy which committed it to expanding environmental programmes, research and community activities (Appendix 1). The same year, it established Environmental Sciences as a cross departmental programme which later grew to a full department in 2002. The university's 2000 vision and mission shows commitment to addressing environmental and developmental concerns in the Eastern Cape Province and South Africa at large and to redressing the socio-economic ills of the past. An Environmental Programmes Committee was established in 2002 and was later re-oriented to become a senate sub-committee currently known as the Environmental Committee (UNEP, 2006).

RU promotes good environmental stewardship on campus through measures to reduce water and energy consumption, waste recycling and reuse of building materials, use of environmentally friendly herbicides, and emphasises indigenous species, organic fertilisers and symbionts in landscaping (Gyan, 2006). The university has a centre for community engagement, established in 2003, which is involved in a range of initiatives aimed at driving change both at community and government levels (Woods, 2006). The Community Engagement Policy objectives include:

- promotion of community service as a form of higher education transformation in relation to working with the community towards a better future;
- generating graduates who have a sense of civic responsibility; and
- promoting learning which benefits the community as well as provide students with the opportunity to apply theory to local, regional and national development issues (Rhodes University, 2005).

The university staff and students interact with the community through volunteer work (ibid.).

A range of environmental and sustainability programmes are offered by departments in the Science and Education faculties. The Environmental Education and Sustainability Unit (EESU), which holds the Murray & Roberts Chair, is involved in community engagement work through research projects, short courses and workshops (UNEP, 2006). These initiatives facilitate development of the community through sharing knowledge resources and the transfer of skills (Woods, 2006). The unit played a key role in the establishment of the Mainstreaming Environment and Sustainability in African Universities (MESA) Partnership (elaborated in section 1.5) and has been an active participant since then.

1.5 MOTIVATION

My personal interest in the area of Education for Sustainable Development (ESD)⁷ (elaborated in chapter 2, section 2.3.5.2) developed over a period of time. My first encounter with sustainable development issues was during my first degree at the University of Zimbabwe (1995-1997) in Harare, in which one of my two majors was Geography and Environmental Science. I was introduced to sustainable development issues and I learnt to appreciate the multi-dimensionality of environmental and sustainability challenges both theoretically in class and practically through fieldwork as both activities took us through ecological and socio-economic issues. Fieldwork involved visits to different socio-economic areas in both urban and rural environments and issues explored ranged from pollution, waste management, housing, service provision among others; from urban settings to natural and modified environments and small business centres in areas surrounding Harare.

⁷ Education for Sustainable Development aims to develop people's understanding of the interdependence of life on earth, the effects of actions and decisions relating to resource use, and factors which foster or impede sustainable development. It helps develop people's awareness, values and attitudes and enable them to be effectively involved in sustainable development; and hence was named a priority solution in the transition towards sustainability (Palmer, 1998). According to Landorf, Doscher and Rocco (2008) the meaning of ESD is complicated by controversy over its primary component concept, that is, sustainable development; the actual role of education, and the broad and inclusive social issues it seeks to address. There is therefore no widely used or accepted definition of ESD. Landorf et al. (2008, p 221) argued that "the conceptualization and implementation of ESD can be advanced by grounding it in the human capability approach" and suggested that it be termed "*education for sustainable human development*" (emphasis in original) which they defined as "educational practice that results in the enhancement of human well-being, conceived in terms of the expansion of individuals' agency, capabilities and participation in democratic dialogue, both for now and for future generations".

After completing my first degree in 1997, I taught Advanced Level Geography at a mission school in a rural area near the town of Mutare. The geography curriculum which I taught also involved field work both in urban and rural areas. Even though the curriculum was very structured and allowed only little flexibility in terms of practical field work, it helped broaden my environmental and sustainability knowledge and I learned to appreciate how these differed from one region to another.

I also studied for an honours degree in Geography and Environmental Science with the University of Zimbabwe (08/2000-06/2001). Besides expanding on my acquired environmental and sustainability knowledge and embracing current issues in the field through class work, I carried out a research project on socio-economic issues surrounding production and marketing of horticultural products (Togo, 2001). I followed the whole marketing chain from a rural area in Domboshava, a district near Harare well-known for horticultural production, to Mbare *Musika* (a long distance bus terminus in Harare) where these products are sold. The study established that among the challenges that farmers, transporters and marketers of horticultural products face are issues of proper handling and perishability of products (e.g. scratching and rotting which lower their value) both in transit and at the market. While I had discovered a wealth of knowledge in the Faculty of Agriculture library on innovative ways of dealing with those problems, it was not clear to me how the university could play a role in local socio-economic development initiatives like horticultural farming in its immediate community.

I did a Masters' degree in Environmental Policy and Planning (University of Zimbabwe, 2002-2003) where I was exposed to the global policy context and outcomes of international environmental conferences and conventions including the United Nations Conference on Environment and Development and the World Summit on Sustainable Development (WSSD). Chapter 36 of Agenda 21 (promoting education, awareness and training) was emphasised throughout the courses. The curriculum was oriented towards problem solving in environmental and sustainability issues. The programme was also characterised by intensive field trips and a research project. My dissertation was on effluent management at another university, Midlands State University in Gweru (Togo, 2003). The project explored management,

treatment and disposal of effluent and involved testing for adequacy of treatment at disposal points. Results from the study revealed a lack of environmental awareness among some staff members. Chemicals that are not environmentally friendly like phenol, acids (e.g. sulphuric and nitric acids) were disposed through the drain together with stains and dyes; and detergents and disinfectants from the kitchens. The effluent was not adequately treated before being discharged into the environment (Togo and Togo, 2005). It was being discharged into a stream which feeds into a bigger river downstream, creating a health hazard for downstream communities who depended on water from the river for domestic use. The university itself was therefore not acting responsibly in promoting/protecting environmental integrity and at the same time was not adequately educating students to respect the environment. That is when I developed the feeling that *universities have to do something* to reduce their environmental impacts and to help address the ecological and socio-economic challenges facing society.

Towards the end of my masters' project I got a teaching post at a university in Masvingo (Great Zimbabwe University) where I worked for a full year before moving onto yet another post at Midlands State University. Both posts were in Geography and Environmental Science Departments. Besides teaching, these jobs helped me to gain experience in developing teaching and learning materials for new courses and practicals, and in supervising student research. In both experiences, the emphasis was on contemporary issues as geography and environmental issues are dynamic, thus the courses I taught did not only focus on conventional/traditional material but were innovative and embraced current issues. My mindset shifted from the initial "*universities have to do something*" to "*universities could do something*" to help address the ecological and socio-economic challenges facing society.

This study is therefore based on these earlier experiences as it explores the role of universities in contributing to sustainability in the contexts in which they operate. I have since learnt to appreciate the fact that good environmental stewardship guarantees a quality existence for future generations and this research has given me the opportunity to address issues that emerged from my earlier studies.

The study is also influenced by present day sustainability trends in society as, besides the sustainability challenges I had first hand experience with in my earlier

work, there are many other environmental and sustainability problems in present day society. Haque (2000) identified the major environmental challenges facing the world as global warming, deforestation, atmospheric emissions, depletion of the ozone layer and depletion of non-renewable resources. These are mainly problems that result from economic development. While societies require economic development to sustain and, in the case of developing nations, improve living standards, this has come at a cost in environmental terms. In the 1950s, development was equated to economic growth, with emphasis on improvements in income and output. The other dimensions of class, inequality and environmental problems were either not given adequate consideration or were left out (Mudacumura, 2006). However, growing environmental consciousness and worsening environmental catastrophes have led to a new model of development, that is, sustainable development (elaborated in chapter 2, section 2.3).

Environmental and sustainable development issues have been in the limelight for quite some time, ever since it was noted that human activity had many negative effects on the environment, some of them irreversible. The present generation has already been exposed to some of the impacts of poor environmental management, manifesting through, for example, persisting adverse weather conditions. Consequently, environmental and sustainable development issues have become topical in debates at international levels (elaborated in chapter 2, section 2.3) and through various conventions, strategies have been suggested to tackle the problems. However, initiatives at local levels are necessary since most of these are specific to different geographical set-ups, though an integrated approach by the global community is necessary. In the sub-Saharan African context in which this study is unfolding, sustainable development challenges which ESD practitioners should address range from ecological, socio-ecological, socio-economic and socio-political issues, some of which are characterised by risk and vulnerability (see section 2.3.9.2).

Internationally, there have been practical endeavours to deal with the issue of sustainability at various levels. These include conferences, agreements, legal measures and institutions (Haque, 2000) to mention a few, but, there is no comprehensive solution to the sustainable development dilemma. Education has a role to play in pursuing sustainable development and this can be supported by the

emphasis it was given during the Earth Summit in Rio de Janeiro (1992) through Agenda 21. This is the same vision that was later broadened by the international community ten years later at the 2002 World Summit on Sustainable Development to include social justice and the fight against poverty as key principles of sustainable development (United Nations Educational, Scientific and Cultural Organization (UNESCO), 2005). The Summit re-affirmed the educational objectives of the Millennium Development Goals and the Decade of Education for Sustainable Development (2005-2014) was declared, showing that education and learning lie at the heart of approaches to sustainable development (section 2.3.5.2 discusses this further).

Despite an increase in awareness of environmental and sustainability issues through conferences and other forms of intervention, the sustainable development goal is proving problematic. Economic progress has brought about problems like global warming, loss of biodiversity, soil erosion and different forms of pollution (Banerjee, 2003). Environmental risk and uncertainty, poverty, inequality and unemployment have also increased (Clugston and Calder, 2000; Scoulllos and Malotidi, 2004). The Brundtland Report suggested that poverty was responsible for environmental degradation⁸ and called for the meeting of human needs through the flow of wealth from industry (Boadi, 2002). Banerjee (2003, p. 143) however, argued that “advances in science, technology, medicine, agricultural production and the promise that ‘development’ would eradicate poverty remains unfulfilled in several parts of the globe, especially in the third world”.

Presently, there is no comprehensive solution to sustainability problems in sight. Universities, among other stakeholders, have taken up the challenge to play a role in finding solutions. Universities give intellectual and professional guidance to people who will become future decision-makers and developers and managers of society's

⁸ The Brundtland report explained how poverty is responsible for unsustainable patterns through pointing to the fact that the basic needs (food, clothing, shelter, jobs) of vast numbers of people in developing countries, who also aspire for an improved quality of life beyond the basics, are not being met. Such endemic poverty (and inequalities) makes such a world prone to ecological and other crises, hence the need to target meeting the basic needs of all and extending to all the opportunity to satisfy their aspirations for a better life in addressing sustainable development issues (World Commission on Environment and Development (WCED), 1987). The idea that poverty is responsible for environmental degradation has however been refuted by other authors, for example Banerjee (2003) (see chapter 2, section 2.3.3).

institutions and hence have a responsibility to develop the capacity required for a sustainable future (ULSF, 1990). They have a significant influence on policies and decisions made by governments, industry and other stakeholders.

The role that universities can play in addressing sustainable development issues was shaped through various declarations which followed international conferences on Environmental Education and sustainable development, including Talloires (section 2.5 of the Rhodes University Environmental Policy (Appendix 1) is the Talloires Declaration). Wright (2002; 2004) carefully identified emerging themes in these sustainability declarations and translated them into broad statements of intent defining the priority roles of universities in tackling the sustainable development problem. These are as follows:

- developing ecological literacy among students to prepare them to deal with environmental problems,
- applying their knowledge in solving the problems of local communities (universities have a moral obligation to do this),
- having sustainable physical operations,
- aiding the development of an environmentally literate people through public outreach,
- developing interdisciplinary curricula,
- encouraging research that contributes to local, regional and global sustainability,
- collaborating with government, non-governmental organisations and industry, and
- cooperating with other universities to facilitate sharing of information and cooperation in pursuit of practical solutions to the sustainability problem (Wright, 2002, p. 214-218; 2004, p. 13-17).

While these themes are said to form the core of the role of universities in tackling the sustainable development problem (Clugston and Calder, 2002), they have not been adequately considered in the context of African universities. Tools need to be developed to consider whether these themes are equally valid in African university contexts, or whether other perspectives need to be brought into the picture.

This study is situated in the MESA Universities Partnership, developed by the United Nations Environmental Programme and partners in 2004 with the objective of enhancing the quality and relevance of university education through implementation of Environmental Education and sustainability across university operations and functions (Ogbuigwe, 2007a). The MESA Universities Partnership is structured into three phases⁹ which run for the duration of the United Nations Decade of Education for Sustainable Development (2005-2014). The objective of the first phase (2004-2007), that is, establishing and piloting of the MESA Universities Partnership in 15% of universities, was successfully completed (UNEP, 2007). Participating universities have started mainstreaming environment and sustainability issues into teaching, research, community engagement and other management activities.

The first phase of MESA was, however, heavily dependent on individual change agent initiatives, hence it was realised that there was “an urgent need to *extend, expand and strengthen these initial change efforts within a systems-wide approach to mainstreaming* in participating universities” (UNEP, 2007, p. 4, emphasis in original). Among the key lessons learnt is that there is a need to develop a systems approach so as to bring change at an institutional level rather than in individual courses/teaching contexts of MESA participants only (UNEP, 2008) (further discussed in section 2.3.8). Phase 1 of the MESA Universities partnership also identified the need for further tools to support such an approach (ibid.).

The second phase of MESA is aimed at consolidating and strengthening of the partnership project activities in 30% of African Universities (UNEP, 2007). This research is oriented towards informing this second phase of the programme, through supporting the establishment of tools for enabling a systems-approach to sustainability in universities. It is based on the findings of the Phase 1 review of the MESA Universities Partnership which indicated the need for a stronger systems approach to MESA in participating universities.

⁹ Phase 1 (2004-2007): Establishing and piloting of the MESA Universities Partnership Project in 15% of African Universities; Phase 2 (2007-2010): Consolidation and strengthening of MESA Universities Partnership Project activities in 30% of African Universities; and Phase 3 (2011-2014): Expansion of the MESA Universities Partnership to 60% of African Universities (UNEP, 2007, p. 1).

1.6 GOALS OF THE RESEARCH

This study is aimed at making a contribution to ways of enhancing Education for Sustainable Development in universities in an African context. It engages the systems approach in analysing efforts by universities to implement sustainability issues across functions and operations. The project designed an assessment tool that allows universities to review their activities from a systems-wide perspective and went on to develop an in-depth case study of Rhodes University in South Africa to explore some dimensions of a whole systems thinking approach to sustainability in universities (Banathy, 1992; Sterling, 2003; 2004). The intention is to explore the systems approach as an innovation within the MESA Universities Partnership, while helping to define the place and role of the institution in the wider social context.

1.6.1 Research aim and Goals

1.6.1.1 Overall research question

How can universities mainstream sustainability in their functions and operations in response to contextual sustainability challenges in a changing environment using a systems approach?

1.6.1.2 Specific research questions

1. To what extent has the university mainstreamed sustainability in its functions and operations?
2. To what extent are the mainstreamed sustainability initiatives at the university addressing contextual sustainability challenges and the sustainability themes associated with the roles of universities adapted from Wright (2002; 2004)?
3. What factors enabled and/or constrained a systemic approach to mainstreaming of sustainability at RU?
4. What are the causal factors influencing mainstreaming activities at RU?
5. What are the major systemic issues that need to be addressed to improve mainstreaming of contextual sustainability challenges at RU and how can this be achieved?

1.6.1.3 Aim

The questions outlined above were anticipated to provide insights that would enable addressing the main aim of the study which is to come up with recommendations detailing how universities can mainstream sustainability in their operations and functions in response to contextual sustainable development challenges using systems approaches. Results of the study will hopefully inform mainstreaming initiatives in universities in Africa, particularly those within the MESA Universities Partnership, but also others which are not necessarily members. It also hopes to inform sustainability practices at RU.

1.7 METHODOLOGY

This research employs critical realism (Bhaskar, 1978) primarily as an underpinning philosophy that provides for the ontological dimension of the study. Systems thinking provides for epistemological perspectives in the study. Both critical realism and systems thinking are further discussed in chapter 3.

Systems thinking is a holistic approach which emphasises the interrelationships and interconnectedness of phenomena, therefore recognising the importance of relational aspects in context in developing explanations. It provides the methodology and tools to build a systems view of phenomena under study allowing them to be perceived in interrelationship with each other and with the environment in which they are embedded. Understanding of phenomena (for example, a university's functions) is therefore not in isolation but is related to the broader systemic environment or context in which the phenomena exist. This highlights the existence of emergent properties which cannot be understood by studying phenomena in isolation. In this study, systems thinking facilitates viewing education in interrelationship with socio-economic and ecological environments. This allows for understanding university-based educational functions in relation to, for example, sustainable development (socio-economic and ecological) needs in the environment in which education is embedded. This also enables educational institutions such as universities, to take advantage of the existing interrelations so as to address the needs of the environment. In this study recontextualisation of data within a systems thinking framework enabled explaining interrelationships between education and contextual sustainability challenges at Rhodes University and facilitated making

recommendations for improving the mainstreaming of sustainability in higher education in response to contextual sustainable development challenges (chapters 5 and 6).

Critical realism provides for depth ontology, which recognises the fallibility of knowledge. It suggests that reality exists independent of our knowledge with reality being intransitive and our knowledge being transitive. This makes a distinction between the objects of knowledge that science seeks to discover, and the theories that we use to explain them. It seeks explanation beyond empirical evidence using abductive and retroductive modes of inference to develop (fallible) explanations of causal mechanisms that shape human experience. In this study, an understanding of RU sustainability initiatives at the empirical level was constructed and then, through analysis of events and mechanisms using critical realism's depth ontology, explanations were developed to explain their adoption. Besides recognising the importance of context in understanding phenomena, critical realism, unlike systems thinking, goes beyond context to seek explanation in the history of phenomena. The morphogenetic approach offers a methodology for explaining social change over time through tracing the history of emergence of events which are created through structure-agency interactions in morphogenetic cycles. In this study, this enabled explaining the historical emergence of sustainability initiatives at Rhodes University, providing a social change vantage point for systems thinking.

Systems thinking has a flat ontology and constructs knowledge based on empirical evidence only. It does not recognise that the knowledge we have or our understanding of phenomena may be wrong and subject to change as new knowledge is discovered (knowledge is fallible). At the same time, it does not provide for the means to isolate causal factors in complex and messy open social systems where a variety of causes can lead to similar outcomes. It also does not provide a way of understanding the historical emergence of phenomena. While critical realism, like social systems thinking, is based on relational thinking and a concept of open systems, and thus argues against reductionism, it does not provide adequate tools for developing a systems view of phenomena at the empirical level. The two theories were therefore found to be complementary which is why they were both employed in this study (see chapter 3, section 3.2 and 3.3).

1.8 OUTLINE OF CHAPTERS

Chapter 1 has introduced the study by providing a contextual background to the setting of the study through exploring the socio-economic, historical and ecological issues in Makana Municipality in which Rhodes University is located. It goes on to give a brief historical background of Rhodes University and outlines environmental initiatives at the institute. The motivation for the study was discussed and the methodology employed by the study and the research goals were defined.

Chapter 2 reviews emerging trends which shaped this study. It starts by tracing the historical development of African universities and their changing roles in society. It goes on to explore their new role in educating society about sustainable development through a discussion of the sustainability debates, including the controversy surrounding the role of universities in ESD. Included is an examination of the role of partnerships in ESD drawing on the example of the MESA Universities Partnership. The chapter highlights some of the sustainable development challenges of contextual relevance to southern Africa and the appropriateness of critical realist methodologies in addressing contextual challenges. It discusses the importance of assessing sustainability in universities and the characteristics of ideal sustainability assessment tools. Finally, it discusses the need for a systems approach in mainstreaming sustainable development issues in universities.

Chapter 3 presents the theoretical framework and the research design and process. The theoretical framework section introduces the ontological and epistemological perspectives of the study, that is, a critical realist ontology and a systems thinking epistemology. It discusses how these informed the study. The research design and research process section give details of the data generation and analyses methods and of how ethics and validity issues were dealt with in the context of the study.

Chapter 4 is a presentation of the data and is divided into four major sections. The first section following the introduction (section 4.2) traces the emergence of sustainability initiatives at Rhodes University. This is followed by section 4.3 which provides a sustainability picture of RU and is based on results of a sustainability assessment using a tool designed for this study. The third section (section 4.4) elaborates on the initiatives contributing to the sustainability picture at the university. The fourth section (section 4.5) explains the factors influencing mainstreaming, the

approaches being used, the obstacles that are faced in the process and suggestions for improving mainstreaming at RU.

Chapter 5 is a recontextualisation of the data to enable understanding of the findings within a systems thinking framework. It explores the relevance of sustainability initiatives at RU within the context of its immediate environment and the identified key roles of universities (Wright 2002; 2004). It also discusses the interrelationships (system structure) that exist among the various divisions and units at RU with regard to sustainable development initiatives.

Chapter 6 presents an analysis and discussion of the findings. This chapter establishes the causal factors behind mainstreaming of sustainability at RU. It discusses the constraining systemic issues which need to be addressed if a systems approach is to be promoted and extended in the way the university responds to sustainability issues. Based both on literature and transfactual argumentation, the chapter proposes use of systems lenses in facilitating the development of systems approaches in mainstreaming sustainability in universities.

Chapter 7 is the conclusion to the study. It provides a reflexive review of the sustainability assessment tool developed and used in the study, and that of the critical realist and systems thinking frameworks. It also provides a summary of the findings, recommendations and contribution to new knowledge made through the study.

2 CONTEXT OF THE STUDY

2.1 INTRODUCTION

This chapter outlines the general history of African universities. It relates the role of higher education institutions to the historical evolution of dominant development theories leading to the emergence of sustainable development as a new development paradigm. It traces the emergence of the concept of sustainable development, its interpretations and critiques, and considers the role of higher education in addressing contemporary sustainable development challenges. The chapter outlines some of the sustainability initiatives in higher education institutions. It provides an overview of some of the sustainability assessment tools used for assessing sustainability in higher education. It also discusses the capacity of the current education system for addressing sustainable development issues.

2.2 HISTORY OF AFRICAN UNIVERSITIES

2.2.1 The Role of Universities

Universities are considered to have three missions, namely: teaching, research and community service (Clugston, 2000). Most universities developed as centres for the creation, transmission and dissemination of knowledge, and provide professional and technical training through teaching and research (Tünnermann Bernheim and de Souza Chaui, 2003). Universities still serve this role in modern society, though they are no longer the sole providers of professional training or knowledge generation (United Nations Educational, Scientific and Cultural Organization (UNESCO), 1995). Traditionally universities predominantly served the interests of the elite upper social strata (Kuhnen, 1978). Kuhnen (1978) argued that modern universities can only be valuable if they are linked to the whole society (i.e. are involved in community service) and confront existing developmental problems in their contexts. For universities to adequately fulfil their roles, they should operate as communities of free enquiry and expression without fear of political and social reprove (UNESCO, 1995).

Universities have the task of critically engaging with values, discerning the truth and are responsible for developing students who can play a role in advancement of

knowledge and ensuring a high quality of life in future (Clugston, 2000). They therefore, play a special role in seeking solutions to societal problems and should be concerned, not only with economic growth, but also other social, cultural, and political issues (Badat, 2007b). Higher (university) education also has a responsibility for lower educational levels (primary and secondary) as it depends on these for the initial education of its students and educates staff for those levels through teacher education and other facilities. These relationships between the university and its society constitute the relevance of higher education (UNESCO, 1995; Tünnermann Bernheim and de Souza Chaui, 2003).

2.2.2 The African Experience

Universities in Africa can be traced back to institutions that developed in Egypt two to three centuries ago (Ajayi, Goma and Johnson, 1996). Later, famous institutions of higher learning developed as a result of the propagation and establishment of Islam in northern and western Africa. Examples of these are the Karawiyyin (859 AD) in Fez, Morocco, the Al-Azhar (970 AD) in Cairo, Egypt and Sankore in Tumbuktu (12th Century) (Assié-Lumumba, 2006). These later modern institutions developed under the influence of religion and addressed issues relevant to the development problems of the day through the training of rulers and priests (Assié-Lumumba, 2006). However, most modern higher education institutions in Africa were developed in the post-colonial era (Samoff and Carrol, 2003).

Early pre-colonial educational institutions were disrupted by slave trade and colonialism which imposed European education on the continent (Ajayi et al., 1996). African experiences with education and higher education vary contextually within the continent and, because of the influence of a variety of colonial powers; there is no single model for these institutions (Ajayi et al., 1996). Education appears to have been critical in the relationship between the colonial rulers and the African subjects. Education policies were used by colonial administrators to control the “pace and direction” of social change (Ajayi et al., 1996, p. 28).

European derived education, though initially influenced by religion, was biased towards trade, administration and law due to the influence of an emerging bourgeoisie society (Assié-Lumumba, 2006). At the time of colonisation, a national development mission influenced higher education and more or less until the 1950s,

colonial higher education was more of a technical or vocational nature with localised relevance concerns (ibid.). It is said to have responded more to the demands of settlers rather than to the needs of local indigenous populations (Assié-Lumumba, 2006).

The contexts of higher education in Africa changed with the advent of independence in the 1960s. New demands arose, for example, the demand for civil service staff and the need to enhance economic development, bringing about optimism, with higher education considered to be addressing new development challenges (Samoff and Carrol, 2003). Policy in higher education was opening up to the wider international community and universities in Africa were to develop curricula that could be productively applied in national development. During this period, development was taken to be synonymous with economic growth. This is reflected in the dominant development theories of the time (Todaro, 1985; Mudacumura, 2006), examples of which are outlined in the next paragraph.

Neo-colonial dependency models were used to explain that the coexistence of rich and poor countries in an international system with unequal power relations makes it impossible for poor nations to become independent, translating into a new type of colonialism (neo-colonialism) which continues after the formal or physical colonialism (Todaro, 1985; Palma, 1989). Emerging neo-liberal theories over-emphasised economic growth and neglected other concerns relevant to overall national development. The main points of neo-liberalism were summarised by Martinez and Garcia (n.d.) as:

- Market liberalisation where enterprises are liberated from any bonds imposed by the government,
- Cutting public expenditure for social services like education and health care,
- Deregulation where government reduces regulation of everything that could diminish profits, including protecting the environment and safety on the job,
- Privatization of state-owned enterprises, goods and services (including banks, key industries, railroads, schools, hospitals, even fresh water) to private investors, and
- Eliminating the concept of the public good or community and replacing it with individual responsibility.

The assumption was that accumulation of wealth was the solution to poverty based on the “trickle down” effect which assumes that the accumulated wealth will eventually flow to benefit the poor (Rosenberg cited in Lotz-Sisitka, Olvitt, Gumede, and Pesanayi, 2006a, p.5). The neo-liberal theories were based on western knowledge systems and rejected/marginalised indigenous (non-western) knowledge systems and did not consider the physical environment and its resources as integral elements of development (Gutiérrez and Pozo, 2005).

Another related development theory based on economic growth, is the new growth theory, which recognised the potential of new ideas and technology in development (predominantly economic growth and productivity) and viewed knowledge as a form of capital or investment leading to higher returns. This means that economies with a large stock of creative and capable human capital were believed to have the potential to grow faster (Daly, Reid and Haque, cited in Mudacumura, 2006). The human capital theory related level of formal education to individual productivity and that of the population to national economic output and growth (Assié-Lumumba, 2006), showing a strong link between higher education and society. This policy was promoted by the World Bank in Africa.

In South Africa, the role that education played can be explained using correspondence theory. According to this theory, “education systems produce labour for the placement of individuals according to their social origins, and thus legitimise structured inequality” (Assié-Lumumba, 2006, p. 39). In such a situation, dominant classes control education and use it to reproduce social inequality. According to Assié-Lumumba (2006), university education in South Africa was established in the 19th century with the founding of the Cape of Good Hope University (now University of South Africa) with several colleges affiliated to it gaining university status later. Due to apartheid policies in the country (discussed in chapter 1, section 1.2) after 1948 laws were passed for the higher education sector to support the policy of apartheid (Assié-Lumumba, 2006). A bill was introduced in 1959 which made it a punishable offence (£100 or 6 months imprisonment) for a non-white to register at a white university and vice versa (ibid.). A new Bantu law in 1959 led to the redesign of Bantu colleges within “the policy of ethnic concentration and segregation by living and institutional affiliations” (Assié-Lumumba, 2006, p. 40).

The 1970s were a period of economic distress (UNEP, 2006) which, in Africa, was later (1980s onwards) compounded by political turmoil and the spread of HIV/AIDS (Samoff and Carrol, 2003). Basic education, institutionalised at the 1990 World Conference on Education for All, was emphasised and reported to have higher social returns than higher education leading to a decline in investment in higher education (ibid.; New Partnership for Africa's Development (NEPAD), 2005). Faith in the role of universities in development had disappeared (Samoff and Carrol, 2003; Bloom, Canning and Chan, 2005). Students protested against government policies to reduce expenditure in higher education which resulted in hostile government responses to universities culminating in university closures and a compromise of academic freedom (Samoff and Carrol, 2003). During this period environmentalists, reacting to weaknesses in development theories, started calling for development that is sustainable, that takes place within the limits of the earth's resources (Lotz-Sisitka et al., 2006a). This led to the emergence of Environmental Education as a discipline (Jickling, 2005).

In the mid 1990s, higher education was recognised to be critical in building the knowledge economy which is central to the development process in line with the modern knowledge-based economies (Samoff and Carrol, 2003; NEPAD 2005). The African Union has recently established a process to revitalise African universities. The aim of this initiative is to transform universities into "Development Universities" which are contextually relevant and competitive in the global knowledge economy, partners and resources for regional cooperation and integration in Africa and to mobilise stakeholders to create synergies in the renewal of African universities (NEPAD, 2005, p. 12). Proposed initiatives to achieve these objectives include development of university strategic plans on different reform initiatives, strong inter-university collaborations and the formation of sub-regional networks.

This realisation, however, coincides with a period of global economic uncertainty, and political and social upheavals in developing countries (Ajayi et al., 1996) which have an impact on the operations of universities. While challenges among universities differ, some of the problems they are currently facing include the following:

- **Financing** – due to inadequate state subsidies and the monetary interpretation of the private/social rates of return from higher education, leading to the privatisation of universities and thus economic hardships among students.
 - **Access and equity** – changes in the world economy (rising prices of oil and manufactured goods) led to a Balance of Payments deficit of indebted African countries forcing them to accept International Monetary Fund/World Bank conditionalities like Structural Adjustment Programmes in return for technical and financial assistance. This led to a decline in higher education public funding resulting in commercialisation of programmes and problems of equity which affect the poor.
 - **Differentiation** – opening up of private institutions, some for profit, which are more competitive as they target the job market and do not subsidise less demanded courses, yet use staff from subsidised institutions.
 - **Quality and relevance** – increase in student numbers leading to shortage of resources; high enrolment not matched by staff; staff preoccupation with extra income generating activities as a result of poor salaries which leaves less time for research and publications among educators; use of outdated curricula; and, chronic shortages of qualified staff.
 - **Brain drain** – outflow of human capital to developed countries due to poor working conditions, poor salaries, too big classes, lack of academic freedom and other related issues.
 - **HIV and AIDS** – educators dying, absenteeism due to illnesses or caring for the sick.
 - **Information and Communication Technology** – constrained by lack of capacity and unfavourable policy environments - especially the high cost of bandwidth.
- (Katikiti, 2000; Samoff and Carrol, 2003; NEPAD, 2005; Assié-Lumumba, 2006)

Assié-Lumumba (2006, p. 45) defined the problem of African universities as “how to (philosophically and practically) cut the socio-historical link between European society and African institutions and how to root them in their own social structures” and called for further research at higher education institutions in Africa to help come up with guidelines for the formulation of relevant policies. Presently higher education

in Africa is tasked with the role of being socially, environmentally and economically relevant (UNEP, 2006). It has to educate society for sustainability through addressing contextually relevant sustainability issues.

In the case of RU, besides the general problems facing higher education in Africa today, the other important challenges it faces are particularly related to its apartheid history. Its location in the former privileged area requires that it stretches its community arm far for it to be relevant in finding solutions to the problems of Grahamstown East. Without such an element the university would remain detached from the poverty-stricken Grahamstown East. Its status as a former white institution also demands transformation in staff and student profiles.

2.3 SUSTAINABLE DEVELOPMENT

2.3.1 Emergence of the Concept of Sustainable Development

The United Nations Conference on the Human Environment (Stockholm 1972) is considered a landmark event in the history of the concept of sustainable development (Edwards, 2005). In 1974 the concept of sustainable development was used by the Geneva World Council of Churches as a bridge between environmental concerns and issues of poverty and deprivation (Dresner, 2002; UNEP, 2006). Later, the International Union for the Conservation of Nature and Natural Resources referred to sustainable development in 1980. However, it was in 1987 that sustainable development became prominent after the publication of *"Our Common Future"* (The Brundtland Report) by the United Nations' (UN) World Commission on Environment and Development (WCED). The concept gained popularity with the 1992 Rio Earth Summit and in 2002 at the World Summit on Sustainable Development, Education for Sustainable Development was called for and universities, among other higher education institutions, were challenged to play a role, through their functions and operations.

The concept of sustainable development emerged from a realisation of the need to balance economic growth and social progress with environmental concerns (Banerjee, 2003). It was conceived due to a calling by Non-Governmental Organisations (NGOs), indigenous groups and international institutions like the UN to re-examine the concept of development (Banerjee, 2003). The primary focus of the

concept has been the critical challenges posed by environmental problems including, global warming, deforestation, atmospheric pollution, ozone layer depletion and depletion of non-renewable resources (Haque, 2000).

2.3.2 Definition and Interpretation

Various organisations and coalitions have contributed to defining sustainable development and by 1996; there were more than 300 definitions (UNEP, 2006). The most widely accepted definition is the one used in the Brundtland Report, that is: “development that meets the needs of the present without compromising future generations to meet their own needs” (WCED, 1987, p. 43). WCED (1987) explained sustainable development as balancing economic growth with environmental protection without stopping development altogether. According to WCED (1987) both growth and population size should be in harmony with the productive potential of the ecosystem for sustainable development to be pursued. The basis of this thinking is the idea that it is possible to enter a new era of economic growth based on the sustainable development of environmental resources. The report recommends a redirection of development to balance environmental protection and economic development without necessarily stopping development altogether (WCED, 1987; Dresner, 2002). However, the definition is still subject to varied interpretations and controversy regarding its meaning.

In trying to interpret WCED's definition of sustainable development, Munier (2005) identified its three main concepts as development, the present and the future. His explanation was that the development implied is not only about economic growth or progress but incorporates social progress which emphasises equity and equality of opportunities (shelter, education, jobs, health care) and environmental protection to ensure the health of resources for the sake of future generations. The concept of the present was explained as the need to act in the present so as to achieve environmental and social advancement. The future was taken to imply the long-term future inhabited by descendants of the present generation (Munier, 2005).

Edwards (2005) explained sustainability using three Es, which are ecology/environment; economy/employment and equity/equality. He described ecology as incorporating systemic understanding of the indispensability of ecosystems to the continued existence of humanity and the limits that are inherent in

the ecosystems. His concept of economic sustainability takes cognisance of the importance of providing secure employment while maintaining the health of the ecosystem. Equity was said to be about concern for one's neighbour in ecologically-based long-term development (Edwards, 2005). Dresner (2002) argues that the debate around the concept is more about equity and not only about environmental concerns versus growth.

While Banerjee (2003) argued that the sustainable development concept falls under the dominant economic paradigm and does not represent a major theoretical breakthrough, some believe that it brings about a new theory of development (Mudacumura, 2006) or a new paradigm (Edwards, 2005) which is more balanced when compared to early development theories because of its inclusion of social and economic issues alongside environmental concerns. Within this framework, Mudacumura (2006) argued for a general theory of sustainability characterised by economic, social, political, cultural, ecological and spiritual dimensions. He then proposed that these be bridged through three overall findings, namely societal empowerment, global networking and holistic thinking and argued that these create an enabling environment to realise the identified six dimensions of sustainability. His argument for societal empowerment is that development is about people's education and organisation. Empowered people have a sense of security through being able to participate in debates about overall societal welfare and hence they gain control of their lives. Their consciousness is raised and their thinking processes are developed giving them self-confidence and they become more assertive leading to further development through exchange of strategic insights.

Mudacumura (2006) explained that global networking might lead to recognition of the fact that the environment has no boundaries and there is increasing interdependence among people and nations. Development stakeholders are called to work together within and between countries to bridge the ecological, economic, social, political, cultural and spiritual dimensions while devising comprehensive development strategies. This may create an enabling environment for solving complex development issues and to achieve outcomes that may be impossible for any one nation to achieve alone, so as to improve the quality of life. Innovative agendas of various research institutions, governments and industries can also be interlinked (Mudacumura, 2006).

Mudacumura (2006) argues that the holistic thinking approach is necessary because of the multi-dimensional nature of sustainable development, that is, it is an interconnection of social, economic, political, cultural and spiritual dimensions. There is therefore a need to think holistically in recognition of the interconnectedness of sustainable development.

2.3.3 Critiques

The WCED's definition of sustainable development was criticised for being based on economic rather than ecological rationality (Haque, 2000; Banerjee, 2003) and for increasing divergence between the main sustainable development concerns, namely environment and development (Fien and Tilbury, 2002). Banerjee (2003, p. 144) argues that the major question regarding sustainable development is "what is being sustained?" - economic growth, the ecosystem or both? The definition is said to have a utilitarian tendency that views development in terms of consumption levels and that emphasises intergenerational equity rather than interclass and international inequalities. It is also criticised for not adequately addressing implications of internal and international power structures (Haque, 2000). It is further said to be vague with respect to the concept of needs (Pittel, 2002).

Banerjee (2003) criticised sustainable development for privileging western notions of environmentalism and conservation and problematising global survival as sustainable development, while leaving out the sustainability of local (peasant) cultures that depend directly on the biophysical environment for survival. He criticised the global sustainable development discourse (evidenced by the International Monetary Fund, UN, World Trade Organisation and World Bank policies) for assuming that poverty rather than affluence is the problem. He exemplified this by comparing the slash and burn agriculture which is blamed for destroying forests with timber logging by forest companies who are rewarded with tax incentives for following "sustainable practices" (p. 159). Jickling (2005) considers the sustainability movement to be a diversion of people by leaders of industrial nations whose interests shape agendas of major international meetings like the World Summit on Sustainable Development, from focussing on things that matter, to activities of little importance to which people do pay considerable attention.

Sustainable development means different things to different groups of people and there is no simple and straightforward definition or a central issue in which opinions overlap, but an evolving list of issues (climate change, management of water resources, poverty reduction, urban decay, etc) which differ between developed and developing countries (UNESCO, 2006). Sustainability is challenging given the features of environmental and sustainable development issues; they are complex, contested and controversial, emergent, contextual and characterised by uncertainty and risk (UNEP, 2006). However, sustainable development still remains crucial as it has to do with the chances of survival of humanity (Munier, 2005).

None of the interpretations of the concept of sustainable development are neutral. They clash and are in most cases mutually exclusive. Despite this, there is a general agreement that the present course of action is unsustainable, but there is a lack of agreement on what needs to be done (UNESCO, 2006). Fears are that sustainable development may be adapted as a 'greenwash' over unchanged consumption rates (Adams, 1993). Hatting (2002), therefore suggests that the concept remain open to criticism and re-interpretation and argues that people should question themselves, their motives, and the basis of their actions, as well as their implications for others and the future. Sustainable development should not be considered a goal of a fixed state of harmony, but a process of change (WCED, 1987) that provides an opportunity to change people's ways of thinking in learning how to live more sustainably (Sauve, 2002; Jickling 2005).

A re-definition of sustainability issues at the local level is required because sustainable development problems crucial to developing countries are different from those of developed nations. While this study does not attempt to come up with a "better" or "overarching" definition of sustainable development, it takes heed of the criticisms of the concept of sustainable development. The study particularly pays attention to the controversial, emergent and contextual nature of sustainable development problems (see section 2.3.5) and thus maintains that a local contextual redefinition of the term is necessary in devising strategies to tackle it through university education.

Tensions surrounding the concept of sustainable development have led to debate between environmentalists and economists (Dresner, 2002). This might be a result of

what Orr (cited in Shriberg, 2002b) referred to as a polite appeasement of both sides of the debate in the definition of sustainable development by the WCED where sustainability pacifies environmentalists while development has the same effect to economists. Shriberg (2002b) outlined different terminologies being used to refer to this debate as anthropocentrism versus ecocentrism; weak versus strong sustainability; technological versus ecological sustainability; cornucopian versus neo-Malthusian; and economic versus biological sustainability.

Proponents of the anthropocentric/technological/weak sustainability argue that nature is resilient and hence there is need to pursue economic development while looking for market and technological solutions to environmental problems. On the other hand, ecocentric/ecological/strong sustainability adherents call for change in social systems and search for the root causes of environmental problems so as to find systemic and innovative solutions (Shriberg, 2002b). The debate has resulted in different ways of modelling the concept of sustainable development as shown in Figure 2.1. Weak sustainability considers the three dimensions of sustainable development - social, economic and environmental - as separate spheres with an overlap (Figure 2.1a). Strong sustainability shows the environment, society and economy as nested systems (Figure 2.1b) suggesting stronger interdependencies where the ecological environment is the broader context in which everything takes place (UNEP, 2006).

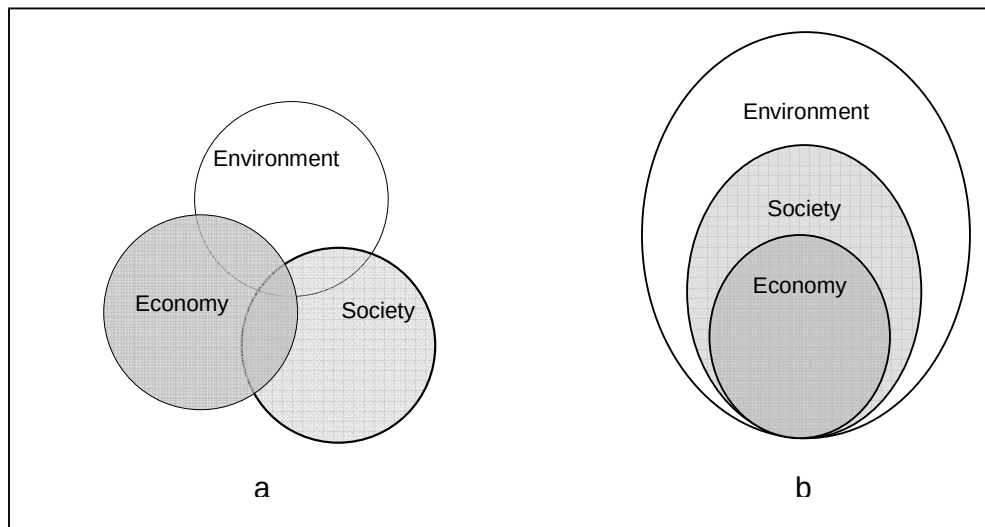


Figure 2.1 Weak (a) and strong (b) sustainability (Adapted from UNEP, 2006).

Strong sustainability shows that the economy, society and the environment are inextricably linked. What transpires in the environment is affected by society or economy. Addressing problems occurring in the economy or society without considering the environment is a partial and incomprehensive approach to solving issues. Commenting on the strong sustainability model, Hatting (2004, p. 162) said

The most important implication of the image of three embedded spheres ... is that economic, socio-political and environmental considerations do not each have their own logic and values separate from the other spheres. Rather they are intertwined from the outset – to such an extent that a fundamental rethink is required of everything that we up until now have conceptualised as economic activity, socio-political engagement and the environment.

This study aligns itself with the strong sustainability model. The model is used in systems thinking to represent complex interconnections among systems (Sterling, 2003). It suggests a holistic approach to addressing sustainability problems. A methodology is provided for this by systems thinking. The model connotes that searching for solutions has to go beyond the individual through addressing relations and interconnections in complex systems. Given the multi-dimensionality of sustainable development, the model may help in conceptualisation and understanding of these issues. In ESD, the holistic approach of the study allows for the appreciation of the interconnectedness and interdependencies of life on earth.

2.3.4 Resilience and Sustainable Development

The concept of resilience is increasingly being used in sustainable development discourse. It was introduced by Holling (1973) in ecological systems (Walker, Anderies, Kinzig and Ryan, 2006). Holling (1973, p. 14) defined resilience as “a measure of the persistence of systems and of their ability to absorb change and disturbance and still maintain the same relationships between populations or state variables”. The form of these disturbances can include storms, fire and pollution (Folke, Carpenter, Elmqvist, Gunderson and Holling, 2002). According to Walker et al. (2006), the more resilient a system, the larger the disturbance it can absorb without shifting into an alternate regime. However, without resilience, ecosystems become vulnerable to disturbances that could previously be absorbed. Folke et al. (2002) defined social resilience as the ability of human communities to withstand and to recover from stresses like environmental change or social, economic or political upheaval.

The logic behind the concept of resilience was explained by Folke et al. (2002). They maintained that the goal of sustainable development is to create and sustain prosperous social, economic, and ecological systems. These systems are inextricably linked as humanity depends on ecosystem services for its wealth and security. People rely on ecosystems for services like clean water and air, food production, fuel, etc. At the same time, humans can positively or negatively transform ecosystems into more or less desirable conditions respectively. Destruction of ecosystems by humanity can have serious implications on human livelihoods. Human and ecological systems are therefore dynamic, interacting and interdependent. According to Folke et al. (2002) resilience in such combined social-ecological systems concerns:

- how much shock the coupled human and natural system can absorb and still remain within a desirable state,
- the degree to which the system is capable of self-organisation, and
- the degree to which the system can build capacity for learning and adaptation.

According to Shriberg (2002b), most definitions of sustainable development leave much to be desired by describing it as an ideal end state, a moral principle or the avoidance of ecological surprise. In support of this view, Folke et al. (2002) maintain that today's development challenges are full of surprises and uncertainties. They cited Holling; Kates and Clark who argued that managing for resilience enhances the likelihood of sustaining development in changing environments where the future is unpredictable and surprise is likely. It is therefore important to build resilience in social-ecological systems as, in low resilient ecosystems, minor disturbances can lead to shifts to less desirable conditions that may even be impossible to reverse.

The Millennium Ecosystem Assessment (see www.millenniumassessment.org) which was carried out between 2001 and 2005 is also in line with resilience thinking. Its aim was "to assess the consequences of ecosystem change for human well-being and to establish the scientific basis for actions needed to enhance the conservation and sustainable use of ecosystems and their contributions to human well-being" (Millennium Ecosystem Assessment Synthesis Report, 2005, p. 9). The main findings

of the Millennium Ecosystem Assessment show that human beings, in a bid to meet human needs, have more rapidly and more extensively changed ecosystems in the last 50 years than any other time in history which resulted in substantial and largely irreversible loss of biodiversity and degradation of ecosystem services which is likely to grow worse (ibid.). This scenario shows the importance of resilience thinking in managing the earth's resources so as to enhance the possibility of sustaining development.

The significance of the concept of resilience in sustainable development lies in the fact that it provides a pro-active approach to sustainability challenges where the emphasis is on mitigating against surprises. The concept therefore caters for the emergent nature of sustainable development challenges. Therefore, while the study will determine what RU is doing in response to contextual sustainable development challenges, it will also establish how those responses contribute to building resilience in the face of these challenges (see chapter 6, section 6.3.2).

2.3.5 Contextual nature of sustainability issues

It was stated in section 2.3.3 that one of the issues which makes the concept of sustainable development complex, contested and controversial is the contextual nature of sustainable development challenges. Generalisation of global sustainability trends tends to mask local sustainability realities which makes it necessary to have a local rather than universal definition of sustainable development. Context in this study is emphasised through the research question which specifically focuses on mainstreaming of environment and sustainability in response to contextual sustainability challenges in university operations and functions. This section highlights prevailing sustainability challenges in the African and South African contexts and how this influenced the choice of a critical realist theoretical framework.

2.3.5.1 The African context

The African continent is rich in natural resources and is characterised by a diversity of cultures, knowledge, resources and development opportunities (UNEP, 2008). According to Case (2006) the continent has one fifth of all known plant, mammal and bird species, and one sixth of amphibians and reptiles. Africa is also characterised by diversity in terms of climate with climatic regions ranging from equatorial, semi-arid tropical to Mediterranean (Hulme, Doherty, Ngara, New and Lister, 2000). It has a

variety of ecosystems, for example savannah, tropical forests, wetlands and montaigne, and coral reef and freshwater habitats (Case, 2006).

The African environment and socio-economic system are however highly vulnerable to the impacts of climate change (UNEP, 2008) and the ecosystem; together with the livelihoods of people; are threatened (Case, 2006). Challenges to the natural environment include climate change, deforestation, over-exploitation of resources, deterioration of marine and coastal ecosystems and water quality issues (Paden, 2007; UNEP, 2008). Problems of poverty, food insecurity, war, HIV/AIDS, environmentally related diseases, drought, water and sanitation are prevalent in the continent (Paden, 2007; Intergovernmental Authority on Development (IGAD) Climate Prediction and Applications Centre (ICPAC), 2007; and UNEP, 2008).

Wars in Africa resulted in 8 million people becoming refugees (Paden, 2007) and, according to UNEP (2008), some countries are still affected by wars and violence. Poverty and food insecurity were also identified as some of the sustainability challenges in the continent (UNEP, 2008). This is worsened by lack of adequate water supply which is likely to “severely constrain food production” further (IGAD ICPAC, 2007, p. 8). Prevalence of diseases like HIV/AIDS (Paden, 2007; UNEP, 2008), leads to pressure on the health system and the economy of countries. IGAD ICPAC (2007) drawing on Nkomo et al. argue that many diseases in the continent are sensitive to climatic factors and give examples of malaria, cholera and meningitis which were found to positively correlate with environmental factors.

These sustainability challenges are compounded by low capacity for responding to environmental changes. The Intergovernmental Panel on Climate Change (cited in Case, 2006) identified lack of economic development and institutional capacity as factors that make African countries highly vulnerable to climate change. UNEP (2008) argues that the continent has low capacity for adapting to climate change. Paden (2007) notes high illiteracy rates of up to 40% in Africa among individuals of more than 15 years. According to Case (2006), negative impacts of climate change in Africa are compounded by other sustainability issues including poverty, diseases and high population density.

Through use of the human development index¹⁰ and the ecological footprint¹¹ in assessing the sustainability of countries, Wackernagel (2007) showed that most countries in Africa do not meet the human development threshold of 0.8 and most have ecological footprints lower than 1.8 which is within the average biocapacity of global resources. Those countries with a high rate of human development had a high ecological footprint and those living within their ecological footprint had a low rate of human development. Notable is the fact that the 19 countries with the lowest human development index are in sub-Saharan Africa (Paden, 2007).

Sustainability challenges prevalent in the African continent are not necessarily reflective of global sustainability challenges. Examples of contextual challenges noted above include poverty and food insecurity, high illiteracy rates and environmentally-related diseases. Africa therefore, according to Paden (2007, p. 128), has “to redefine the paradigms of its development to solve these problems in an African context”. However, owing to environmental diversity within the continent, there are geographical differences in sustainability challenges which call for local contextual redefinition of sustainable development.

2.3.5.2 The South African context

As this study is unfolding in South Africa, it is also necessary to consider sustainable development in the context of the country. Major sustainable development challenges in the country were revealed by the Department of Environmental Affairs and Tourism (DEAT) in the state of the environment report (DEAT, 2006) and the National Framework for Sustainable Development in South Africa (DEAT, 2008). In 2005 the DEAT released a discussion document for the South African National Strategy for Sustainable Development (DEAT, 2005). The aim of the discussion document was stated as “summarising the basis and need for a contextualised South African National Strategy for Sustainable Development” through emphasising “national context parameters” without undermining “international best practice and

¹⁰ The human development index was developed by the United Nations Development Programme as a proxy measure to gauge development (Wackernagel, 2007) and is based on combining measures of life expectancy, literacy, educational attainment, and GDP per capita for countries (Human development index, n.d.). The United Nations considers the 0.8 mark as the threshold for high human development (Wackernagel, 2007).

¹¹ The ecological footprint is a measure of human demand on the ecosystems. An ecological footprint of less than 1.8 global hectares per person makes a country's resource demands replicable (Wackernagel, 2007).

benchmarks" (DEAT, 2005, p. 1). The document also noted the fact that sustainability issues have cultural, political and geographical dimensions in addition to the prominent sustainability dimensions including socio-economic and ecological issues. The discussion document however pointed out that the country's first attempt to address sustainability challenges through its Reconstruction and Development programme following majority rule (1994) was more oriented towards addressing socio-economic inequities and "glossed over" environmental issues (DEAT, 2005, p. 5).

Sustainability challenges discussed in chapter 1 (section 1.2) as part of the local context of the study are reflected at national level. Despite mentioning that the country had made significant progress in environmental management (in areas such as cleaner production, energy efficiency, and renewable energy) in the past decade, DEAT outlined sustainable development challenges, which were identified through detailed assessments, as follows:

- a high and increasing ecological footprint (2.6 ha per person compared to the global average of 2.3 ha),
- increasing pollution, declining air quality with negative impacts on people's health,
- unsustainable exploitation of natural resources,
- declining water quality and aquatic ecosystem health,
- land degradation,
- unmet basic needs,
- unemployment,
- inequality, and
- deeply entrenched and increasing levels of poverty which reinforce direct dependency on natural resources and make the poor more vulnerable to environmental threats like water and air pollution (DEAT, 2006, p. 2).

To elaborate on some of the challenges identified above, the country is said to be meeting the current demands of water but needs to factor in the ecological reserve¹² component. There was a concern of vulnerability to climate change in terms of water

¹² The ecological reserve relates to water that should be left in rivers, wetlands and estuaries to sustain aquatic ecosystems and water sustainability in future.

management and conservation in view of the fact that the country was water stressed and has a developed agricultural sector (DEAT, 2006). Per capita greenhouse gas emissions in South Africa were found to be more than many developed countries due to reliance on coal for cheap electricity (92% of South Africa's electricity is from coal) (ibid.). Sectors most vulnerable to climate change were singled out as health, maize production, plant and animal biodiversity, water resources and rangelands (DEAT, 2006).

Loss of biodiversity and ecosystem functions is another area of concern. The country has a rich diversity of ecosystems, plants and animals and is home to three globally recognised biodiversity hotspots (forests, grasslands, wetlands, estuaries, coastal and marine ecosystems); that is:

- the Cape Floristic Region,
- the Succulent Karoo, and
- the Maputaland–Pondoland–Albany hotspot (DEAT, 2006) (where the Makana District is located).

While biodiversity supports the economy in many ways including agriculture and tourism, the ecosystems are threatened by alien plant invasion and human pressure (DEAT, 2006).

In the case of human vulnerability, poverty and inequality were reported to be high in the country. The number of people living on less than US\$1 per day were said to have increased between 1994 and 2002 but since 2002, poverty is said to have declined due to social grants. Poverty and inequalities are still a challenge in South Africa and, according to DEAT (2006), poor people remain more vulnerable to changes in the environment and this is compounded by HIV/AIDS and sanitation problems, as discussed in the Makana District context in chapter 1 (section 1.2).

South Africa established a National Biodiversity Institute (2004) for monitoring and reporting on biodiversity and by 2005, a National Biodiversity Strategy and Action Plan was in place (DEAT, 2006). The National Framework for Sustainable Development is intended to “serve as a basis from which to develop a national strategy and action plan” (DEAT, 2008). The framework takes cognisance of the

issue of context and hence re-defined sustainable development in the context of the country's developing economy characterised by continuing inequalities and a deteriorating resource base (DEAT, 2008). While the framework accepts the strong sustainability model of sustainable development (Figure 2.1b, section 2.3.3), it however argued that this was underpinned by its governance system (Figure 2.2).

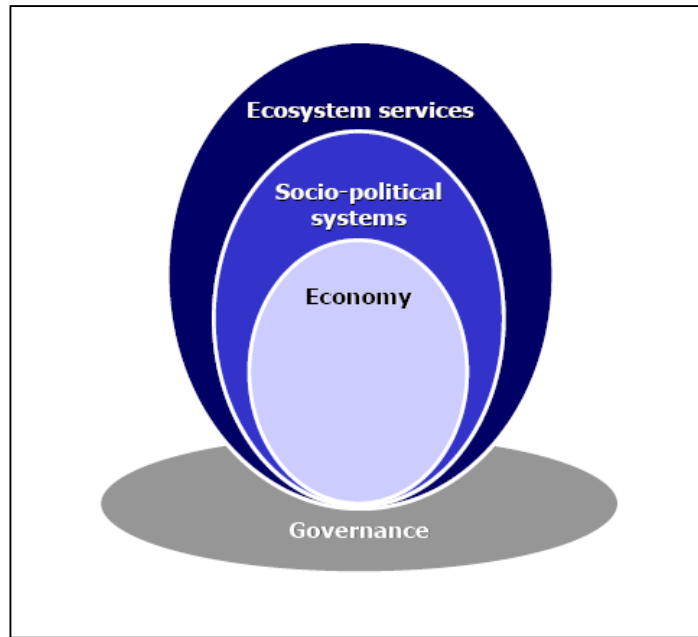


Figure 2.2 Social, economic and ecosystem factors underpinned by governance (DEAT, 2008)

According to DEAT (2006, p. 15), the diagram represents a systems approach to sustainability with social, economic and ecological systems embedded within each other and “integrated via the governance system that holds all the other systems together”.

Like the 2005 discussion document for the South African National Strategy for Sustainable Development (DEAT, 2005), the National Framework for Sustainable Development also emphasises context and notes that some of the growth strategies that were employed by developed economies may not work in South Africa especially due to poverty challenges and inequalities. It also noted the need to keep within ecosystem limits and to develop sufficient governance capacity. All this was said to be necessary in achieving a “*sustainable shared and accelerated growth*” (emphasis in original) (DEAT, 2008, p. 15).

2.3.5.3 Contextual nature of sustainability issues and critical realism

The contextual nature of sustainable challenges influenced the choice of a theoretical framework to inform the study. While it has been indicated that the study employs a systems thinking methodology (section 2.3.3, elaborated in chapter 3), due to the multi-dimensionality of sustainability issues, a critical realist theoretical framework underpins this methodology as it recognises the importance of context, culture and history in understanding mechanisms influencing the nature of these sustainability challenges.

Sustainability challenges in Africa and South Africa are deeply embedded within historical and geographical contexts. A good example of a unique event in the context of South African is apartheid. This was an important factor in the socio-economic and to an extent ecological sustainability challenges that the country is currently facing. To understand these challenges better therefore requires the use of a methodology which recognises interdependencies of life on earth and integrates natural and social sciences.

Benton (2001), argued against a dualism between society and nature. He takes note of the fact that sociology has not been paying much attention to environmental issues until recently. He argued that the sociological engagement with nature has predominantly been through “social constructionism” where nature is separated from “‘culture’, ‘signification’, ‘meaning’, and ‘society’” (Benton, 2001, p. 135). He further argued that sociology has great potential to illuminate environmental discussions (Benton, 2001). The same perspective is shared by Huckle (2004, p. 38) who argued that social science should combine with natural science and vice versa so as to “understand how society is embedded in nature” and at the same time “the forms that nature takes in specific social ... circumstances”.

Benton (2001, p. 144) proposed “a non-reductive but naturalistic sociology of the environment” which recognises several aspects including the evolutionary history of people, culture, their practices and agency; the possibilities for human social development (understood in terms of historical, cultural and geographical variables) and an adequate understanding of environmental issues. According to Huckle (2004), critical realism provides an appropriate methodology as it is a unified science

which bases the natural and social sciences upon common principles even though diverse procedures are employed due to varied subject matters.

According to Forsyth (2001, p. 146) use of critical realism in environmental research helps to show that “scientific explanations of environmental change provide only partial insights into complex biophysical processes”. Through emphasis on the social nature of knowledge, critical realism “sensitises us to the ways in which existing modes of explanation reflect agendas of the societies that created them” (ibid.). To demonstrate this, Forsyth (2001) used, among other examples, the Universal Soil Loss Equation. This was developed in response to soil erosion problems in America and its application in less developed countries with different land use practices, rainfall and soil formation aspects revealed that it was not really universal. Forsyth (2001) also used an example of the deforestation discourse which reflects the values, social framings and perspectives of powerful societal groups. Deforestation is considered as degradation in industrial societies in which trees are associated with natural beauty. However in other locally-based contexts it presents positive beneficial opportunities through provision of energy, building materials and by making available agricultural land (ibid.).

Critical realism developed in reaction to the positivist conception of reality which is based on regularities of events (see chapter 3, section 3.3). It rejects the postmodern ontological relativism¹³ and strong constructivism (Huckle, 2004) but acknowledges that all knowledge is fallible and subject to falsification. Forsyth (2001) acknowledges that environmental science cannot be absolutely realist but that critical realism can facilitate avoiding damaging social and biophysical impacts of environmental discourses which leave out the need and experiences of people not previously included in science. It facilitates examining the extent to which environmental discourses are shaped by the values and experiences of powerful societies (ibid.). Critical realism therefore accepts a weak social constructivism (Huckle, 2004) but also acknowledges that the world is more than these social constructions (Forsyth, 2001, p. 154). This makes critical realism an appropriate theoretical framework in studies which are based on globalising ideologies, but which are situated in possibly unique contexts, especially where the intention, like in this study, is to establish

¹³ Relativism regards the truth to be relative to the individual and considers all points of view to be valid.

contextual influences and responses to the problem. The nature of sustainability challenges in Africa also calls for a critical examination and the critical realist framework provides an appropriate methodology, because it retains a commitment to emancipation.

2.3.6 The Role of Education in Sustainable Development

The sustainable development goal proved more elusive and difficult to realise than was initially expected (Leal Filho, 2000). Though international conferences addressed various environmental problems (climate change, pollution, biodiversity, etc), it was realised that “generating environmental information is not enough” in addressing sustainability issues (Lotz-Sisitka, 2004, p. 12-13). This led to calls for public awareness, communication, education and social marketing, and Environmental Education and Education for Sustainable Development were defined internationally as a response to the crisis (ibid.).

2.3.6.1 Environmental Education

Environmental Education is believed to have evolved from earlier forms of education (González-Gaudiano, 2006). According to Webster (2004) environmental issues penetrated the curriculum during the Romantic Movement in the 18th century in the United Kingdom and America. Before that, nature was considered as a hostile environment or wasteland (Webster, 2004). The Romantic Movement is said to have been in reaction to industrialisation and its associated problems. These early environmental concerns were captured in the curriculum as nature studies in which students would be engaged in education outdoors to enable them to explore the environment (Environmental Education and Training Partnership (EETAP), 1997).

Nature studies evolved into conservation education (Stevenson, 2006) and were taught in science subjects including Botany, Biology and Ecology with the objective of developing awareness of environmental problems (EETAP, 1997). According to Webster (2004), emphasis in schools during that period was on various ways of caring for nature including managing habitats for wild animals and monitoring environmental dynamics and processes. Environmental Education is believed to have later grown out of conservation education (Bowman as cited by EETAP, 1997).

The concept of Environmental Education was formalised by the International Union for the Conservation of Nature and Natural Resources in 1970 following Rachel Carson's *Silent Spring* (1962) which conscientised people about the effects of pesticide use on the environment (Jickling, 2005). Environmental Education was defined by the International Union for the Conservation of Nature and Natural Resources in 1970 as "a process of recognising values and classifying concepts in order to develop skills and attitudes necessary to understand and appreciate the interrelatedness among man [sic], his culture and his biophysical surroundings" (Sato, 2006, p. 1). It seeks "to develop understandings, values and action skills necessary for people to work with others to improve the quality and sustainability of their natural and social environments" (Fien, 1993, p. iv). The European Community Council of Ministers defined the objective of Environmental Education as "to increase public awareness of the problem in this field, as well as possible solutions, and to lay the foundations for a fully informed and active participation of the individual in the protection of the environment and the prudent and rational use of natural resources" (Journal of the European Communities; cited in Palmer, 1998, p. 16).

Environmental Education contributes towards sustainable development goals (UNESCO, 2002 as cited in Lotz-Sisitka, 2004) and has from the beginning, been concerned with relationships between environmental and social issues (Jickling, 2005). It contributes to sustainable development narratives and strives towards goals similar to those of the sustainability concept (Lotz-Sisitka, 2004).

2.3.6.2 Education for Sustainable Development

While education was considered important in addressing environmental problems by the Stockholm Conference (1972), the centrality of its role in sustainable development was emphasised at the Rio Conference in 1992 (Ogbuigwe, 2006) through Chapter 36 of Agenda 21. The WSSD in 2002 identified ESD as a critical intervention area for furthering the goals of sustainable development at a global level. The role of education was then consolidated at the UN general assembly in 2002 when the Decade of Education for Sustainable Development (2005-2014) was declared following the recommendation of the WSSD Plan of Implementation (Ogbuigwe, 2006). The vision was broadened to encompass social justice and the fight against poverty as key principles of sustainable development (UNESCO, 2005). Since then, sustainable development has become a common concern in UN

conferences and there has been consensus that education is a driving force for the change needed (UNESCO, 2005).

In 2002 when the Decade of Education for Sustainable Development was declared, UNESCO was tasked with leading the decade and developing an implementation scheme. UNESCO defined the overall goal of the UN Decade of Education for Sustainable Development as:

... to integrate the values inherent to sustainable development into all aspects of learning to encourage changes in behaviour that allow for a more sustainable and just society for all (UNESCO, 2005, p. 1).

The core objective of ESD was given as promotion of values and ethics through education to positively impact on people's lifestyles and behaviour (ibid.). ESD was said to imply an approach to Environmental Education which is participatory and action oriented while aiming at influencing the direction of change for the better (UNESCO, 2005). The major issues to be addressed by ESD were defined through the UN Decade of Education for Sustainable Development as:

- developing public understanding and awareness,
- improving access to quality education,
- reorienting existing education programmes, and
- providing training programmes (UNESCO, 2005).

ESD has its roots in the history of quality basic education and sustainable development which are areas of interest to the UN (Lotz-Sisitka, Gumede, Olvitt and Pesanayi, 2006b). ESD works towards the attainment of the Millennium Development Goals agreed upon at the Millennium Summit in 2000. Among them is goal 7: Ensure Environmental Sustainability (UNEP, 2006). Key ESD themes were identified as overcoming poverty, gender inequality, health promotion, environmental conservation and protection, rural transformation, human rights, intercultural understanding and peace, sustainable production and consumption, cultural diversity and information and communication technologies (ibid.). The aim of ESD was defined by Palmer (1998, p. 30) as "to help people understand the interdependence of life on Earth, the effects of actions and decisions relating to resource use and factors which foster or impede sustainable development. It is concerned with

developing people's awareness, values and attitudes, thus enabling them to be involved effectively in sustainable development”.

A large amount of confidence was placed in education as the solution to sustainable development as is evident in the literature. Scoullos and Malotidi (2004) and Nicolaides (2006) argue that education is a prerequisite for achieving sustainable development. According to Nicolaides (2006, p. 418), the intention of ESD is “to educate students as the future custodians of the planet, to act ethically and responsibly and to demand less resources and customer goods and the associated manufacturing of pollutants”. UNEP (2006) shares this view and argues that education is not only about knowledge transfer and skills enhancement but is also about working with people to take charge of their own lives in a shared world, through preparing them to plan for, cope with and find solutions to issues threatening environmental sustainability. Smyth (cited in Stevenson, 2006) called ESD a proactive rather than reactive approach to the environment which aims at preventing problems rather than cleaning up afterwards. Palmer (1998, p. 77) sees education as “a priority solution” in the transition towards sustainability.

Alongside arguments in favour of ESD are critiques of ESD as a goal of education. The ESD agenda is said to be broad, diffuse and increasingly dominated by economic discourse which narrows and marginalises environmental perspectives (Lotz-Sisitka, 2004). It is criticised for being based on the concept of sustainable development, which itself is said to suffer from internal contradictions and is subject to a variety of interpretations (González-Gaudiano, 2006). Furthermore, the concept was created outside the education community with a major thrust coming from international and political economic forums (Hopkins and McKeown, 2002). According to Jickling (2005, p. 256) sustainable development is “contested as an aim of education ... [it is] irrational, promoted uncritically and unreflectively”. He argues further that sustainable development, though an important idea, can neither be taken as an “organizing concept” nor “an aim of education” and that it falls short of the potential of Environmental Education (ibid., p. 257).

The current education system has also been critiqued by Woollcombe (cited in Gutiérrez and Pozo, 2005, p. 303) for being good at producing “planetary vandals” where students are trained to plunder the environment for economic growth. At the

same time, it was argued to socialise students into highly unsustainable aspirations (many cars, power boats, skiing holidays), making education's role in sustainable development questionable (Woollcombe cited in Gutiérrez and Pozo, 2005). Education institutions, for example higher education institutions, even directly contribute to sustainability problems (e.g. pollution, resource consumption) that affect the same communities they are supposed to serve (Creighton, 1998; Dunkin, 2000). According to Jickling and Wals (in Lotz-Sisitka, 2004) sustainable development should not be seen as the only solution to environmental problems. They argue that directing education towards sustainable development narrows the possibility for creative alternatives (ibid.). They therefore argue for more open-ended approaches to considering education and sustainability issues.

A lack of agreement on what needs to be done makes the task of educating for sustainability difficult (UNESCO, 2006). Sauvé (2002, p. 2) strongly argues in favour of Environmental Education which she said is “naturalist, conservationist, problem solving, systemic, holistic, humanist, critical, bioregional, feminist, etc”. She argued that the development ideology (in sustainable development) may compromise Environmental Education's basic goals and criticised ESD for being reductionist from the standpoint of basic education. González-Gaudiano (2006) predicted tension during and beyond the Decade of Education for Sustainable Development until an improved policy slogan replaces ESD beginning with the redefinition of the sustainable development concept.

This study is situated within current ESD discourse as it is taking place during the Decade of Education for Sustainable Development. While the study does not claim superiority of ESD over Environmental Education, it is guided by current ESD literature which has explored and tried to define the roles of universities in ESD. The next section elaborates on these defined roles of universities.

2.3.7 The role of universities in ESD

Clugston and Calder (2000, p. 34) described the role of higher education institutions in ESD as to “help students understand the roots of environmental degradation and motivate them to seek environmentally sustainable practices while also teaching the roots of today's injustices in full integration with modelling justice and humanness”. They state that genuine commitment should be evidenced in the critical dimensions

of institutional life (for example, written statements of mission and purpose, academic programmes, energy and purchasing practices, outreach, faculty hiring and development, etc).

Among other higher education institutions, universities are challenged to become key players in educating society about sustainable development (UNEP, 2006). They are called on to utilise their core functions of teaching, research and community engagement to address sustainability issues in the contexts in which they operate (ibid.). They should inform and educate not only students, but also their employees and societies about consequences of environmental degradation (Delakowitz and Hoffman, 2000). UNESCO (cited in UNEP, 2006) outlined the issues to be addressed by universities as follows:

- increasing the relevance of teaching and research for the societal processes leading to more sustainability and discouraging unsustainable patterns of life;
- improving the quality and efficiency of teaching and research;
- bridging the gap between science and education, traditional knowledge and education;
- strengthening interactions with actors outside the university, in particular local communities and businesses; and
- introducing decentralized and flexible management concepts (UNEP, 2006, p. 50).

The role of universities in contributing to sustainable development has been reiterated through various declarations. According to Wright (2002) reference to sustainability in higher education was first made, indirectly though, by the Stockholm Declaration in 1972, and later became central to several others. The Stockholm conference, which was considered a milestone in sustainable development issues, recommended that Environmental Education be promoted in all countries (Scoullou and Malotidi, 2004). Principle 19 of the declaration mentioned that Environmental Education was needed to facilitate good conduct by people and the community at large in improving the environment (UNESCO, 1972 as cited in Wright, 2002).

The 1977 Tbilisi Declaration, which was a result of an intergovernmental conference on Environmental Education held the same year in Tbilisi, was considered one of the starting points of formal initiatives for Environmental Education and offered guidelines for strategies of action (Wright, 2002; UNEP, 2006). The declaration encouraged universities to develop environmental curricula, develop environmental

awareness, provide training, engage in cooperative projects, and inform and educate the public about environmental issues (Wright, 2004).

The Talloires Declaration (1990) was a statement by university administrators of commitment to sustainability (Wright, 2002; UNEP, 2006). It stated that university heads must provide leadership and support to mobilise resources in institutions so as to respond to sustainability challenges (UNESCO, cited in Wright, 2002). Declaration signatories were encouraged to collaborate and to encourage non-members to sign. According to Wright (2002), signatories of the declaration increased from 20 in 1990 to over 275 in 2000.

The Halifax Declaration recognised that universities have a leadership role to play in sustainable development at various levels (local, national and international) and it offered a plan of action for Canadian universities (Wright, 2002). The declaration suggested that universities should rethink and re-construct their environmental policies and practices in order to continue contributing to sustainable development at various levels (UNEP, 2006).

The 1992 Rio Earth Summit culminated in the production of Agenda 21 which has a whole chapter (Chapter 36) that addresses issues of sustainability in education with the main thrusts being:

- re-orienting education towards sustainable development,
- increasing public awareness of environmental issues, and
- promoting environmental training among educators (Wright, 2002, p. 207).

In 1993, the Kyoto Declaration called for a clear vision and creation of specific plans of how to achieve sustainability within universities. At the same time, it challenged universities to use both Environmental Education and their physical operations to promote sustainability (Wright, 2002; UNEP, 2006).

The Swansea Declaration (1993) was an echo of past declarations on sustainability in higher education. It emphasised the need for universities to review their physical operations and the need for environmental literacy. It added a new dimension to the discussion by stressing that equality was important in achieving sustainability and

appealed to universities in richer countries to help their poorer counterparts (Wright, 2002; UNEP, 2006).

The Conference of European Rectors-Copernicus (CRE-Copernicus) Charter (1994) called for a higher education sustainability statement relevant to the universities that form the Conference of European Rectors (now Association of European Universities). It encouraged universities to become leaders in creating sustainable societies and the key areas mentioned were public outreach, environmental literacy and encouraging partnerships (Wright, 2002; UNEP, 2006).

The Thessaloniki Declaration (1997) stated that environmental sustainability must be linked to poverty, population, food security, democracy, human rights, peace and health and a respect for traditional cultural and ecological knowledge (Wright, 2004). It also affirmed the need for re-orientation of university curricula and states that all subjects in formal education must address issues related to environment and sustainable development (UNEP, 2006).

The Lüneburg Declaration (2001), in preparation for the 2002 World Summit on Sustainable Development (WSSD), synthesised most declarations related to sustainability in higher education and stressed the need to understand the interconnectedness of globalisation, poverty alleviation, social justice, democracy, human rights, peace and environmental protection issues in relation to sustainability in higher education (Wright, 2004).

While there are differences in emphasis from one declaration to another, Wright (2002 and 2004) summarised common principles and themes among the majority of institutional policies, national, and international declarations on sustainability in higher education. These emerging themes are summarised in Table 2.1.

Table 2.1 Emerging themes from sustainability declarations (Adapted from Wright, 2004, p. 13)

Declaration	Moral obligation	Public outreach	Sustainable physical operations	Ecological literacy	Develop interdisciplinary curriculum	Encourage sustainable devt*	Partnerships with industry, NGOs, government	Inter-university cooperation
Tbilisi	X	X		X		X	X	
Talloires	X	X	X	X	X	X	X	X
Halifax	X	X		X			X	X
Kyoto	X	X	X	X		X	X	X
Swansea	X	X	X	X		X		X
CRE-CORPENICUS	X	X		X		X	X	
Thessaloniki	X	X		X	X		X	
Lüneburg	X	X			X (1/2)	X	X	X

*devt. - development.

These themes are said to form the core of the role of universities in tackling the sustainable development problem (Clugston and Calder, 2002). They are broad statements of intent and suggest priorities for sustainability in higher education (Wright, 2004). The Talloires Declaration (1990) is unique in that it incorporates all the themes outlined by Wright (2002; 2004). Together with the CRE-Copernicus Charter (1994), the Talloires Declaration is considered to have been most influential for the sustainability movement in higher education institutions in Europe (Geli and Leal Filho, 2006). The following list from Wright (2004, p. 13-17) summarises these declarations:

- **Moral obligation:** This theme is based on the argument that modern universities have two roles - the first one being epistemological in nature where the university has to answer “the great questions of human existence” (the search for knowledge and truth), with the second one being application of knowledge “to solve the complex problems of society” (p. 14).
- **Public outreach:** This theme calls for universities to go beyond the education of their students to educate the general population in the communities in which they reside so as to develop an understanding of sustainable development.

- **Sustainable physical operations:** This theme was not emphasised in sustainability declarations (see Table 2.1). It entails the “greening” of campus operations (p. 15).
- **Ecological literacy:** “The ability of an individual to comprehend the functions of the world with a realization that all human activities have consequences for the biosphere, and the translation of this understanding into action for the health of the earth” (p. 15). This theme is emphasised by most declarations (Table 2.1).
- **Develop interdisciplinary curriculum:** This theme argues that students can become more ecological literate “if they see the connections between each subject they study and the environment” rather than taking a mandatory course in environmental studies (p. 15).
- **Encourage sustainable research:** This is a call for universities to encourage and promote faculty (staff) to carry out research that contributes to local, regional and global sustainability. However, it might be difficult to observe this theme without compromising the academic freedom of intellectuals hence the need for caution in pursuing it.
- **Partnerships with industry, non-governmental organisations and government:** This theme derives from the view that universities cannot create change on their own hence the need for cooperation with other organisations at various levels identified by the theme.
- **Inter-university cooperation:** This theme encourages universities to cooperate with each other besides partnering with other organisations.

The identification of emerging themes by Wright (2002; 2004) was based on declarations which took place primarily in the context of the developed world. Themes emphasised by other important declarations in the sustainability movement in higher education, which were in the context of developing countries, were not included, that is the Kasane Declaration (2002, Botswana) and the Ubuntu Declaration (2002) issued at the World Summit on Sustainable Development in

Johannesburg, South Africa. The themes identified by Wright (2002; 2004) therefore leave out some of the issues which are of particular concern in the African context in which this study is taking place. The Ubuntu and Kasane Declarations mention some of these contextual challenges.

The Kasane Declaration, one of the first of its kind in Africa, like the Lüneburg, was also developed in preparation for the WSSD. It was presented to WSSD as a commitment by participating universities to prioritise the environment and sustainable development in activities like curricula, research and community engagement (UNEP, 2006). According to the declaration, universities should:

- develop human resources capable of integrating social and economic equity, environment and development through democratic and participative processes;
- develop life-long learning skills based on problem and project-oriented approaches;
- ensure gender equity in their programmes and activities;
- promote the use of information and communication technology in the generation, acquisition and dissemination of knowledge;
- ensure that indigenous and contemporary knowledge systems are brought into the learning and research processes;
- facilitate equitable socio-economic development through close collaboration with civil society as well as the public and private sectors in order to support economic, environmental, and technological development;
- be receptive to interacting with other role players in formulating strategies for training and research in sustainable development;
- serve as role models in sustainable resources management; and
- facilitate exchange of views and experiences that will pave the way for educational reforms (UNEP, 2006, p. 26).

The declaration suggests cooperation and networking in addressing the identified areas of higher education re-orientation and noted that universities are “indispensable” sustainable development partners and “catalysts” for change (ibid.).

The Ubuntu Declaration was an initiative by the education and scientific organisations of the world (including the Global Higher Education for Sustainability Partnership (GHESP) (explained further in section 2.3.8), UNESCO, International Association of Universities and the University Leaders for a Sustainable Future) to strengthen Science and Technology Education for sustainable development (UNEP, 2006).

Issues of sustainability raised by the Ubuntu Declaration in which higher education, including universities, has a role to play are as follows:

- Reviewing programmes and curricula of schools and universities, in order to better address the challenges and opportunities of sustainable development.
- Promoting efforts to attract young people to the teaching profession both to meet the Millennium Development Goals of universal access to primary education as well as to further strengthen primary, secondary and tertiary education.
- Developing mechanisms to continuously inform teachers and update programmes on major progress in scientific and technological knowledge relevant for sustainable development.
- Promoting knowledge transfers in innovative ways in order to speed up the process of bridging gaps and inequalities in knowledge.

The declaration called for international partnerships to accomplish ESD goals and suggests networks and RCEs as ways of addressing the outlined objectives (Clugston and Calder, 2002; Ubuntu Declaration, 2002).

Between them, the Kasane and the Ubuntu Declarations raise new thematic areas of focus which are relevant to the African context (some of them were discussed in section 2.3.5). These include issues of:

- access and equity (gender) in education,
- equitable socio-economic development,
- teacher education,
- use of information and communication technology,
- inequalities in knowledge, and
- bringing indigenous and contemporary knowledge systems into the learning and research processes (Ubuntu Declaration, 2002; UNEP 2006).

UNEP (2008) argues that universities in Africa generally operate in a fragile socio-ecological context. Engaging with sustainability therefore does not only imply adopting identified roles but “a deeper engagement with the remaining institutional legacies of colonialism and neo-colonialism in Africa” and involves a “... broader

post-colonial intellectual project of reconceptualising African Universities, their relationship to democracy and societies and the environment in which they are embedded” (UNEP, cited in UNEP, 2008, p. 13). UNEP (2008) also identified use of technology, changing student population and needs, and changes in the way universities are financed, as other important issues.

Initiatives to facilitate the role of education (including universities) which continued beyond 2002 have also not been captured by Wright (2002; 2004). As mentioned in chapter 1 (section 1.5), UNEP and other partners developed the MESA Universities Partnership (2004) aimed at mainstreaming sustainability in universities in Africa. This partnership was developed in an African context and therefore engages with issues of particular relevance to Africa (as reflected in section 2.3.5 and 2.3.9.2).

The launch of the United Nations Decade of Education for Sustainable Development led to an International Implementation Scheme which also highlights the role of education, including higher education, in sustainable development (UNESCO, 2005) (explained further in section 2.3.6.2). The 2007 Ahmedabad Declaration and Recommendations (2007) adopted by the Fourth International Conference on Environmental Education in India, took note of increasing inequalities, climate change problems, poverty, health risks, gender equity, social justice, and environmental health among other sustainability challenges. It emphasised the relevance, responsiveness and accountability of education and highlighted the role of research in identifying alternative methods of learning. It described ESD as a lifelong, holistic and inclusive learning process (The Ahmedabad Declaration, 2007).

Another initiative not captured in Wright’s (2002; 2004) work is the Regional Centres of Expertise (RCEs) for Education for Sustainable Development network (2004), the concept of which was developed by the United Nations University (briefly explained in chapter 1, section 1.2). Regional Centres of Expertise are platforms for learning, sharing information and collaboration among other things, and universities have played an important role in their development. The second international RCE conference in Penang, Malaysia (7-8 August, 2007) concluded that universities are important to RCEs as learning, teaching and research organisations (Mochizuki and Fadeeva, 2008). The four main objectives of RCEs which universities among other organisations involved in RCE networks are expected to address, are:

- re-orient education towards sustainable development, covering existing programmes/subjects from the point of ESD and designing integrated sustainable development curricula. ESD programmes are tailored to address issues and the local context of the community in which they operate;
- increase access to quality education that is most needed in the regional context;
- deliver trainers' training programmes and develop methodologies and learning materials for them;
- lead advocacy and awareness raising efforts to raise public awareness about the importance of educators and the essential role of ESD in achieving a sustainable future. RCEs promote the long-term goals of ESD, such as environmental stewardship, social justice, and improvement of the quality of life (Regional centres of Expertise, n.d).

While sustainability declarations in higher education are said to define the role of universities in addressing sustainable development, it is difficult to explicitly state how these roles are to be met. Problems that universities might face in addressing sustainable development include a poor understanding of the concept (Katikiti, 2000) and misconceptions of what the process of sustainable development entails (Leal Filho, 2000). Clugston and Calder (2000) were, however, optimistic and believed that committed institutions will find ways of defining the concept for themselves. Scott and Gough (cited in UNEP, 2006) argue that universities should provide a platform for debating the sustainability concept rather than rush to develop action plans as the concept does not denote policy objectives that can be implemented once and for all. According to UNEP (2006), sustainability in universities should entail a learning and problem solving process that is open, reflexive and ongoing to cater for changing environmental and social circumstances.

This study intends to establish if there are initiatives in place at RU which address the identified emerging themes. As the study is also focussing on the contextual nature of sustainable development challenges (as was discussed in section 2.3.5), the relevance of both the identified themes and the initiatives in place in relation to the local context will be determined.

2.3.8 The role of partnerships

In pursuing sustainable development, a multi-stakeholder approach was said to be necessary owing to the contested and controversial nature of the concept (Observatory of Good University Practices, 2006). The WSSD Implementation Plan proposed the need to build partnerships (between and among universities, NGOs, governments and businesses) and to develop strategies and methodologies to share knowledge and generate activities to enhance sustainable development (ibid.). UNESCO encourages partnerships at local, national, regional and international levels among various stakeholders with a responsibility or an interest in education and sustainability in the United Nations Decade of Education for Sustainable Development International Implementation Scheme (Lotz-Sisitka et al., 2006b).

Hemmati and Whitfield (2003) argue that partnerships would improve quality of decisions and scale of implementation through a wide range of perspectives, knowledge and experience which may not be possible if only governments are involved. Partnerships improve the strength of ESD by bringing about a transdisciplinary approach that weaves diverse disciplinary contributions together in the quest for sustainability (Hopkins and McKeown, 2002).

Worldwide, many partnerships are being created to facilitate sustainability work. At an international level, significant initiatives include the GHESP which was established in 2000 by four international organisations committed to mobilising universities and higher education institutions to support sustainable development (ULSF, 2002). These are the ULSF, CORPENICUS-CAMPUS, International Association of Universities and UNESCO. GHESP was reaffirmed as Type II partnership¹⁴ at the WSSD in 2002 (UNEP, 2006). The aim of the partnership is developing and sharing strategies, models and best practices for promoting higher education for sustainability, and analysing experience in order to make recommendations in consultation with key Northern and Southern stakeholders (Clugston and Calder, 2002). Collaboration is however, mostly at regional level where sustainability issues are common. GHESP is however no longer operating as its term of operation expired at the end of 2007 (ULSF, 2002).

¹⁴ Type II partnerships were outcomes of the World Summit and involve governments, NGOs and businesses. 283 Type II Partnerships were announced at the WSSD and approximately 12 of these are focused on education for sustainability (Clugston and Calder, 2002).

The MESA Universities Partnership, which is at regional level, has a partnership network involving major global and African players including African universities, UNESCO, the Association of African Universities, Southern African Development Community Regional Environment Education Programme, the Global Virtual University, the United Nations University and GHESP among others (UNEP, 2008). By 2008, the partnership consisted of 77 universities and 29 partners (UNEP, 2008). MESA recognises the central role of universities in sustainable development and is aimed at implementing the United Nations Decade of Education for Sustainable Development objectives in and through universities in Africa (UNEP, 2006), to strengthen Africa's capacity in responding to sustainability challenges, by enhancing the quality and policy relevance of university education in Africa in the context of sustainable development and the Millennium Development Goals (Ogbuigwe, 2007a).

The MESA Universities Partnership suggests that sustainability issues be mainstreamed in all university programmes and across all university functions including curriculum/teaching, research, community engagement and management operations. Mainstreaming was explained as involving the "*systemic integration of environment and sustainability into a wide range of disciplines, faculties, programmes and courses in universities, as well as integration of these concerns into university policies, management practices and student activities ... [It] is value based and involves transformative learning processes and new ways of thinking about teaching, research and community engagement*" (UNEP, 2008, p. 19, emphasis in original). It calls for participatory processes involving "co-definition of what needs to be mainstreamed" and how this can be done in different universities (ibid.).

The objectives of MESA include:

- enhancing quality and policy relevance of African university education in the context of sustainable development and the achievement of Millennium Development Goals,
- increasing the knowledge on ESD in Africa for sound decision making embracing principles and values of sustainable development,

- raising awareness about environment, development and society beyond the university,
- offering opportunities for collaborative projects between universities, civil society, communities and the private sector, and
- contributing to revitalisation of higher education in Africa and to strengthening African scholarship and partnerships for sustainable development (UNEP, 2006, p. 4).

These are to be achieved through:

- an ESD innovation course to strengthen the capacity for establishing ESD in universities,
- seminars for university leaders,
- student workshops,
- biennial conference (opportunity for reporting back ESD work and for North-South dialogue), and
- corporate environmental links and pilot programmes linking university communities with business and industry in sustainable development partnerships (UNEP, 2006, p. 1; Ogbuigwe, 2007b, unpaginated).

As mentioned in chapter 1, this study is oriented towards informing the MESA Universities Partnership. Following Phase 1 of the MESA Universities Partnership, the following operating mechanisms were suggested for phase 2:

- the need for a wide range of capacity building initiatives focussed on a range of university activities necessary for mainstreaming,
- the need for a stronger systems-approach ... in MESA to support systemic changes in universities, so that innovations are not dependent on individual efforts and university leaders need to become more involved, and
- the need for sub regional networks to provide for more localised networked interactions and for stronger integration within university policy systems (UNEP, 2008, p. 33).

Among the key focus areas of phase two is therefore “the development of a systems approach to mainstreaming in participating universities” (UNEP, 2008, p. 33). This had to be supported through the development of tools to promote systems approaches to mainstreaming activities (ibid.). This study therefore developed a sustainability assessment tool based on a systems thinking framework which was

piloted by other universities in the MESA Universities Partnership in tandem with this study. It is also attempting to develop a systems approach to mainstreaming through an in-depth case study of Rhodes University which could also inform the MESA Universities Partnership in expanding the activities beyond the contexts of participants to the take up of initiatives by whole institutions (see section 2.3.9.2 for elaboration on what MESA has achieved so far).

2.3.9 ESD initiatives in higher education

2.3.9.1 A global perspective

In response to the sustainability declarations in higher education, universities worldwide, especially in the developed world, have taken the initiative to reorient their activities towards sustainable development. Different approaches have been used in the sustainability movement, the most prominent being the use of international standards for industries like the International Organisation for Standardisation 14001 and the Eco-Management and Audit Scheme. Within education this has included changing the curriculum or incorporating environmental issues in existing curriculum, introducing new teaching methodologies and involving students in action oriented sustainable development research in communities.

Swedish universities, the University of Glamorgan (Wales) and the University of Applied Sciences in Germany have, for example, made use of international standards in trying to improve their sustainability (Delakowitz and Hoffman, 2000; Arvidsson, 2004; and Price, 2005). According to Delakowitz and Hoffman (2000), the University of Applied Sciences offers a Diploma in Ecology and Environmental Protection and the 30-40 students it enrolls per year on average engage in all the Eco-Management and Audit Scheme steps through practical training and projects. Besides that, environmental protection and basic ecological issues are addressed in other studies integrated into the university's education and training programme. The university is involved in research which works towards improving sustainability in the following areas: alternative sources of energy, techniques for emission reduction, efficient use of energy and resources and chemistry in power plants (ibid.).

Swedish universities made use of Environmental Management Systems in response to the government's decision that public authorities should act as role models in

contributing to sustainable development (Arvidsson, 2004). The methods employed and the target groups differed but generally the Environmental Management Systems work was increasing in some of the institutions while in others there was basically no progress. An example is the Royal University College of Music which concluded that it was not affecting the environment much. It produced an Environmental Policy and considered Environmental Management Systems to be fulfilled and implemented. Arvidsson (2004) concluded that while it was true that the university's negative environmental impacts were negligible, there was need for the university to be at least positive and to find something to work on rather than being passive. The overall conclusion was that it is difficult to force universities into Environmental Management Systems (ibid.).

The University of Glamorgan in Wales also used an Environmental Management Systems approach. It engaged in a process which involved setting up a steering committee, developing an Environmental Policy, implementing Environmental Impact Assessment and developing an environmental management programme. Groups targeted in training and awareness included teaching, technical and administrative staff and students (Price, 2005). While a degree of success was said to have been achieved, Price (2005) argued that centralised initiatives like Environmental Management Systems are difficult to implement at universities as they function heterarchically, that is, they are organisations where there is little or no feeling of responsibility. The university system does not reward resource efficiency and hence lacks incentives for Environmental Management Systems establishment. Price (2005) thus suggested mainstreaming of sustainability into all university operations and incorporating an environmental element (for example, a module) in all courses as one way of tackling the problem.

Nicolaides (2006), commenting on the role of Environmental Management Systems, said that they (Environmental Management Systems) help institutions to practice what they teach, but at the same time argued that there may be obstacles, for example, institutions perceiving Environmental Management Systems as a threat, lack of knowledge among management and resistance by employees who want to remain working in their comfort zones. Lessons from the discussion by Nicolaides (2006, p. 421-422) include the following:

- the impact of the environment should be a primary concern in all university decision making processes and students should be part of the effort as this will make them more likely to participate in sustaining the university environment,
- Environmental Management Systems and ESD provide important opportunities for faculty and students to engage with the critically important issue of sustainability,
- a university which follows an environmentally friendly path enhances its public image, attracts and retains committed employees and reduces consumption and thus saves money, and
- including environmental issues in existing university courses as well as having distinct courses in which content is uniquely environment and sustainability is a better approach as faculties will not feel as if they are working beyond the parameters of their disciplines (Nicolaidis (2006) draws this idea from Dyer's (1996) Pedagogical Model).

Nicolaidis (2006) concluded that an Environmental Management System which includes an ESD component was the way to success for sustainability in higher education.

Wemmenhove and De Groot (2001) carried out a study at the University of Dar es Salaam in Tanzania to establish institutional efforts towards curriculum greening. They discovered that the presence of Environmental Education in the curricula was comparable to that of western institutions but also that the curricula were monodisciplinary. Conclusions from the study led to the definition of three principles. The first one defines environmental issues as Tanzania's main development concern; the second one is centred upon the community and is concerned with community oriented methods and education of the public; and the last one called for student-activating educational approaches (Wemmenhove and De Groot, 2001).

Tahir (2001) investigated the Environmental Education status in higher education institutions offering distance education in Commonwealth Asia. The overall conclusion from the study was that "Commonwealth countries in Asia can boast a few modest, reasonably successful initiatives in distance education on the environment" (ibid., p. 36). However, the study also identified the need for more work

and for creating more opportunities especially with regard to the training of staff at higher education institutions. According to Tahir (2001), it is also necessary to emphasise the linkage between Environmental Education and sustainability in developing environmental awareness.

In Europe, various courses of action have been taken, for example, waste management, resource optimisation and curricular greening but the priority objective was orientation towards sustainability in teaching and research in all fields of study (Geli and Leal Filho, 2006). Some Spanish universities engaged in redefinition of their studies to improve the quality of graduates through what they called the ACES (Curriculum Greening of Higher Education, acronym in Spanish) Network Project (ibid.). The project culminated in the production of a model (the ACES Model) which orientates teaching methodologies and brings to light the aspects required in innovating the university curriculum. However Geli and Leal Filho (2006) believed that much had to be done before sustainability could be achieved. Another attempt that was made to promote Environmental Education was the proposal of a masters' level subject with an international perspective by Buchan, Spellerberg and Blum (2007). The subject was named: 'Aspects of Sustainability: an International Perspective'. The topics proposed include:

- Atmosphere and climate,
- Transport systems, fuel and sustainability,
- Agriculture, conventional and organic farming,
- Ecological economics,
- Tourism and sustainability, and
- Urban physical environments (Buchan et al., 2007, p. 8).

It also included trips to a landfill site and an organic farm (ibid.).

Of critical importance in introducing courses which address sustainability issues is the contextual nature of sustainable development challenges (cross reference to discussion in section 2.3.5). Priority environmental and sustainability problems vary from one country to another leading to variations in ESD foci and approaches in dealing with the problems. The topics proposed by Buchan et al., (2007) may not suit conditions in some countries especially in developing nations where, for example, issues of management and access to clean water resources may be topical.

Problems of poverty and environmental degradation may also rank higher than most of those proposed by Buchan et al. (2007) (see chapter 1, section 1.2 and this chapter section 2.3.5.2). The pollution problem may need to be addressed from the context of pollution of poverty¹⁵ because of the question of technology appropriateness in developing nations. However the proposal is a stepping stone and what could be done is to refocus the topics in various contexts to address relevant topical issues.

The involvements discussed above represent only a small sample of the diversity and complexity of ESD initiatives that are currently taking place in universities around the world. Having a variety of initiatives/approaches in addressing sustainable development challenges can be positively viewed as a strength, especially owing to the contested and controversial nature of these issues. There still isn't a proven correct way of addressing sustainability through university operations and functions. Most of the approaches discussed are, however, fragmented as they only consider, at most, one aspect of the university functions and operations. An example is the use of Environmental Management Systems which targets only the operations division of the university leaving out other important areas of intervention like teaching, research and community engagement. Gough and Scott (2007) noted that universities may find it easier to take corporate action in campus environmental management than other functions. Even though environmental management is influenced by economic incentives, Gough and Scott (2007) argue that this is not necessarily bad as it contributes to environmental sustainability. Because universities purchase a significant amount of material for their running, sustainable environmental purchasing can result in considerable cost savings to individual universities, while a wider application has the potential of influencing supplier behaviour leading to environmental benefits. Clugston and Calder (cited by Shriberg, 2002b) argued that most of the efforts by universities are oriented towards environmental initiatives and hence lack the necessary emphasis on broad sustainability issues. Most of the steps are also fragmented yet sustainability requires comprehensive strategies, as discussed in chapter 6 (section 6.4) and chapter 7 (section 7.4.2).

¹⁵ "Pollution of poverty refers to environmental problems that result from the lack of development rather than from the development process itself. These problems include poor water quality, inadequate housing and sanitation, malnutrition and disease" (Glossary of Environment Statistics, 1997, unpaginated).

This study is attempting to develop a holistic approach to university initiatives addressing sustainability challenges. It is concerned about sustainability in all aspects of university life including teaching, research, community engagement, management, operations and students' activities. At the same time, the study is concerned with broad sustainability issues and not only environmental/ecological issues (section 2.3.5 reveals the multidimensionality of sustainability challenges in Africa).

2.3.9.2 ESD in Africa

In southern Africa, Environmental Education and ESD practitioners are said to be facing a complex array of sustainable development challenges (see also section 2.3.5). Table 2.2 below outlines some of these challenges which were defined through consultations with ESD practitioners in 14 countries.

Table 2.2 Sustainable development challenges of ESD practitioners in southern Africa (Adapted from Lotz-Sisitka et al., 2006a, p. 19-21)

Environmental issues and risks	Social issues, risks and challenges	Economic challenges	Political challenges
▪ Climate change ▪ Environmental degradation ▪ Over-exploitation of natural resources ▪ Land degradation and food insecurity ▪ Fresh water contamination ▪ Air pollution ▪ Solid and liquid waste management ▪ Drought ▪ Wildlife depletion, poaching and loss of biodiversity ▪ Deforestation ▪ Desertification ▪ Water wastage, pollution and inadequate sanitation ▪ Coastal zone degradation and marine issues (degradation of the marine environment) ▪ Land use conflicts ▪ Uncontrolled urban development	▪ HIV/AIDS – resulting in a deepening of poverty, lack of alternatives ▪ Other health risks such as malaria ▪ Education systems which are too theoretical and not practical ▪ Lack of self-sufficiency ▪ Malnutrition and health of children ▪ Vulnerability of women and children due to health risks and abuse ▪ High illiteracy rates, which limits people's participation in development ▪ Street children and orphans ▪ Social values and moral regeneration ▪ Population growth and settlement patterns	▪ Poverty and decrease in standards of living ▪ High level of unemployment ▪ Food security ▪ Land tenure systems still tied to traditional systems ▪ High costs of inputs and low selling prices for products ▪ Shortage of adequate housing, facilities and capital for appropriate development	▪ Corruption and poor governance ▪ Lack of synergy amongst government departments, policies and implementation strategies ▪ Failure to implement policies ▪ Decentralization of policy making ▪ War and lack of security ▪ Short term objectives

Colonial legacies have played a significant role in creating unsustainable patterns in the region through transposing “western principles, ideologies and patterns of thinking” (Schreuder 2002, p. 109). The Decade of Education for Sustainable Development presents an opportunity to redesign education to address these problems. Southern African countries are therefore in the process of re-orienting their curricula and policies from colonially derived systems to those that address contextual social and economic development problems but at the same time respond to the global discourse (Lotz-Sisitka, 2004).

The ESD consultation carried out in southern Africa established that Environmental Education in the region is strongly oriented towards contextual socio-ecological issues, thus it has a strong environmental focus but also considers other concerns to re-orient education towards sustainable development (ibid.). This provides a firm foundation for ESD work in the region (Lotz-Sisitka, 2004). Results of the consultation process also showed that “partnerships and networking are one of the cornerstones of ESD practice”. Education and environmental management organisations were singled out as being particularly concerned about the United Nations Decade of Education for Sustainable Development objectives, although other groups such as scientific organisations, businesses and local governing bodies are also getting involved (Lotz-Sisitka et al., 2006b, p. 3).

Though universities in the region already offer a wide range of environmental and sustainability courses across disciplines, the MESA Universities Partnership has presented them with an opportunity to initiate, extend and expand ESD processes. Initiatives taking place within the MESA Universities Partnership include the review, expansion and introduction of new teaching courses at local levels. Other projects are targeted at reviewing and reorienting research, community engagement and university management practices (UNEP, 2008). The discussion that follows highlights selected projects which were initiated as a result of the MESA Universities Partnership.

Within a year of implementation of the MESA Universities Partnership, a wide range of outcomes in various contexts was evident. Table 2.3 outlines examples of some of the initiatives from the first phase of the partnership.

Table 2.3 Examples of outcomes from Phase 1 of the MESA Universities Partnership (Adapted from UNEP, 2008, p. 31)

University	Achievements
Zimbabwe Open University	The participating department agreed to oversee the development of a university Environmental Policy reflecting ESD principles. The department will act as a secretariat for a United Nations RCE to be developed by the Zimbabwe Environmental Education Consultative Forum.
Egerton University, Kenya	Development of a Masters Degree in Environmental Science based on UNEP MESA material, expansion of a botanical garden, establishment of an Environmental Week, and Dean's committee seminars in two faculties.
University of Swaziland	Held a planning meeting, consulted with the Vice-Chancellor and established the UNISWA steering committee for the implementation of MESA. Developed a proposal to audit existing courses on 'sustainability elements' within the university.
Mekelle University, Egypt	All courses in the Department of Land Resources have included a chapter on sustainable development, engaging in tree planting with resource management and environmental protection and environmental clubs to raise student awareness on environmental issues.
University of Buea, Cameroon	Establishing a national network for ESD with other universities, establishing a regional network with universities in Chad, Central African Republic, Gabon and the Republic of Congo for ESD training, utilising adapted case studies to consider ways of integrating sustainability into various degree programmes, and ongoing revision of existing university syllabi to include ESD.

In the second phase of the programme, universities are addressing ESD through change projects at local levels. Out of the 23 change projects, 18 were identified through a sustainability assessment using the Unit-based Sustainability Assessment Tool (USAT) developed as part of this study (see Chapter 3, section 3.5.3.1 and Appendix 2, no.1), which facilitated ascertaining areas within the university which required improvement in terms of mainstreaming sustainability. The USAT was used in various ways with many of the universities employing only one out of its three parts, as part of an International Training Programme used to strengthen phase 2 of MESA. Some examples of the change projects are as follows:

- The Engineering faculty of the University of Mauritius is involved in an Eco-Campus initiative where it is exploring the possibility of composting office waste paper and providing more sustainable energy resources for Mauritius (UNEP, 2008). A pilot project has been established in the Engineering faculty with the intention of expanding it to incorporate the whole university and the community (Ramsun-Aulum and Davies, 2008). The initiative also involves the development of a compulsory General Education Module which will address sustainability issues (UNEP, 2008).

- The University of Botswana's Education Faculty is introducing a Masters Degree in Environmental and Sustainability Education, with a focus on contextual sustainability challenges including water management, climate change, mining, and biodiversity among others (UNEP, 2008). MESA participants at the university have been engaged in a stakeholder consultation process, have carried out a needs assessment using the USAT, and have set up departmental regulations and modules for the programme (Ketlhoilwe and Jeremiah, 2008). The initiative has already been approved by the responsible authority, that is, the university's Department of Languages and Social Sciences Education Board (ibid.).
- The National Institute of Public Administration in Zambia has set in motion a process of mainstreaming Education for Sustainable Development within specific courses (Munyambago and Yamba, 2008). The project commenced in April 2008 and is being piloted in the management division of the institute where sustainable development concepts are being incorporated into the Diploma in Management Studies and Project Management programmes (ibid.).
- Juba University in Sudan is involved in establishing and implementing a policy on mainstreaming sustainability issues into university teaching, research and community engagement (Ramadan and Abusin, 2008). The draft policy document has already been established (ibid.).
- The Faculty of Law at the University of Cape Town in South Africa is involved in restructuring the Environmental Law curriculum to ensure a wider perspective on Environmental Law, and access to Environmental Law modules (UNEP, 2008). The curriculum was re-oriented to include Principles of Environmental Law, Natural Resources Law, Pollution Law and Land-use Planning Law (ibid.).

These examples show that MESA is supporting curriculum change, changes in management practices and community engagement in its activities.

However, not all activities in Africa are directly related to MESA. A study carried out by Gyan (2006) to assess implementation of environmental policies in South African universities revealed a number of sustainability practices in four universities which turned out to be the only South African universities with environmental policies at the time of the study. These include the University of Cape Town, the University of Kwazulu-Natal, Nelson Mandela Metropolitan University and Rhodes University (currently only the University of Cape Town and Rhodes University are involved in MESA). The four universities were reported to be in the process of implementing their environmental policies. However, all of them had neither Environmental Management Systems in place nor set measurable assessment targets (Gyan, 2006). The universities were also facing problems related to finance, human resources and lack of Environmental Education among employees which negatively affected the implementation processes (ibid.). At the same time Gyan (2006) argued that the efforts by the institutions were piece-meal and not well-coordinated. However, despite the mentioned set-backs, the following practices were identified:

- Water – all the four universities had put in place water conservation mechanisms even though some reported increasing water usage due to growing student numbers. Some were also involved in water recycling and leakage reporting.
- Energy – all the universities were involved in energy conservation practices with some having monitoring systems in place.
- Solid waste – two universities were involved in waste recycling while two others sorted waste on site which was then collected for recycling.
- Hazardous waste – all the universities were contracting private companies to collect their hazardous waste.
- Biodiversity – a common trend among the universities was that of a shift in focus from exotic to indigenous vegetation even though at the University of Cape Town some members of the university were reported to be in favour of exotic trees.
- Land management – there was use of Geographical Information Systems in land management throughout the universities.
- Transport – the University of Cape Town and Nelson Mandela Metropolitan University had student bus services which encouraged transport pooling.

- Building design and renovation – these two areas were also given consideration in various ways among the universities, for example, carrying out Environmental Assessments before constructing new buildings, installing energy efficient heating and lighting systems in new buildings.
 - Purchasing – only the University of Kwazulu-Natal and Rhodes University took into consideration environmental issues in purchasing selected items, for example, pesticides and bulbs where the most environmentally friendly were chosen.
 - Environmental Education – all the universities had Environmental Education as part of courses and research activities. Three had specialised environmental courses with the exception of Nelson Mandela Metropolitan University.
 - Environmental Education for staff – only the University of Cape Town had an induction course for new staff while the University of Kwazulu-Natal and Nelson Mandela Metropolitan University targeted specific groups of employees. All the universities were however involved in communicating environmental information through various means.
- (Gyan, 2006).

Many other sustainability initiatives are also taking place in Africa outside university contexts. An example is the Secondary Teacher Training Environmental Education Programme (ST²EET) in Zimbabwe which was initiated in 2003, which responds to Environmental Education and ESD through focussing on teacher training colleges (Chimbodza, Ongevalle and Madondo, 2004). The project is mainstreaming Environmental Education into all teaching courses in Zimbabwe's secondary teacher training colleges so as to enhance life skills and sustainable use of natural resources (ST²EET outcome mapping workshop, 2005). Activities of the project include formulation of projects, sensitisation workshops in colleges, establishment of environmental parameters, development of Environmental Education resource material and orientation programmes for college lecturers (Chimbodza et al., 2004).

Informal initiatives in addressing ESD are also taking place in the Southern African region. In South Africa for example, Share-Net, an informal educational resource materials development network, facilitates collaboration in development and use of Environmental Education resources to support teachers and the community in

Environmental Education processes (Taylor and Janse van Rensburg, 2002). In Zimbabwe, the Rifa Conservation Camp, set up in 1982 promoted conservation education for the youth during the time it was in operation (Stiles, 2002). An existing informal initiative in the country is the Conservation Education Centre which is funded by the Sebakwe Black Rhino Conservation Trust. The centre was established in 2003 and is running Environmental Education programmes for schools, universities and colleges. Its objective is the promotion of environmental conservation and sustainable development through education, research and community involvement (Sebakwe Black Rhino Trust, n.d.).

Despite the above mentioned initiatives, a lot still needs to be done to make universities sustainable. The Southern African Development Community Regional Environment Education Programme consultation process in Southern Africa revealed that few higher education institutions address ESD issues through their research programmes and that these need to be strengthened and extended to improve quality (Lotz-Sisitka, Olvitt, Gumede and Pesanayi, 2006c). Among the setbacks identified in the region are inadequate resources, shortage of funding, lack of awareness among staff and policy issues (MESA Audit Questionnaires, 2007). According to Ogbuigwe (2007b), initiatives like the MESA Universities Partnership may not succeed if they are not supported by the necessary financial and human resources, and this is a challenge faced by universities in Africa.

One of the emerging strengths of the MESA Universities Partnership, besides a high quality of decisions through sharing knowledge and experiences, lies in the fact that the programme runs in phases. This enables a review of the completed phase so as to inform the upcoming one. Phase one of the MESA Universities Partnership, though it was successfully completed, established that mainstreaming was basically taking place in individual teaching contexts of MESA Universities Partnership participants (UNEP, 2008). At the same time, it identified the need for developing tools to support mainstreaming activities. Phase two of the MESA is therefore exploring the infusion of systems thinking for mainstreaming sustainability activities in order to promote a university-wide approach, and the development of tools to support such an initiative (ibid.).

2.4 SUSTAINABILITY ASSESSMENT TOOLS

Despite the fact that sustainable development remains a contested and controversial concept and that it is still not clear what universities moving towards sustainability should focus on, there is need to assess sustainability so as to benchmark initiatives, identify weak areas within institutions and to measure progress with time. According to Shriberg (2002a), assessment tools can help in operationalising charters and policies on sustainability in higher education. Declarations like the Talloires only outline guidelines but do not say what exactly education should do to contribute to sustainability. Sustainability assessments can also help define priorities for universities and provide a basis for institutions to compare and reflexively review their sustainability efforts. Lozano (2006) indicated that sustainability reporting helps to communicate the efforts and progress of the organisation/institution to stakeholders.

According to Brizius and Campbell (cited in Horsch, 1997), an indicator provides evidence of the existence of a condition or that certain results have or have not been achieved thus enabling decision makers to assess progress towards the achievement of intended outputs. Indicators are “proxy measures that point to a certain state or condition of not directly measurable complex systems” (Reid, Nikel and Scott in Müller, n.d., p. 8). One of the issues emerging through ESD debates is the possibility of knowing the effectiveness and efficiency of policy making (Müller, n.d). Bell and Morse (cited in Müller, n.d.) note that indicators have been promoted widely as evaluative tools for monitoring progress in sustainable development among other aspects. They also aid in enhancing the quality of ESD through informing decision-making processes in sustainable development (Müller, n.d). According to Wals (cited in Müller, n.d.) many people across the world are working on developing indicators of sustainable development.

According to Horsch (1997), the process of choosing appropriate indicators can be difficult and this makes it necessary to observe certain criteria involving the inclusion of several people and those who will be responsible for data collection and data use, and those with the technical expertise to understand the strengths and limitations of specific measures. Othman and Pereira (n.d., p. 8) cited Peterson; Smith; and Spangenberg et al. who argue that indicators must be “simple, easily understood to

policy makers and public, widely credible, scientifically valid, transparent to non-experts, quantifiable, independent, robust, linkable, [and] sensitive". In this study, indicators were developed through a review of internationally recognised sustainability assessment tools which are elaborated in the discussion that follows.

Among a variety of tools that have been developed for use in assessing sustainability efforts in higher education (Shriberg, 2002a; 2004; Lozano, 2006) are the Sustainability Assessment Questionnaire (SAQ) (ULSF, 1999), the Auditing Instrument for Sustainability in Higher Education (AISHE) (Roorda, 2001) and a tool for the Graphical Assessment of Sustainability in Universities (GASU) (Lozano, 2006). The SAQ offers its users a comprehensive definition of sustainability in higher education and provides a snapshot of institutions on the path to sustainability (Shriberg, 2004). It covers seven critical dimensions of higher education including:

- curriculum,
- research and scholarship,
- operations,
- faculty and staff development and rewards,
- outreach and service,
- student opportunities, and
- institutional mission, structure and planning (ULSF, 1999).

Shriberg (2004) argues that the questionnaire has a clear focus on sustainability and sustainability processes and paves the way for designing sustainability strategies at the local level. The major weakness of the SAQ is that it is primarily qualitative and impressionistic and hence responses cannot be used to rate or compare institutions (ULSF, 1999). At the same time, in large institutions, considerable effort will be required to answer many of the questions comprehensively, for example listing courses and research efforts related to sustainability (Shriberg, 2002b), making this a time consuming task.

The AISHE was developed in recognition of the fact that, while various charters give direction to the way in which higher education can contribute to sustainable development, they do not offer guidelines on what exactly needs to be done. There was therefore need for a concrete list of criteria operationalised through some

auditing instrument. The AISHE makes it possible to decide by internal or external auditing, to which level the university (or a part of it) has succeeded in implementing sustainability. AISHE consists of 20 criteria within five fields of attention as follows:

- vision and policy,
- expertise,
- educational goals and methodology,
- education contents, and
- result assessment (Roorda, 2001).

Roorda (as cited in Shriberg, 2004) defined the goal of AISHE as expanding sustainability efforts across Europe and the world, resulting in certificates, awards and other forms of recognition for users. AISHE is also a tool that can foster participation in the auditing process. It is said to be an excellent example of a process-oriented approach to sustainability assessment (Shriberg, 2002b). According to Shriberg (2002b), a significant weakness of AISHE is that the criteria are abstract and difficult to understand. The tool does not explicitly include indicators on motivations for pursuing sustainability which makes it possible for institutions to use the tool without being explicit about the reasons for moving a campus in a particular direction (ibid.).

The GASU was designed to facilitate the analysis, longitudinal comparison and benchmarking of universities' sustainability efforts and achievement. It was developed by modifying the Global Reporting Initiative Sustainability Guidelines. Lozano (2006) argues that the Global Reporting Initiative guidelines are one of the most comprehensive tools for assessing and reporting sustainability as they are inclusive of the three dimensions of sustainable development (economic, environment/ecological and social). The Global Reporting Initiative indicator hierarchy identified 13 indicators under economy, 35 under environment and 49 under social dimensions. Lozano (2006) modified these guidelines by including the education dimension so as to make them suitable for universities. The GASU therefore uses indicators grouped under economic, environmental, social and educational dimensions and offers a condensed graphical overview of these (Lozano, 2006). Its major strength lies in the fact that it is indicator-based which, according to Lozano (2006), makes it better in terms of transparency, consistency

and usefulness for decision-making over accounts and narrative assessments. It can also be used to measure and compare progress, two aspects which Shriberg (2002b) identified as most difficult in assessing sustainability in higher education.

Ideal sustainability assessment tools, according to Shriberg (2002b, p. 74-76), should therefore:

- *Identify Important Issues*: “Sustainability assessment tools should address contextually appropriate issues of major importance to campus environmental, social and economic efforts and effects”.
- *Be Calculable and Comparable*: “The ability to calculate progress toward sustainability is often a limiting factor in assessment. Campuses require quick, yet penetrating ways to measure status, progress, priorities and direction”.
- *Move Beyond Eco-Efficiency*: “eco-efficiency indicators stress material utilization, environmental performance and regulatory compliance, while sustainability indicators stress issues at the nexus of the environment, society and economy with the goal of no negative impacts”
- *Measure Processes and Motivations*: “the tools to measure sustainability should delve deep into decision making by asking about mission, rewards, incentives and other process oriented outcomes”.
- *Stress Comprehensibility*: “Sustainability assessment tools should be comprehensible to a broad range of stakeholders”.

This study developed a sustainability assessment tool which attempts to address some of the weaknesses of the other tools discussed earlier by being easy and quick to use, indicator-based for benchmarking and comparative purposes; and by being applicable in individual departments and units hence not requiring much effort in the assessment. The tool was also intended to meet some of the criteria defined by Shriberg (2002b), especially moving beyond eco-efficiency and being calculable and comparable. It also considered Lozano’s (2006) argument that sustainability assessments in universities should take into account educational aspects (see chapter 3, section 3.5.3.1 and Appendix 2).

2.5 SYSTEMS THINKING AND ESD

Much faith has been placed in education as one of the keys to environmental solutions and of late, to sustainability (see Palmer, 1998; Scoullos and Malotidi, 2004; and Nicolaides, 2006). However, not much has been done to explore the capability of the current education system in advancing the sustainable development agenda and there is a scarcity of literature on how education is expected to perform this role. Sustainability in higher education is still a relatively new field and hence, according to Shriberg (2002b), lacks empirical data and academic case studies. Literature only contains theoretical work, practical advice and “stories of transformation” but there is a lack of “rigorous theoretical development” and of “a coordinated approach to assessing campus initiatives and providing well-grounded strategies for success” (ibid., p. 51-2).

According to Sterling (2003, p. 49) since the UN Stockholm conference (1972), “there have been many international resolutions and reports which identify and give mandate to education as the most critical key to change with respect to addressing environment and development issues and ushering in a more sustainable society”. Environmental Education, which was promoted since the 1970s and has been part of the curriculum for more than 30 years, has been developing in response to continued, ever-increasing unsustainable patterns in society. The present society, especially in Africa, is under enormous threats from the consequences of climate change and global warming, diseases and various other risks which result from human activities in the broader global context (discussed in section 2.3.5).

Education systems are primarily products of the predominant values and beliefs in society (Popkewitz, 2001). According to Popkewitz (2001, p.151), curriculum is historically formed and it “inscribes rules and standards by which we “reason” about the world and our “self” as a productive member of that world”. It defines the boundaries of what should be known and what knowledge is most important. It directs the actions, feelings and perceptions of individuals about both the world and themselves. If curriculum is a product of predominant values and beliefs as Popkewitz (2001) argued, it is thus difficult to expect it to produce a generation of people who will be able to question and consequently change the existing societal values and beliefs.

The other argument that Popkewitz (2001, p. 159) advanced is that the same curriculum which shapes human actions is “an invention of modernity”. To give a brief overview, the modernity era or the Enlightenment period, is a period during which reason and progress, and scientific knowledge based on logic were seen as having the capacity to displace ignorance and superstition (Grbich, 2004). Reality was thus regarded as knowable. The emergence of modernity was characterised by a major shift from feudal agriculture and home-based produce to profit-oriented company-run industries. Nature was seen as a resource, to be conquered by industry, and to be controlled by men through science (Grbich, 2004). The first period of modernity¹⁶ was said to have been characterised by massive exploitation and use of natural resources using industrial technologies for production and directing of political and economic energies towards the distribution of social goods like healthcare, employment and wealth (Mythen, 2005). These were regarded by Jones (1993, p. 123) as “the benefits of rational thought”.

Around the turn of the 20th century the ability of science to provide finite answers was questioned and there was a realisation that reality was much more complex than was perceived during high modernity (Grbich, 2004). At the same time, modernisation had brought with it hazards and insecurities which resulted in what Beck (1992) termed a “risk society”, meaning, not only an increased risk in society, but a society that is organised in response to risk.

Beck (2006, p. 4) defined risk as “the *anticipation* of catastrophe” and argued that “modern society has become a risk society in the sense that it is increasingly occupied with debating, preventing and managing risks that it itself has produced”. Beck (2006) also argued that the key institutions of modernity which include science, business and politics are no longer instruments of risk management only, but are also a source of risk. This is supported by Laszlo (2001, p. 2) who argued that:

... the dominant educational system is still grounded in reductionistic worldviews and continues to propagate outdated myths and values. Indeed, educational processes have been perpetuating cultural myths and perspectives (e.g., the Grand Narrative of Progress) that maintain or accentuate the global crises, rather than create solutions.

¹⁶ A period roughly spanning the 15th to the 18th century characterised by rapid development in science and technology (Early modern Europe, n.d.).

The same view is shared by Sterling (1996) who contends that while education is regarded as the key to sustainability, it also plays a role in reproducing an unsustainable society:

... most mainstream education sustains unsustainability - through uncritically reproducing norms, by fragmenting understanding, ... by an inability to explore alternatives, by rewarding dependency and conformity, and by servicing the consumerist machine (Sterling cited in Sterling, 2003, p. 46.).

The point of this discussion is that if education is a product of modernity, and is a source of risk and unsustainable patterns, how best can it be used to resolve the same problems of modernity? What the current society requires is the ability to shift from risk society to resilient communities in the face of ecological surprises or emergent and contextual sustainability challenges (cross reference to section 2.3.4).

Several suggestions have been made with regard to overcoming this inherent weakness of education which results from it being a product of modernity and being an instrument in perpetuating unsustainable patterns. According to Sterling (2004, p. 50), while the common perception regarding ESD has been that “little more than a change in teaching or curriculum is necessary”, ESD should not be treated as an add-on to the existing structures and curricula as this will only result in it adapting to the current education trends. At the same time, physical operations of institutions of learning should also be considered as they have a considerable impact on the environment. Sustainability should thus entail a change of fundamental epistemology in culture and hence also in education thinking and practice.

Sterling (2004, p. 50) proceeds to posit that the effect of patterns of unsustainability on current and future prospects is so pressing that the response of higher education should not be predicated only on “the integration of sustainability” into higher education, because this invites “a limited adaptive response”. Instead, he argues for the “transformation of higher education towards the integrative and more whole state implied by a systemic view of sustainability in education and society” (sustainable education). Without that, Sterling (2004) argues, the response of higher education to sustainability is likely to be partial. Sterling (2004, p. 51) is in favour of an “emergent postmodern paradigm” which suggests a change of epistemology, from reductionism towards holism where higher education institutions are expected to respond

sufficiently (*response-ability*) to the wider social context of the crisis of unsustainability. This would mean viewing education as a subsystem of society.

As has been discussed earlier (section 2.3.5.3), critical realism facilitates a deeper understanding of environment-society connections and the social nature of knowledge where explanations reflect agendas of the societies that created them, providing partial insights into complex processes (Forsyth, 2001). Critical realism reacts to this relativism problem of postmodernism and hence was considered an appropriate theoretical framework to underpin this study. (See chapter 3, section 3.3 for further discussion on critical realism).

Sterling (2003) suggests use of systems thinking, where education and society are viewed as being in a co-evolutionary relationship, instead of basing on the possibility that education can change people's behaviour with respect to sustainable development. According to Sterling (2003, p. 49), the key question should then be "how can education and society change together in a mutually affirming way, towards more sustainable patterns for both?" This signifies a mutual relationship between education and society characterised by positive feedback loops where "change towards sustainability in wider society supports sustainable education, which supports change in wider society, and so on". Through drawing on critical realism, this study considers ontological aspects of understanding the relationship between education and wider society, as well as epistemological aspects.

Laszlo (2001) argues for an alternative learning system in the form of an evolutionary learning community. Laszlo (2001, p. 1) contends that this would be "an ideal alternative learning system that seeks to catalyze the purposeful creation of sustainable and evolutionary futures". Designing an evolutionary learning community implies

... the creation of environments where people can learn about the interconnected nature of our world, the ecological impact of our individual and collective choices, and the joy of finding a meaningful way to contribute to the *emergence* of sustainable and evolutionary futures (Laszlo, 2001, p. 2, my emphasis).

Another worldview proposed by Hubbard (2003, p. 1) is "conscious evolution" which is based on the argument that "humanity has gained the powers of codestruction of

our world, or the *cocreation* of immeasurable futures” (my emphasis). According to Banathy (1996, p. 317) “Conscious evolution enables us to use the creative power of our minds to guide our systems and our society toward the fulfilment of their potential”. A similar argument is found in Archer’s (1995) work on the morphogenetic cycle where agents, in responding to their context, are said to shape structures/social systems through a process of emergence (see chapter 3, section 3.3.7).

Ison (1999, p. 108) proposes a variety of ways through which systems thinking can be applied in higher education, e.g. development of courses and training/education programmes, thinking about and effecting change in the organisations that make up the higher education sector; and thinking about and effecting ‘designs’ for the higher education sector as a whole. Ison (1999), however, argues that there has been limited application of systems thinking in those areas. Literature on the use of systems ideas and methodologies in the mentioned areas is therefore also limited.

Krasny, Sriskandarajah, Sterling and Tidball (n.d.) argued that ESD lacks a unifying theoretical framework and they suggested the application of resilience and systems theories in developing guidelines to help education practitioners to more effectively meet sustainability goals. They proposed application of resilience and systems theory to education at multiple levels, including teaching resilience within educational programs, and using resilience and systems theory as a way of looking at the relationship between educational programmes and the broader socio-ecological system, as a means to inform pedagogical approaches, and as a cultural worldview.

This study was shaped both by the key lessons from phase one of MESA Universities Partnership (discussed in section 2.3.8) and the review of literature on the state of the current education system with regard to the sustainable development issues presented above. It therefore draws strongly from systems theory in order to develop a systems approach for educating society about sustainability, and on a critical realist ontology and theories of emergence which help to explain change processes and link social and natural sciences in co-evolutionary processes of change for resilience building and sustainability. The concepts of systems thinking and critical realist causality, emergence and ontology shaping the study will be elaborated in the following chapter (chapter 3).

2.6 CONCLUSION

The contextual and conceptual background discussed in this chapter has helped to formulate the focus of this study. Universities and other higher education institutions in Africa have been shown to be characterised by a multiplicity of challenges and mainstreaming ESD is only one of them. Colonial legacies which alienated universities from addressing the immediate problems of their social contexts have also been shown to persist into the post-colonial era. However, the same higher education institutions are now expected to address sustainable development, which itself is ill-defined, contested and contextually diverse.

While much has been said on the role of higher education in general and of universities in particular in sustainable development, there is no clearly defined criterion which can be employed by these universities in addressing sustainable development issues. Initiatives and priorities therefore vary from one institution to another and are mostly of a fragmented nature. Partnerships like the MESA Universities Partnership have had a positive influence in mainstreaming activities and have led to the execution of various mainstreaming projects in universities in Africa. These projects, however, remain largely fragmented or focussed on aspects of the system rather than encompass system-wide responses, hence this study. Current education systems, because of the cultural reproduction function, are in a difficult position to address sustainable development issues. As a result, the study identified the need for employing a systems thinking approach underpinned by a critical realist ontology, theory of change (emergence) and mode of analysis. The next chapter describes the theoretical framework which informed the study and the methodological concepts used in data collection and analysis.

3 THEORETICAL FRAMEWORK AND METHODOLOGY

3.1 INTRODUCTION

Critical realism provides the underlying philosophy to guide this research because it allows for the examination of complex social systems in which it is difficult to isolate components and study them under controlled conditions (Sayer, 2000). It is an appropriate 'underlabourer' for this case study as its strength lies in causal explanation and in following up connections to situate the case within the wider context, thus illuminating "part-whole relationships" (ibid., p. 19). The systems thinking approach deals with epistemological perspectives in the analysis of open and complex social systems, but there is the problem of relativism in systems approaches. Critical realism therefore provides the ontological perspective of the study as it facilitates understanding the contextual and thus causal and emergent nature of environmental issues (see chapter 2, section 2.3.5.3 and this chapter section 3.2.7).

The purpose of this chapter is to clarify the metatheoretical and methodological concepts which informed the study. It discusses systems thinking and critical realism and the way in which the two theoretical vantage points shape this study. The application of systems thinking and critical realism in the study is elaborated in the methodology section. This is then followed by a discussion on the research design, the methods used in collecting and analysing the data, including ethical and validity questions and how they were addressed.

3.2 SYSTEMS THINKING

Systems thinking is an epistemology or a way of viewing systems from a broad perspective including seeing interrelationships between components of the system and their relationship to the broader environment (Lyneis, 1995; Webster, 2004; Reed, 2006). Systems thinking thus rejects the fragmentary approach where individual events or components of a system are studied piecemeal. Of importance in systems thinking is the concept of a system. Bertalanffy (1968, p. 55) defined a system as "a set of elements standing in interrelations". Ossimitz (1997) admitted that a system is difficult to define owing to different conceptions in different fields but identified the general characteristics of a system as follows:

- A system is made up of components,
- The elements are in interrelationship with each other,
- The system has a boundary defining it from the surrounding environments which ensures/determines its identity (what can enter or leave the system is determined at the system border),
- Systems are temporally dynamic with respect to the aim of the system, and
- Individual components of a system may be considered whole systems at another level of analysis, hence systems are hierarchical.

3.2.1 Early developments

Systems thinking developed in response to the problem of science in dealing with complexity. Classical natural science was said to view the world as a collection of isolated parts (reductionism) with properties of the whole deriving directly from those of parts (Bertalanffy, 1968). According to Bertalanffy (1968) this simplified reality by isolating components from the complex and messy world before analysing them piecemeal. Science uses the advice of Descartes to break down problems and analyse them independently and then use these simpler phenomena to explain complex ones (Checkland, 1999). The problem of complexity in science is captured in the following quote:

The crisis of science today arises because of the increasing difficulty of such profitable talk among scientists as a whole. Specialization has outrun trade, communication between the disciples becomes increasingly difficult, and the Republic of Learning is breaking up into isolated subcultures with only tenuous lines of communication between them - a situation which threatens intellectual civil war. The reason for this breakup in the body of knowledge is that in the course of specialization the receptors of information themselves become specialized. ... The more science breaks into sub-groups, and the less communication is possible among the disciplines, however, the greater chance there is that the total growth of knowledge is being slowed down by the loss of relevant communications (Boulding, 1956, p. 198-199).

Ludwig von Bertalanffy (1901-1972) thus realised that there was a need to develop a consistent approach to understanding complexities beyond the capability of a single discipline and proposed a General Systems Theory. Bertalanffy defined this theory as “a scientific exploration of ‘wholes’ and ‘wholeness’” (organicism). Though holistic thinking developed in various disciplines, Checkland (1999) alleged that it was Bertalanffy who first proposed a generalisation of these emerging ideas in systems thinking.

Bertalanffy, who was a biologist, and the other founding fathers of the systems movement (K. E. Boulding, an economist; R. W. Gerard, a physiologist; and A. Rapoport, a mathematician) formed a Society for the Advancement of General Systems Theory which was later renamed the Society for General Systems Research (Checkland, 1999). Their target was to develop theoretical systems which were applicable to more than a single discipline as a way of addressing complexity in science (ibid.).

Checkland (1999) argued that the proposed General Systems Theory has not emerged but instead faced sharp criticisms especially for its generality and lack of a coherent body of tested knowledge. However, the views of these early systems thinkers, especially about holism and interdependencies of life on earth, have continued to shape and influence developments in systems thinking in various ways. Checkland (1999) followed up on progress in the systems movement which he said took the form of the development of systems ideas (e.g. in cybernetics) and application of systems thinking within disciplines (e.g. the 1970s systems revolution in geography). Further developments are captured in Figure 3.1. This study is concerned with problem solving developments in systems thinking, specifically application in understanding complex issues (more or less related to work in soft systems) with the intention of developing strategies to address the issues (see section 6.4).

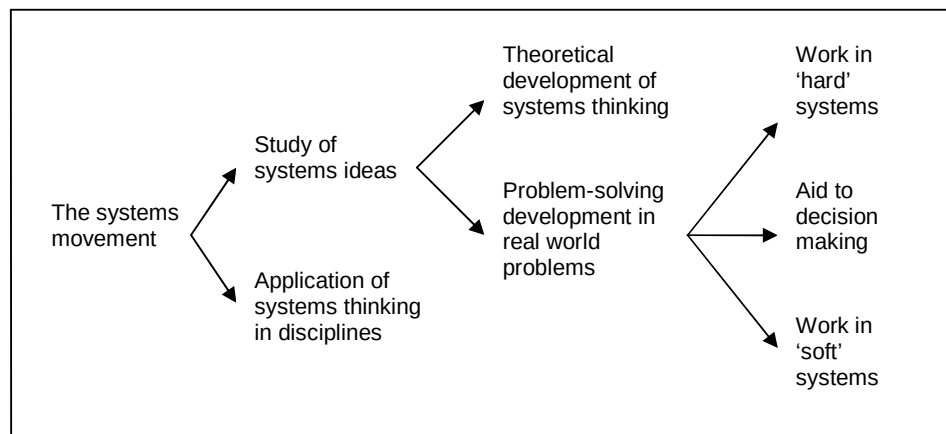


Figure 3.1 Activities within the systems movement (Adapted from Checkland, 1999)

3.2.2 The nature of systems inquiry

Systems ontology, according to Banathy (2000), answers the 'what' question, that is, what things are, what a person or a society is and what kind of world we live in. The ontological task is therefore the formation of a systems view of what is or, in other words, a systems view of the world. Systems ontology is difficult to define as systems take different forms, e.g. a cell, a human being, an organisation are all systems (Bertalanffy, 1968). With regard to critical realist ontology, reality is also argued to be not quite accessible to immediate observation. However critical realism accepts this position and argues that theories of social studies may be wrong and may change as new discoveries are made. It explicitly recognises the fallibility of knowledge, depth ontology and causality in open systems (see section 3.3.2). This study probes a new ontological frame for systems thinking through making use of critical realist ontological perspectives (see chapter 2, section 2.3.5.3).

Systems epistemology deals with general questions of how we know what we know (Banathy, 2000) and is concerned with what Bertalanffy (1968) called the investigation of organised wholes. Knowledge is not a simple approximation to 'truth' or 'reality' but 'an interaction between knower and known', dependent on 'a multiplicity of factors' (ibid., 1968 p. xxi). Thus Churchman (cited by Banathy, 2000) stressed that subjectivity (reflecting on sources of knowledge, social practice, community, interest in and commitment to ideas, etc.) cannot be avoided especially when working with human systems. Systems epistemology is therefore based on social constructivism in which reality is believed to be a social construct. Critical realism however argues that reality is beyond what we know (see section 3.3.2) and knowledge is fallible (see section 3.3.1).

Banathy identified the domain of systems inquiry as systems **philosophy**, systems **theory**, systems **methodology** and systems **application**. He explained systems philosophy as a reorganisation of ways of thinking and knowing perceived reality based on holism, and systems methodology as a selection of approaches, methods and tools that best fit the type, purpose and nature of the inquiry and the problem. He sub categorised the latter into two tasks which are (i) the identification, characterisation and classifying the system of interest including the larger system which is its environment, and (ii) selecting, identifying and characterising appropriate strategies, methods and tools in the system of interest. Systems application entails

the application of systems approaches or methodologies in a specific context (Banathy, 1997). In this study, the system of interest will be classified and characterised; and the appropriate tools, methods and strategies will be identified and applied (see section 3.2.6.1), and probed ontologically using critical realism (see section 3.2.6 and 3.2.7).

3.2.3 Systems thinking concepts important to this study

A number of concepts were developed to explain the nature and behaviour of systems. Of interest to this study are the concepts of holism, hierarchy, complexity, emergence and feedback. **Holism (wholism) or organicism** is based upon the principle that wholes are greater than the sum of their parts, which means “the properties of each part are dependent upon the context of the part within the whole in which they operate” (Gilbert and Sarkar, 2000, p. 1). Systems of various orders thus cannot be understood by investigating their parts in isolation (Bertalanffy, 1968).

Closely related to holism is the concept of emergence. According to Banathy (1997), the joining and integrating of the web of relationships between the parts creates **emergent properties** of the whole, making it difficult to see properties of the whole from the viewpoint of the parts. The principle of emergence is used to explain properties of the whole which, according to Checkland (1999) are only meaningful when attributed to wholes. This means that if component parts of a system are studied in isolation, emergent properties which arise due to interrelations of these components will be lost. The concept of emergence is also key in critical realism which similarly uses it to explain new properties which result from the conjunction of two or more features (see section 3.3.3). While this study relied on the USAT which has a Part A based on a unit-based framework where assessment of integration of sustainability is at the level of individual departments, individual assessments from departments were finally brought together to cater for the possibility of emergence of new properties (see chapter 4, section 4.3.2). The morphogenetic approach (Archer, 1995) was also employed to explore emergent properties at the university (chapter 4, section 4.2).

The term **complexity** is difficult to define as it is relative, thus making it difficult to distinguish what is complex from what is simple (Complexity, 2008). However many definitions tend to depict a situation where a large number of elements in a system

are in copious forms of relationships which create complex patterns (ibid.). Complexity theory is concerned with the study of complex adaptive systems with self organising attributes and emergent properties (McMillan, 2004). According to Ritzer and Goodman (2004), complexity affords systems the ability to develop new subsystems to deal effectively with their environments. This was explained by Banathy (1996) as a reorganisation of the system at even higher levels of complexity; hence the paradox that “only complexity can reduce complexity” (Luhmann as cited by Ritzer and Goodman, 2004, p. 185).

The concept of organised complexity explains the existence of levels of organisation of systems. **Hierarchy theory** is used to explain the differences between different levels of **complexity**. Checkland (1999, p. 81) argued that the knowledge we have of the world is at different levels of complexity and thus the aim of hierarchy theory is “to provide both an account of the relationships between different levels and an account of how observed hierarchies come to be formed: what generates the levels, what separates them, what links them?”

Feedback is one of the central concepts of communication theory which explains the exchange of materials, energy and information between an open system and its environment (Bertalanffy, 1968). Checkland (1999) pointed out that in a hierarchy of open systems; maintenance of the hierarchy entails processes where there is information communication for regulation or control purposes. According to Banathy (1996), feedback helps to explain the outcomes of a system in relation to the expected goals. Negative feedback shows the need for correcting something in the system for the goals to be achieved, while positive feedback leads to the transformation of the system in co-evolution with its environment (ibid.). In organisations, feedback refers to the sharing of concerns and observations and suggestions between people or divisions so as to improve performance (Feedback, 2008).

3.2.4 Classification of systems

Systems have been classified in different ways based on different factors often relating to the behaviour, foundation or nature of the systems. Bertalanffy's (1968) classification was based on the system's communication (or lack of it) with the environment. He proposed a classification of systems into closed and open systems

and described closed systems as those systems considered to be isolated from their environment. Open systems are those involved in exchange of matter (materials, energy, information) with their respective environments and can achieve a steady state based upon continuous material exchange with their environment. (Critical realism argues that society is an open system, section 3.3.5). In closed systems, the final state depends on initial conditions with the unchanging components expected to reach a state of equilibrium. Only an alteration of either the initial conditions or the process will result in change in the final state. However in open systems, a similarity in the final state may be reached from different initial conditions and in different ways (equipfinality) (ibid.). Critical realism also argues that in an open social system, different causal mechanisms can lead to the same outcome and that different outcomes can result from similar causal mechanisms (Sayer, 2000) (see section 3.3.5).

Banathy (2000) alleged that there are two major types of systems: natural systems and designed systems where natural systems range from sub-atomic systems to living systems like the planet etc. Designed systems were explained as human creations (human or social systems) including engineered physical systems, hybrid systems (combining physical constructions and nature, e.g. hydroelectric power plants), designed conceptual systems (e.g. theories and philosophies) and human activity systems (purposeful [and emergent] creations) (e.g. a university).

Boulding (1956) based his classification on complexity and suggested an arrangement of systems in a hierarchy of complexity. He developed nine levels/classes as follows:

- Frameworks: the geography and anatomy of the universe,
- Clockworks: the solar system or simple machines such as the lever and the pulley,
- Thermostats control mechanisms or cybernetic systems,
- Cells, open systems or self-maintaining structures,
- Plants,
- Animals,
- Human beings,
- Social organizations: the unit of such systems is not perhaps the person but the "role" - that part of the person which is concerned with the organization or situation in question, and
- Transcendental systems: the ultimates and absolutes and the inescapable unknowables (Boulding, 1956, p. 202-205).

Checkland (1999) defined five major typologies of systems which include natural systems, designed physical systems, designed abstract systems, human activity systems and, after Boulding (1956), transcendental systems. Unlike Banathy (2000) who distinguished between natural and human/social systems, Checkland argued that the social system is on the boundary between a designed human activity system and a natural system as it can result from natural relationships in a community (e.g. a family) or it can be an assembly meant for specific activities. He supported his argument by drawing from the work of Ferdinand Tönnies (1855-1936), a German sociologist; that is *Gemeinschaft und Gesellschaft* (Community and association/society) published in 1887. *Gemeinschaft* (community) refers to a naturally occurring grouping based on mutual bonds and a feeling of togetherness (e.g. family life) while *Gesellschaft* (society/association) is contrived and meant to fulfil members' individual aims and goals. Checkland (1999) however argued that there is no generally accepted classification and sometimes there is a mix of logical categories as this classification is based on a variety of purposes, interests or outlooks. Classification of educational systems (like universities) will be dealt with in section 3.2.6.

3.2.5 Development of systems thinking in sociology

Ideas from the General Systems Theory were developed and have grown in diversified disciplines for example Geography, Computer Science, Physics, Sociology and Political Science, to mention a few. In the social sciences the development of systems theory faced distinctive properties of such sciences which are absent in the natural sciences and hence had not been captured satisfactorily by the General Systems Theory. Some of the properties of social sciences were outlined by Checkland (1999) as follows:

- social phenomena have dense connections between many different aspects limiting opportunities for experimentation;
- the phenomena involved have the capacity to alter the situation as they are active participants; and
- predictions are difficult to make in social settings as humans have the potential to react to these and possibly change the outcome.

In short, the problem of social science in this case is complexity as Checkland (1999) alleged. Due to the above reasons, systems thinking was slow to develop in the social sciences.

Looking back to the classical sociologists however, the likes of G. F. W. Hegel - German (1770-1831); August Comte - French (1798-1857); Vilfredo Pareto - Italy (1848-1923); and, as discussed earlier, Ferdinand Tönnies, all had in their writings concepts and ideas which have more or less helped shape systems theory in the social sciences today. An overview of their contributions to the development of the discipline of sociology is captured by Ritzer and Goodman (2004) and the ensuing discussion draws from their analysis.

Notable in Hegel's philosophy is the concept of dialectics which is explained as both a way of thinking and a view that the world is made up of processes, relationships, dynamics and conflicts. Comte coined the term sociology and was an adherent of positivism who believed that the study of social phenomena should employ scientific techniques. He developed an evolutionary theory of social change and of interest is the fact that he stressed the systematic character of society. He focussed on larger entities like the family as the basis of analysis rather than the individual. Pareto's elite theory of social change assumed that society is dominated by a small group of the elite on account of enlightened self interest. Ritzer and Goodman (2004) indicate that his lasting contribution to sociology is his envisioning of society as a system (a whole) in equilibrium made up of different parts. Talcott Parsons (1902-1979) working in the United States contributed to the rise of structural functionalism but important in this discussion is his contribution to systems theory through the AGIL scheme (adaptation; goal attainment; integration and latency pattern maintenance) where he believed that for a system to survive, it must perform certain functions. The AGIL scheme defines these imperatives or necessary activities directed towards meeting the systems' needs as follows:

- Adaptation: A system must to some extent adapt to its environment,
- Goal attainment: A system must define and achieve its primary goals,
- Integration: A system must regulate the interrelationship of its component parts, and
- Latency pattern maintenance: A system must furnish, maintain, and renew the motivation of its individuals and the cultural patterns that create and sustain that motivation (Ritzer and Goodman, 2004, p. 95).

More recent proponents of systems theory in sociology include Walter Buckley (1922-2006), an American Professor of Sociology, Niklas Luhmann (1927-1988), a German sociologist, and Kenneth Bailey (1942 -). Niklas Luhmann was influenced by Talcott Parsons' structural functionalism even though it was from an analytical point of view. He described a system in terms of its distinction from the environment and maintained that a system is always less complex than its environment. He regarded social systems as systems of communication which select a limited amount of all the available information from their environments. He argued that society fulfils the characteristics of autopoietic systems and hence is an autopoietic system. These characteristics include that it produces its own basic elements, establishes its own boundaries and structures and is self-referential and closed. An important element of his theory is communication where anything outside communication is regarded as part of the environment. Critical realist sociologists like Benton (2001) and Forsyth (2001) criticise this view by arguing that sociologists have not been taking adequate account of the relationships that exist between nature and society (their views were discussed in chapter 2, section 2.3.5.3).

Buckley is among the first to apply concepts from general systems theory based on the work of Bertalanffy to sociology. The central issue he addressed is what sociology has to gain from systems theory. In his *Sociology and Modern Systems Theory*, he argued that systems theories built on mechanical and organic models were "inappropriate" in dealing with the system represented by the sociocultural realm (Buckley 1967, p. 1). He defined social systems in sociology in terms of mechanical, organic, and sociocultural models and argued that the sociocultural systems were the most complex and most open. From Buckley's classification of social systems, mechanical systems tend to be entropic (tendency to run down) while sociocultural systems are negetropic (tendency to elaborate structures). From a critical realist point of view, both Bhaskar and Archer also argue that structural elaboration (that is through emergence) is possible through social interaction of agents (see section 3.3.6 and 3.3.7).

Ritzer and Goodman (2004) indicated that Bailey's work is not well known or influential although he made notable contributions to systems theory in sociology. Among his publications is the 1994 *Sociology and the New Systems Theory: toward a theoretical synthesis* in which he synthesised systems theory developments in

sociology in an attempt to develop an integrated view of the various approaches. He discussed at large views of early systems thinkers including Bertalanffy, Giddens, Parsons and Miller among others, and presented summaries of different systems theory vantage points. The book ends with a synthesis chapter of the developments in both systems theory and mainstream sociology. Bailey defined systems in terms of conceptual, concrete and abstract systems; either isolated, closed, or open. He explained the degree of openness of a system using concepts of entropy and negentropy (Bailey cited by Ritzer and Goodman, 2004). (The concept of negentropy is arguably similar to structural elaboration (Archer, 1995), see section 3.3.7).

3.2.6 Social systems/Human activity systems

This study draws considerably from the work of Bela Banathy (1992, 1996, 1997, and 2000) on human activity systems¹⁷. Sterling (2003) argues that Banathy has made significant contributions regarding the application of systems thinking in education. Human activity systems, according to Banathy (1997), are less tangible than natural and designed physical systems and manifest themselves in forms of activities which are selected and organised by people to attain a purpose. A good example of this is the MESA Universities Partnership whose aim is enhancing the quality and policy relevance of university education in Africa in the context of sustainable development and the Millennium Development Goals (see Chapter 2 section 2.3.8). Education systems (for example universities) were classified as deterministic or purposive systems, a sub-group of human activity systems, depending on their degree of openness to/interaction with the environment (ibid.). Deterministic human activity systems are discussed as being open but with clearly defined goals and some degree of freedom in selecting means of operating and they have several levels of decision-making which makes them complex (Banathy, 1997). Purposive systems have set goals too but they select their own operational objectives and methods and are more open to environmental changes (Banathy, 1992). From this description, it seems that universities have characteristics of both deterministic and purposive systems.

¹⁷ Human activity systems is an appropriate conception of an education system because it brings about the notion of dynamism/change (activity) with time and is significant in this study as continuous transformation in operations of universities involved in mainstreaming sustainability is bound to happen.

Banathy (1997) described human activity systems as open systems which are sustained by internal and external relations and the process of regulation. They are in exchange of energy with their environment. They are wholes but are also parts of the larger systems and their constituents may be constituents of other systems. Human activity systems change in adaptation to their environment or where this does not happen, the whole system changes through co-evolution and co-creation change. According to Banathy (2000) human/social systems are unbounded and this suggests complexity where factors related to one problem may in turn be linked to other factors, making it difficult to draw a boundary. At the same time an apparent solution for one problem may interfere or worsen others. An example of this is the use of bio fuel which apparently contributes to sustainability by reducing reliance on non-renewable fossil fuels. Bio fuel use can, however, potentially worsen food security and availability as production of bio fuel crops takes up land which could be used to grow more food crops.

Banathy (1992, 1996, and 1997) used models, that is, representations of systems, to represent the dimensions of a human activity system and to portray its relationship to the environment. Models are a manifestation of systems through the perceptions of human beings who make meaning of what they see and hence there is no single testable account of a human activity system but rather a set of possibilities (Banathy, 1997). Models do however provide a useful frame of reference in examining and talking about a system (Banathy, 1992 and 1996). Banathy is said to have recognised the fact that any given model of reality is inherently incomplete and thus he developed three models or lenses to provide a more multi-dimensional perspective (Walton, 2004). Figure 3.2 is a model of a human activity system capturing its dimensions which include purpose, process, interaction, integration and emergence. Banathy (1997) also pointed out that human activity systems should be considered at three levels, that is, serving the purpose of its collective entity, its members and the environment in which it is embedded.

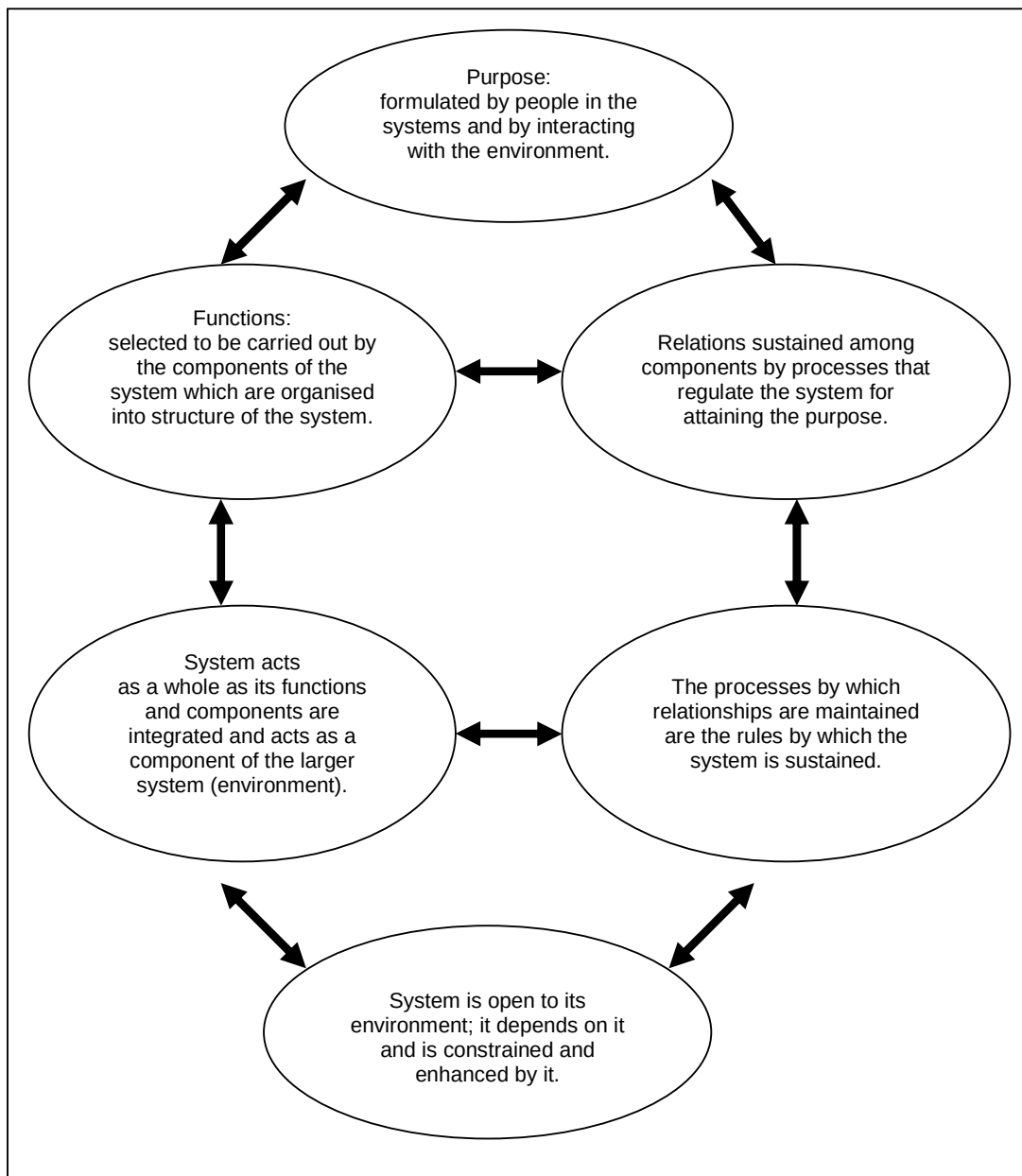


Figure 3.2 A systems model of a human activity system (Adapted from Banathy, 1997)

3.2.6.1 A systems view of education

According to Banathy (1992), a systems view of human activity systems provides a way of looking at ourselves, our environments, the systems around us and those that we belong to. He argued that a systems view helps in understanding education

systems as ever-changing and open to their multiple environments. Figure 3.3 is his comprehensive system of educational inquiry.

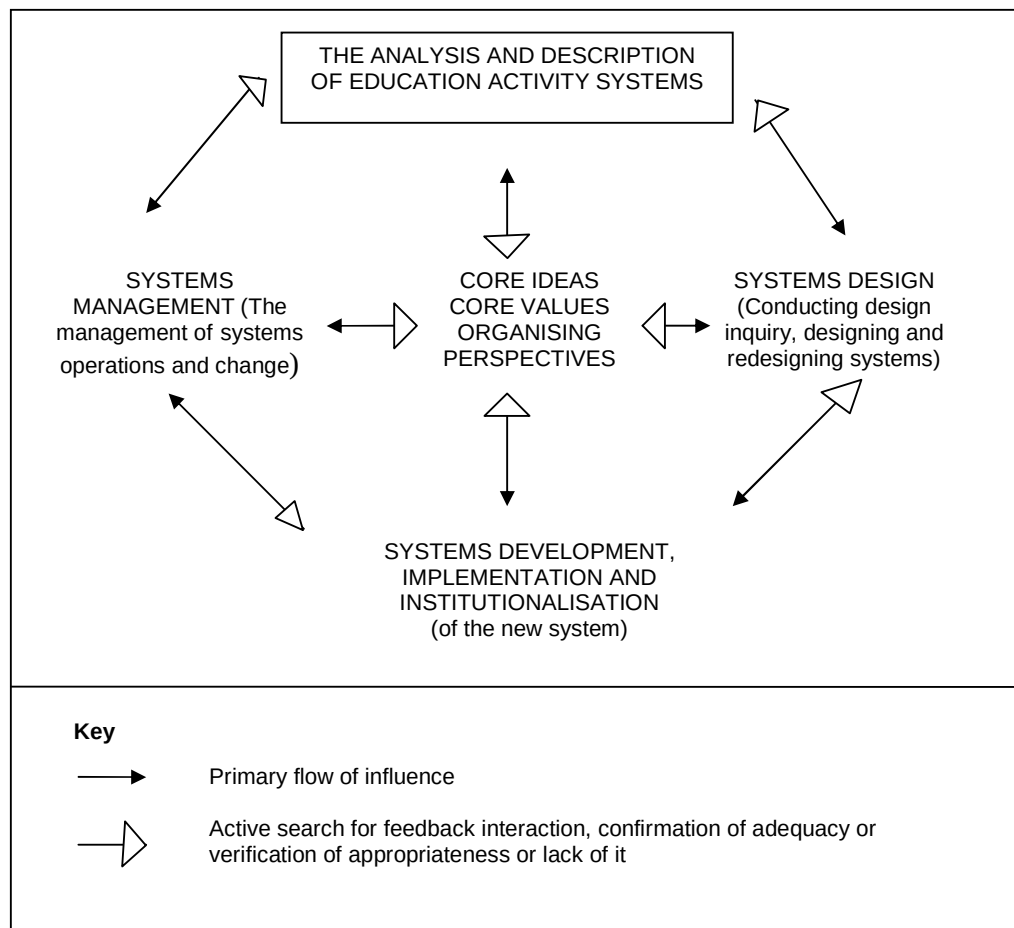


Figure 3.3 A comprehensive system of educational inquiry (Adapted from Banathy 1992)

The questions this study is asking (chapter 1, section 1.6.1) can be responded to through use of systems models to analyse and describe an educational system (the boxed part in the diagram). The study will however make recommendations for the other aspects of the comprehensive system of educational inquiry.

Banathy (1992) recommended three models that can be used in describing and analysing educational activity systems (institutions), that is, the system-environment model, the functions/structure model and the process model. He described models as mental images representing general systems concepts and principles which are

then used as “frames of reference ... to examine and talk about the system” (Banathy, 1992, p. 20). Walton (2004, p. 268) defined the focus of each of the levels as follows:

- Systems-environmental model – what is the system of interest?
- Functions/structure model – what is the system about?
- Process model – how does the system transform inputs to outputs?

3.2.6.2 The systems–environment model

According to Banathy (1992, p. 22) the systems-environment model is “a lens that projects a bird’s-eye view of the landscape in which the system is embedded” and thus enables describing the system within the context of the community and the larger society (hence chapter 1, section 1.2, chapter 2 section 2.3.5, chapter 5, section 5.2 and 5.3). The concepts and principles of the model help in defining factors that guide the relationship and interaction between a system and its environment. The adequacy and the responsiveness of the educational activity systems to the environment, and that of the environment towards the system can be assessed. An example could be the relationship between a university and the wider contextual sustainability challenges (see chapter 5, section 5.2). Figure 3.4 shows the systems-environment model outlining the pertinent concepts and relations.

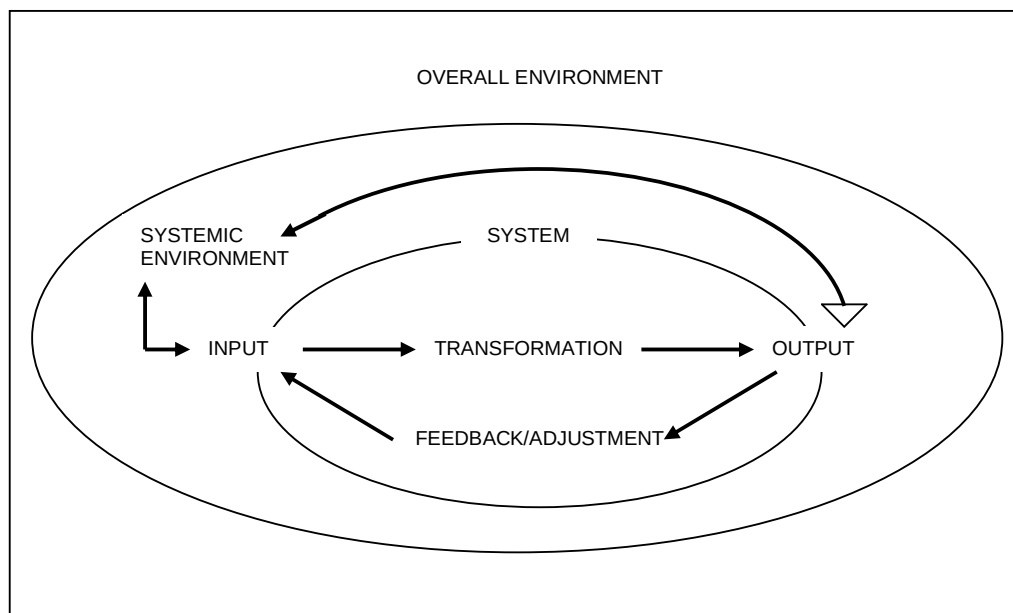


Figure 3.4 The systems-environment model (Adapted from Banathy, 1996)

The following is an explanation of the concepts:

Input – everything the system receives from the environment including information, energy, materials and other resources like money, people or expectations, demands, policies and constraints and rules (Banathy, 1992). Inputs were subcategorised into three groups as follows:

- environmental expectations, demands, policies, and requirements that exist in the environment,
- resources needed by the system in order to function (people, information, knowledge, money, materials, etc.), and
- undefined input which might be noise (Walton, 2004, p. 270).

The environment – the context in which the system is situated including constraints and rules (similar to causal mechanisms in critical realism) under which the system operates. It includes everything that may affect the system, or that may be affected by it. The environment is a supra-system of the educational activity system and is also called a multi-system as it is composed of many sub-systems. In terms of educational activity systems, this environment is from the immediate community to the global community. Walton (2004, p. 270) further elaborated on the environment by explaining that the systemic environment contains relevant inputs, that is, “inputs that have sufficient degree and intensity to significantly affect the system”, whereas the general environment included everything that affected the system even though the influence is slight. Using an example of a university in the context of this study, the environment can be the global context from which the concept sustainable development emerged. It includes governmental educational departments/ministries whose policies influence university operations and other educational institutes with which the university interacts. The systemic environment can refer to the immediate local context in which the university is situated, where existing and emerging contextual sustainable development challenges influence its activities, for example, Makana Municipality in the case of Rhodes University (see chapter 1, section 1.2).

Output - stands for everything that the system sends back to the environment which is basically the outcome of what the system does. In educational activity systems, this includes educated learners, knowledge and other services to the community

(Banathy, 1992, Walton, 2004). At RU an example is the tutoring of learners by the university in schools in Grahamstown East (see chapter 5, section, 5.2.3.5).

Self-regulation - Banathy (1992) mentioned that human activity systems have to be sensitive to change in the environment of relevance to them through modifying or re-defining themselves in relationship to and interaction with the environment as well as internal operations so as to produce expected outcomes. This process is called self-regulation and takes place through either adaptation or transformation (co-evolution) (structural elaboration in critical realism, see section 3.3.7). In the context of the MESA Universities Partnership, this can be exemplified by the re-orientation or introduction of new courses by participant universities as a way of responding to sustainable development challenges emerging in their environments.

Embeddedness/nestedness – systems can be embedded within other systems. Walton identified three levels of embeddedness as follows:

- The system of interest (primary system),
- The enclosing system (meta-system level), and
- Component parts of the system of interest (sub-system level) (Banathy, 1992; Walton, 2004).

The system of interest exists in interrelationship with other peer systems and this is referred to as the supra-system (Walton, 2004). Taking an example of the MESA Universities Partnership, a member university which is embedded in its own systemic and in the overall environment, is also part of the MESA network. The MESA network in this case forms the supra-system. Figure 3.5 models systemic relations in the supra-system. While Walton (2004) only modelled relations between the system at the centre and those surrounding it, Figure 3.5 shows a more complex network of relationships. It is however simply an example of the network of connections that can characterise a supra-system and can vary from one context to another.

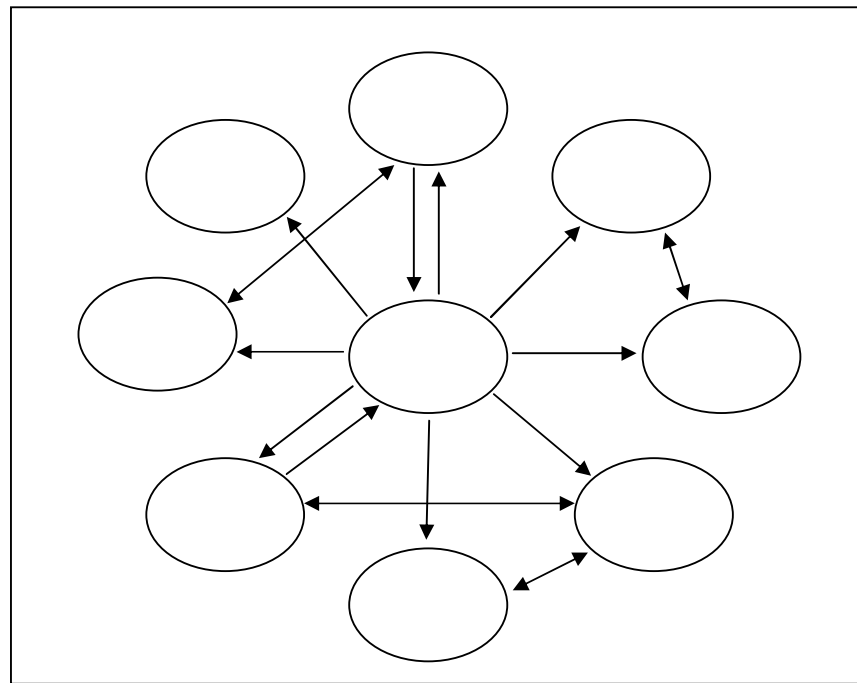


Figure 3.5 A model of the supra-system (Adapted from Walton, 2004)

3.2.6.3 The functions/structure model

The functions/structure model articulates what the system of interest does (Walton, 2004). The model defines the image, purpose, functions, components and structure of the system.

Image – is defined through expectations and needs of the environment and/or from expectations of people within the system. In the context of universities responding to sustainability, this may entail looking at the sustainable development challenges of the systemic environment and stating the university's role in responding to these. This should also consider the views of the members of the university community in terms of developing strategies for responding among other things.

Purpose – defining purpose helps to interpret the image of the system in more detail where elaboration is made of what the system is about through looking at generic purposes (common to human activity systems) as well as unique purposes (Banathy, 1992). Walton (2004, p. 276) adapted (from Banathy, 1992) and outlined the basic guiding questions in defining purpose as follows:

- Who are the clients of the system? (E.g. students and society's institutions in the case of universities).
- What services are offered to them? What characteristics do the services have? Where, when, and how are the services offered? (E.g. developing ecological literacy among students through curricula which requires consideration of issues related to the content of the curricula and other technicalities).
- What are the environmental constraints that the system has to consider? How do these constraints impact on the definition of the system? How do these potentially affect the functions of the system? (Environmental constraints can be in form of limited resources from outside the university which may end up negatively affecting the operations of the system).

Functions - entail what the system has to do in order to achieve the purpose (Banathy, 1992). According to Walton (2004), the functions are a description of the internal operations of the system which explains/elaborates how the system accomplishes its purpose. An example could be the inclusion and examination of sustainability topics in curricula so as to develop ecological literacy among students.

Components and structure – this stage defines the specific components that are responsible for fulfilling the functions of the system (Walton, 2004) and are in interrelationship and interact with each other. The pattern of interrelationships forms the structure of the system. In the case of this study, the structure of the system is defined in the context of sustainability issues only.

The functions/structure model is rooted in structural functionalism. Structural functionalism regards social systems as systems of stratification which motivate and place people in their “proper” positions so as to fulfil the systemic requirements of these positions (Ritzer and Goodman, 2004, p. 93). The established system of positions and the requirements of these positions in structural functionalism are comparable to the systemic components and the functions forming the structure of the functions/structure model. However, unlike critical realism which emphasises context and historical contingency of structures, structural functionalism was critiqued for being based on the belief in a single theory or a set of conceptual

categories that can be used to analyse all societies (Ritzer and Goodman, 2004). In critical realism, explanation is embedded within the social context (Kaboub, 2001) and people are argued to have the capacity to respond differently to structures (see section 3.3.5).

3.2.6.4 The process lens

This is also termed the motion picture model where a system, through a sequence of events, transforms inputs into outputs (Walton, 2004). Banathy (1992) outlined the operations of the process model as follows:

Input processing – through communication, signals from the environment are assessed and those selected provide or become input into the transformation process. An example in this study is the careful assessment of recommendations coming out of sustainability declarations which led to the definition of roles of universities in sustainable development, which in this case can be equated to input (see chapter 2, section 2.3.7 and chapter 5, section 5.2.2).

Transformation process – this brings about the desired outcomes through transformation of input into output while at the same time contributing to maintaining, developing or changing the system. A specific transformation process of the educational activity system is, for example, the transformation of the learner. In this study however, the main object is mainstreaming of sustainability issues as a way of responding to contextual sustainable development challenges.

Output processing – involves identification and assessment of the relevant output, dispatching it into the environment and providing guidance on the state of the input (Banathy, 1992). This is where relevance and adequacy is assessed in relation to expected outputs. In this study, this may entail assessment of sustainability projects before they are launched in, for example, the community.

The systems-environment model was used as a lens to understand sustainability initiatives within the RU education system together with some systems concepts drawn from the functions structure model (chapter 5, section 5.2). The three models above provided a framework for developing a systems approach to mainstreaming

sustainable development issues in Rhodes University. For elaboration on how the models informed the study, see section 3.5.1, chapter 5 and chapter 6.

3.2.6.5 Systems thinking and sustainability

The study also draws from more recent work on systems thinking by Stephen Sterling (2003; 2004). Sterling, in his 2003 (PhD) study, explored why Environmental Education was co-existing with continued environmental challenges (some of his views were discussed in chapter 2, section 2.5). He also explored the potential role of systems thinking and argued that a whole systems approach in education may lead to the development of the necessary awareness and competencies among those involved and hence to a profound ecological receptivity. According to Sterling (2003, p. 9) whole systems thinking develops from “a desirable syncretisation of concepts, tools and methodologies of *systems thinking* and the vision, values, and philosophy of *ecological thought*...” (emphasis in original), with the main roots given as “systems thinking, indigenous thought, the organicist tradition in western science and philosophy, environmentalism and the emerging complexity sciences”. He reviewed the work of other systems thinkers including Banathy, Ackoff, Bertalanffy, Checkland and Bateson, to mention a few, in developing his viewpoint.

The scope of Sterling's investigation was broad. He explored the application of whole systems thinking in various aspects of education and learning. His paper *Higher education, sustainability and the role of systemic learning* (2004) explored the application of systems thinking in sustainability in higher education. This study will utilise two of his proposed models, that is, the nesting systems model and the model representing interlinkages between the operational dimensions of an institution (Sterling, 2003; 2004).

In sustainability in higher education, Sterling (2004) proposed a systems view of sustainability where he suggested that a system that undermines the health of either its subsystems or its environment is unsustainable. He defined sustainability as “the ability of a system to sustain itself in relation to its environment” (Sterling, 2004, p. 52). He used the nesting systems model (related to Banathy's (1996) systems-environment model) to explain the relations between education, society and the ecosphere (Figure 3.6). Sterling (2004, p. 53) places higher education institutions (which inter-link with each other) within the supra-system of education, which itself is

a sub-system of society/economy as it is shaped and oriented by the “needs, policies, values and norms” of the wider social context it serves (cross reference to section 3.2.6).

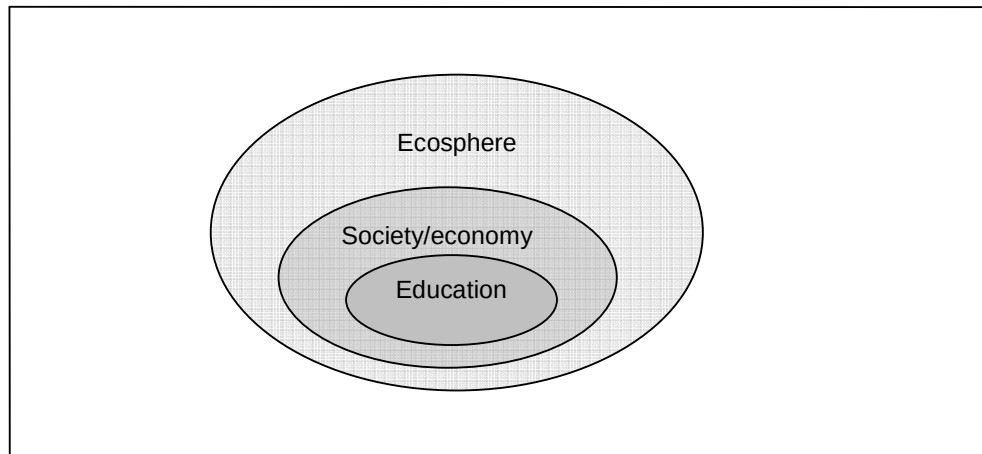


Figure 3.6 Education, society/economy and ecosphere as nesting systems (Sterling, 2004)

Sterling’s (2004) nesting systems model seems to elaborate on Banathy’s (1996) systems-environment model by specifying the systemic and overall environment as society/economy and ecosphere respectively. This shows that what takes place in the education system can be due to the influence of society/economy or the ecosphere. This closely relates to the argument by critical realism that society is an open system in which different causal mechanisms can lead to the same outcome (see section 3.3.5) which requires caution in interpreting reality (depth ontology) and acceptance of the fact that knowledge can be fallible.

Sterling (2004) proposed a holistic approach to the operational dimensions of an institution (which is embedded in the broader social/economic and ecological environments). He modelled this relationship as is shown in Figure 3.7 below, where each of the identified dimensions has at least six relational paths to be considered.

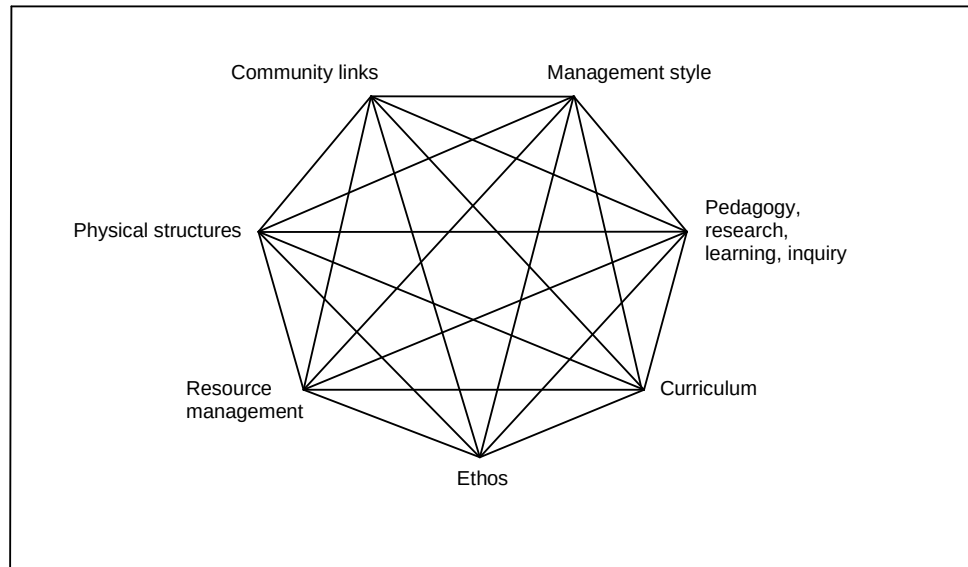


Figure 3.7 Seven operational dimensions of an educational system (Sterling, 2004)

Sterling (2004, p. 66) argued that “The systemic view recognises that the existing relationships in the system may be characterised by dysfunctionality, lack of synergy or by negative or unintended emergent properties, conflict and contradiction ...” Some of the questions he outlined to facilitate moving towards a whole systems view are as follows:

- How far are the dimensions regarded as a systemic whole?
- How far are the relationships within and between these dimensions characterised by systemic coherence and health emergence, or by fragmentation and contradiction?
- How far is planning and change systemic and collaborative? (Sterling, 2004, p. 66).

This model will be adapted to capture the dimensions of the university which the study explored (see chapter 5, section 5.3.2) and using critical realism, causal mechanisms will be probed using depth ontology.

3.2.7 Critique of systems thinking

Systems thinking is situated within a postmodernist ecological worldview which stresses the interconnectedness of life on earth and complexity. Postmodernism, according to Grbich (2004, p. 25) favours “mini-narratives” based on small scale studies situated in particular contexts where there are no claims for universality or generalisability. It considers that there is no one correct theory and accepts all perspectives as equally valid (Dobson and Love, 2004). According to Potter and López (2001, p. 7), science and the production of knowledge are understood by postmodernism as a process of social construction where knowledge is considered to be “whatever human beings come to socially certify as such”. Postmodernism is therefore characterised by relativism and is thus criticised for committing an epistemic fallacy from a critical realist point of view. According to Sayer (2000), relativism takes truth to be a construction of particular communities or dominant groups. The following quote from Dobson and Love summarises the critical realist critique of postmodernism.

A central consequence of ... post-modernist argument is varying degrees of relativism as is demonstrated by Kuhn (1970) when he suggests that “though the world does not change with a change of paradigm, the scientist afterward works in a different world” (p. 121). For the critical realist, Kuhn’s quotation is an example of what is termed the epistemic fallacy. The critical realist sees Kuhn’s statement as incorrect in that it confuses two different worlds – an intransitive world that is natural and (relatively) unchanging and a transitive world that is social and historical. The critical realist would suggest the re-phrasing of Kuhn’s statement in an unremarkable and nonparadoxical manner: “Though the (natural (or object)) world does not change with a change of paradigm, the scientist afterward works in a different (social (or cognitive)) world” (Bhaskar 1991, p. 10). Such a re-phrasing acknowledges the presence of a deep or real element to the world along with an empirical, perception based world - it avoids the so-called epistemic fallacy through its recognition of the difference between statements about the knowledge domain and statements about the ontological domain. Bhaskar (1991) argues that this is a fundamental error of much of postmodernist work which assumes that statements about being (ontological statements) can be analyzed in terms of statements about knowledge of that being (epistemological statements) (Dobson and Love, 2004, p. 97-98).

According to Dobson and Love (2004), while critical realism acknowledges that the world can be understood under particular conditions and within available discourses, this does not imply that judgement cannot be made between different explanations as postmodernism implies. “Critical realism accepts ‘epistemic relativism’, that is the view that the world can only be known in terms of available descriptions or

discourses but it rejects 'judgemental relativism' – the view that one cannot judge between different discourses and decide that some accounts are better than others" (Bhaskar, cited in Sayer, 2000, p. 47). Critical realism therefore argues that while human beings produce knowledge, they can be mistaken (Potter and López, 2001). It argues that reality is independent of beliefs, perceptions or alleged knowledge and that knowledge, beliefs and perceptions change and are therefore fallible (ibid.). Through accepting the truth to be a set of beliefs imposed by dominant authorities and used to construct its objects, relativism is therefore self-undermining by leaving out the author's own account and the question of practical adequacy of knowledge claims (Sayer, 2000). This study avoids falling into the trap of relativism and hence an epistemic fallacy by drawing on the critical realist ontology as an underlabourer to systems thinking, which enabled going beyond social constructivism (the empirical level at which systems theory operates) to probe causal mechanisms influencing what we experience (see chapter 1, section 1.7, this chapter section 3.3.2, and chapter 6, section 6.2).

The other criticism levelled against systems theories is of using models to represent reality which simplifies the complex nature of the objects of social study (Ward, 2002). According to Ward (2002, p. 33), this reduces "complex emotional beings" to "quantifiable variables". Ward (2002) also argued that focussing on systems thinking tools may result in ignoring the complexity (in terms of depth ontology and causality) and historical contingency of the world around us. Both these weaknesses were addressed in the study through use of concepts of critical realism. Critical realism recognises the role of agency in reproducing or modifying structures/social systems (see section 3.3.6). Archer's (1995) social realist theory (section 3.3.7) enabled analysing the historical emergence of sustainable development initiatives at Rhodes University (section 4.2) and this addressed historical contingency which systems thinking tends to overlook.

Another critique of systems thinking has been specifically levelled against Niklas Luhmann's general system theory where he argued that society is an autopoietic system which is closed from outside interaction (see section 3.2.5). According to Ritzer and Goodman (2004, p. 197), while society may be developing into an autopoietic system, "a closed system of functionally differentiated realms unable to act in the name of the social whole", this is something to resist and theories have to

be developed to counter it. Luhmann is criticised for not making this appear inevitable (ibid.). In addition, Ritzer and Goodman (2002) argue that there is evidence of dissolving boundaries between social systems which counters Luhmann's position that society establishes its boundaries and is closed. This study drew from the work of Banathy and Sterling who acknowledge that society is an open system (see section 3.2.6) and critical realist causality (section 3.3.4) that also works with open systems.

Section 3.2.4 which discusses classification of systems raised another weakness of systems thinking approaches where there is no consensus on what constitutes a system resulting in a variety of classification categories. As mentioned in section 3.2.2, this makes it difficult to define systems ontology. This study therefore relies on critical realist ontology.

The following section discusses critical realism which underlabours systems thinking in the study. While systems thinking, which allows for epistemological interpretations in the study, argues for a holistic approach and inclusivity of all the dimensions that relate to the system of concern, it does not provide for depth ontology, unlike critical realism. The study draws on ontological perspectives from critical realism, to address some of the ontological problems of post-modern relativism of systems thinking and by the nature-society schism of sociologists such as Niklas Luhmann (discussed earlier in this section).

3.3 CRITICAL REALISM

According to Yeung (1997), there are different versions of critical realism which are not entirely consistent with each other. This study does not, however, provide the platform for reviewing or evaluating these different varieties. Perceptions providing insight into the research questions were drawn from what Yeung (1997) referred to as the Bhaskarian version of critical realism.

Critical realism is most closely associated with, though not restricted to, the work of Roy Bhaskar (Archer, Bhaskar, Collier, Lawson and Norrie, (eds.), 1998). He introduced both the term critical realism and the philosophy (Sayer, 2000). Critical realism developed as a critique of the positivist approach to science and of post-modern relativism (Danermark, Eskröm, Jacobsen and Karlsson, 2002). Bhaskar

developed a general philosophy of science and described it as transcendental realism and a philosophy of social science which he termed critical naturalism. Elision of the two terms formed the umbrella term critical realism (Archer et al., 1998).

Transcendental realism argues that objects of scientific investigation should have plausible generative mechanisms that can be triggered to produce certain outcomes (Bhaskar, 1978). Objects of knowledge are regarded as “the structures and mechanisms that generate phenomena” (e.g. the structures and mechanisms that generate changes in a university system) while knowledge is considered “produced in the social activity of science” (e.g. through systems based interpretations of university changes) (ibid., p. 25). According to Bhaskar’s transcendental realism, explanation should seek to identify causal mechanisms and how they operate (Sayer, 2000). In the context of this study, this would involve identifying causal mechanisms and how they influence changes in a university system in relation to contextual sustainable development issues (see chapter 6, section 6.2). Science therefore becomes an ongoing process with scientists continuously improving the concepts for studying mechanisms, which implies that new knowledge may be generated through research which may correct existing beliefs (Benton and Craib, 2001, p. 120).

According to Kaboub (2001), positivists argue that society and nature should be studied in the same way and in accordance with the Humean notion of law while hermeneutics argues that social sciences aspire to understand the meaning of social events, and therefore society cannot be studied by using a naturalist methodology. Bhaskar, in his book *The Possibility of Naturalism* (1998), therefore addresses this question through asking: “to what extent can society be studied in the same way as nature?” (Bhaskar, 1998, p. 1). He defined naturalism as “the thesis that there is (or can be) an essential unity of method between the natural and the social sciences” (ibid., p.2). Critical naturalism is therefore the view that society and human phenomena can be studied in the same way as nature and proposes use of social scientific methods in identifying mechanisms producing social events (Archer et al., 1998). However, the human world is different and more complex than the natural world and it is difficult to find constant conjunctions in it (ibid.). The hermeneutic position stresses that human sciences are concerned with the reasons for agents’

behaviour and these cannot be analysed as causal mechanisms as they are not logically independent of the behaviour they explain and operate at a level different from that of causes (Archer et al., 1998). Critical realism explains that human agency is made possible by social structures that require reproduction of certain actions and also that humans inhabiting these social structures can reflect upon and change the actions that produce them through reflexivity and social interactions (critical realism's theory of emergence, see section 3.3.3).

3.3.1 The transitive and intransitive dimensions of reality

Bhaskar, in developing his critical realist theory, made a distinction between the transitive and intransitive dimensions of knowledge. The intransitive dimension is the underlying structure of reality (Kaboub, 2001) which is formed by the objects of social study, that is, physical processes or social phenomena. The transitive dimension is characterised by theories and models which constitute the "raw materials" of science, that is, our perception of reality (Bhaskar, 1978, p. 21; Danermark et al., 2002, p. 23). The world, to which our theories and concepts refer (intransitive), is neither a product of, nor constituted by our theories about it (transitive) (Carter and New, 2004). For example, when universities theorise about, say, the causes of climate change, their theories may be wrong and may change as the climate changes and impacts on society change.

According to Sayer (2000), a shift in the transitive dimension does not necessarily mean a shift in the intransitive dimension. This is because "all knowledge is fallible" and science may be wrong at any point when it theorises about and models real objects (Danermark et al., 2002, p. 23). This means that systems models are also fallible. In this study, for example, a functions/structure model in relation to sustainable development at a university is subject to change as sustainable development challenges in society also change. Danermark et al. (2002) therefore argued that theories should be regarded as the best truth we have about reality at a point in time as these can always be surpassed by new theories in future and hence cannot be regarded as the ultimate truth. For the social world, the real cannot be said to be totally independent of knowledge as reality itself is partly socially constructed (Forsyth, 2001). As a result, a change in the minds of researchers may not bring about significant change in the phenomena that they study (Sayer, 2000), for example, change in people's belief about the shape of the world was not associated

with change in the shape itself. Therefore, to attribute the properties of knowledge to the objects of knowledge is to commit what Bhaskar termed the epistemic fallacy (Carter and New, 2004, p. 2) (see section 3.2.7).

3.3.2 Stratified ontology

Critical realism is based upon the belief that things do not happen by chance but there are causal mechanisms that generate them (Sayer, 2000). It represents a shift from epistemology to ontology, and within ontology, a shift from events to mechanisms. According to critical realism, “the world is structured, differentiated, stratified and changing” (Danermark et al., 2002). The basic tenet of critical realism is that there is a reality beyond what we know¹⁸ and understand, the real being intransitive, while knowledge and theories of the real are transitive (Bhaskar, 1978; Sayer, 1984 and 2000; Danermark et al., 2002):

... there exists a reality independent of our concepts and knowledge of it. ... this reality and the way it behaves are in important respects not accessible to immediate observation. If ‘everything that is’ were in the open, if reality were transparent, there would be no need for science; indeed no science would exist other than as mere data collection (Danermark et al., 2002, p. 20).

Critical realism distinguishes levels of reality into real, actual and empirical levels (Sayer, 2000, p. 11). This results in a stratified ontology representing emerging realities as follows:

- the ‘real’ world of mechanisms, powers, tendencies, and so on, which science seeks to discover;
- the ‘actual’ level of flows or consequences of events which may be produced under experimental conditions or occur in more complex and less predictable ‘conjunctures’ outside the laboratory; and
- the ‘empirical’ level of observed events (Benton and Craib, 2001, pp. 124-125).

Stratification of reality into levels shows the existence of causal mechanisms at the empirical level (Benton and Craib, 2001). The real (intransitive) is that which exists (natural or social) and is independent of our knowledge and is the realm of objects and their structures and powers (Sayer, 2000). These mechanisms may exist unexercised. This shows recognition by critical realism that “what has happened ...

¹⁸ As discussed in section 3.2.7, this is how critical realism differs from systems thinking with the latter accepting the social construction of knowledge at the empirical level.

does not exhaust what could happen” (Sayer, 2000, p. 13). It helps us understand that we could become many things that we are currently not (*ibid.*). The actual (transitive) is “what happens if and when these powers are activated” (*ibid.*, p. 12). The empirical (transitive) is what we experience, whether directly or indirectly and is separated from the actual where events take place independent of our experience of them (Danermark et al., 2002). Using climate change as an example, the empirical can be taken to refer to changing climatic experiences like warmer weather or frequent storms (see Huckle, 2004), which we may experience without the knowledge of factors triggering the changes, which represent the actual domain (e.g. increased use of fossil fuels) and real domain (unequal power relations or modernist development frameworks). The stratified ontology, according to Benton and Craib (2001, p. 125), shows that critical realism is a form of “depth realism” and scientific investigation is about uncovering what is behind the things that we experience, i.e., generative causes. Bhaskar (1978, p. 16) therefore regarded empiricism as characterised by an “epistemic fallacy” as it does not maintain the distinction between ontology and epistemology, equates the real with the empirical and neglects the conditions under which experience is significant.

A diagrammatic representation of the stratified ontology (Figure 3.6) shows that the domains of reality are overlapping. The actual and the empirical are part of the real. However, the actual can not be equated to the real as it only represents activated mechanisms leaving out other mechanisms that are not being exercised. Similarly the empirical is part of the actual level but cannot be equated to it as there are other events taking place independent of experiences.

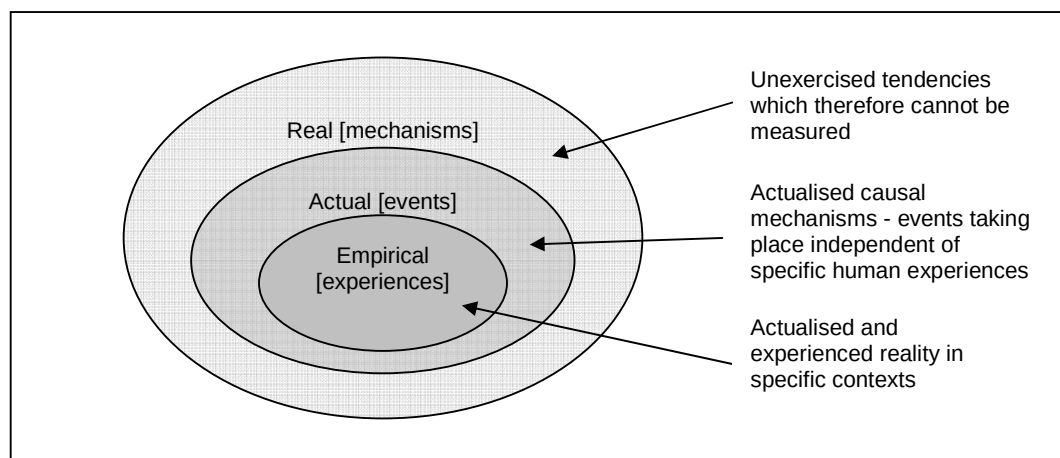


Figure 3.8 Overlapping domains of reality

Bhaskar (2008) presents the overlapping relationships of the domains of reality as in table 3.1 below.

Table 3.1 Bhaskar's overlapping domains of reality (Adapted from Bhaskar 2008)

	Domain of Real	Domain of Actual	Domain of Empirical
Mechanisms	√		
Events	√	√	
Experiences	√	√	√

3.3.3 Emergence

Critical realism's stratified ontology is in contrast to other ontologies which are flat and consist of only the actual or the empirical (Sayer, 2000). Empirical realism equates what we experience with everything that exists (e.g. Luhmann's systems thinking, section 3.2.5) and actualism considers what happens at the level of events to exhaust the world (e.g. systems theories that focus only on interaction), but critical realism argues that the world is characterised by emergence, where the conjunction of two or more features leads to the development of new phenomena with properties that cannot be reduced to those of their constituents (ibid.) (analyses causal mechanisms influencing interactions and communications in open systems). Objects are therefore said to possess emergent powers which cannot be reduced to those of their constituents (Sayer, 1984). The powers of water (e.g. capability to put out fire) exist at a different level from those of hydrogen and oxygen (highly flammable) (ibid.).

In the context of the social world, interrelationships between people or institutions influence what a person as an individual or a single institution can do (Sayer, 2000). Lawson (cited in Sayer, 2000, p. 13) argued that social systems involve "dependencies or combinations [which] causally affect the elements or aspects, and the form and structure of the elements causally influence each other and so also the whole". Social phenomena are therefore not as durable as the objects that are studied by the natural sciences and those that do endure do so as a result of

deliberate effort to maintain continuities and not simply by doing nothing (Sayer, 2000). Emergent powers therefore are created because the combination of individuals modifies their powers in fundamental ways (Sayer, 1984). For example, university partnerships in sustainable development such as the MESA Universities Partnership bring together professionals from diverse backgrounds which strengthens their mainstreaming strategies and this means strengthening their capacity to respond to sustainability challenges, that is emergence (emergence is explained in university change context in Lotz-Sisitka and Lupele (2006)). As a result, explanation of the actions of people requires a macro (holism) rather than micro (reductionist) regress to the social structures in which they are located (ibid.).

3.3.4 Causation

Critical realism rejects the Humean successionist view that causation is characterised by a regular sequence of events (the cause and effect relationship) (Bhaskar, 1978). It argues that what causes an event bears no relationship to the number of times we have observed it happening (Sayer, 2000). Causation is therefore not understood from the perspective of a regular succession of events, hence there is no need to search for “putative social laws” to explain events but to identify causal mechanisms, how they work, discovering if they have been activated and if so, under what conditions (ibid., p. 13).

In the social sciences causal laws are often invisible and are embedded in the natural structure making them different from empirical patterns of events (Kaboub, 2001). The future is therefore regarded as open as things could happen in many different ways (see the next section, i.e. section 3.3.5). Furthermore, if objects which are contingently related (each can exist without the other) are brought into contact and interact, further new mechanisms may arise (Sayer, 2000). Using the MESA Universities Partnership as an example, interaction of members can result in improved competencies in mainstreaming sustainability, which may not have been possible without interaction among members. Even in the natural sciences, many causal laws are not invariant succession of events but express tendencies (the likelihood of occurrence of certain events) given certain conditions. For example, “water does not invariably boil at 100 °C, but only does so when air pressure is at a certain level” (Carter and New, 2004, p. 2).

Critical realism acknowledges that social phenomena are intrinsically meaningful, thus, meaning is not only externally descriptive of them but is constitutive of them (Sayer, 2000). This means that there is always an interpretive element in social science as meaning cannot be measured or counted. Unlike natural science, social science operates through a double hermeneutic where there is fusion between the researcher and the researched, with the researched's actions not reducible to the researcher's interpretation of them (ibid.). However, unlike interpretivism, critical realism argues that this does not rule out causal explanation:

- a) because material change in society has to be explained too, and
- b) because reasons can also be causes, in that they prompt us to do things and think differently.

In other words, it poses a wider conception of causation that is customary in that it does not assume that all causes must be physical (Sayer, 2000, p. 18).

While Sayer (2000) argued that identifying causal mechanisms is difficult in social systems (open systems), he suggested studying examples that provide contrasts in aetiology, for instance the absence of an otherwise common condition by asking what he called characteristically realist questions like the following:

- What does the existence of this object/practice presuppose?
- Can/could object A ... exist without B ...?
- What is it about this object which enables it to do certain things?

Applied to the university context, this could mean asking questions like

- What does the existence of an Environmental Policy at a university presuppose?
- Could sustainable development curricula exist without sustainability expertise among staff?
- What is it about student environmental groups which enable them to initiate sustainability-related outreach projects?

According to Sayer, such questions help to distinguish between “what can be the case and what must be the case, given certain preconditions” (2000, p.16).

3.3.5 Closed and open systems

According to Sayer (1984), it is often assumed that the extent to which regularities occur is “a measure of the maturity of a science”, implying that social sciences are immature. Regularities only occur in closed systems. Critical realism reflects upon conditions that must hold for regularities to occur. “There must be no change or qualitative variation” in the object possessing causal powers (the intrinsic condition of closure) and “the relationship between the causal mechanism and those of its external conditions which make some difference to its operation and effects” must be constant (the extrinsic condition of closure) (ibid., p. 112). These conditions assume that no new emergent powers are developing in the system.

However, social science cannot be experimentally closed but must be considered within the concept of an open system; as a result, it can only be explanatory but not predictive (Kaboub, 2001) (see chapter 5 and 6). Kaboub (2001) called this the epistemological limit of naturalism. Social systems are usually “complex and messy” hence it is difficult to isolate particular components and to study them under controlled conditions (Sayer, 2000). This is partly because people have the capacity to interpret the same material conditions and statements in different ways, leading to different ways of responding and thus becoming different kinds of people (Sayer, 1984). This violates the intrinsic condition of closure. At the same time, they are capable of violating the extrinsic condition of closure through their actions which can modify the configuration of systems (ibid.). According to Carter and New (2004, p. 1) social relations cannot be reduced to a set of “unchanging generalisations” because of the complexity of human ambition, desire, interests and relationships, that is, though human behaviour is not being regarded “inexplicable or chaotic”, the “many interwoven dimensions of social life are roughly patterned rather than law-determined”. The idea of people having the capacity (agency) to respond to systems seem to be in refutation of the structural functionalist claim that people occupy places in a system to fulfil systemic requirements of these positions (see section 3.2.6.3).

Consistent regularities are only possible in some natural systems (closed systems) with the conditions of closure being that the object possessing the causal power is

stable and the external conditions in which it is situated are also constant (Bhaskar, 1978). These are not common in the social world where the same causal powers can produce different outcomes or different mechanisms can produce similar results (Sayer, 2000). In the natural sciences they can be artificially produced during experiments. In the social world they are only approximate, limited in duration and a result of deliberate effort (ibid.). As a result, in analysing any one cause in social science, there is need to try and control for the effect of other causes, but the controls seldom approach satisfaction of both conditions of closure (Sayer, 1984). For example, in establishing what triggered a university to start a sustainability course, there might be a number of influential factors including demand for such a course by students but, at the same time, the existence of expertise within the university may have played a role as without it, the course may not have been implemented despite student demands for it. This makes it difficult to establish which one of the two was the main cause.

3.3.6 Structure and agency

Critical realism regards society as consisting of two theoretically distinct elements of structure and agency, that is, social institutions and the creative individual respectively. There has, however, been debate over the primacy of structure or agency in sociological theory and, according to Archer (2003), there is no consensus on what they are in social science. Engaging in the ongoing structure and agency debate is beyond the scope of this study, thus only a short overview will be presented.

Weik (2006) defined an agent as a human being with a body and a mind and/or brain, and said the major structure *versus* agency debate centres on the extent to which this agent is free in making choices in actions and to what extent these choices are determined by social forces. Agency is therefore the capability of doing things (Giddens cited in Weik, 2006), that is, of actively changing the course of events by causal intervention. Agents (people) are influenced (though not determined) by structural situations. They choose what they do but these choices are made from among a structurally and culturally generated range of options which they do not choose (Carter and New, 2004).

Various definitions were proposed for structure. Giddens (cited in Weik, 2006) defined social structures as rules and resources and argued for the duality of structure where social structure is both the medium and the outcome of social action. According to Sayer (1984, p. 84), “sets of internally related objects or practices” may be termed structures. This goes along with the most basic generic feature of structures which Weik (2006) identified as the relation, mostly through interaction, of two or more people. Social structures exist only where people reproduce them. People reproduce social structures because they find it difficult not to conform to social practices even if they may be trying to escape such practices (Sayer, 1984). As a result, people in their conscious activities unconsciously reproduce and occasionally transform structures governing their substantive activities of production (Bhaskar cited in Kaboub, 2001).

The objects of social structures have emergent powers or liabilities which cannot be reduced to those of their constituents (Sayer, 1984). Societies therefore, are irreducible to people. For example, the quality of sustainability strategies that the MESA Universities Partnership as a grouping of universities develops may not be the same as that of strategies developed by individual members. Bhaskar thus argued against methodological individualism which, from a critical realist perspective, deduces explanation for phenomena or social events from facts about or the behaviour of participating individuals (social atomism) (Kaboub, 2001). To give an example with regard to the MESA Universities Partnership, this can mean that sustainability strategies developed by one individual in a university cannot be used to explain the strategies of the MESA Universities Partnership as a whole. Society pre-exists human beings but is reproduced or transformed by them (Bhaskar cited in Kaboub, 2001). “Society is both ever present *condition* and continually reproduced *outcome* of human agency” (Bhaskar, 1989, p. 92, emphasis in original). Bhaskar’s transformational model of social activity (Figure 3.9) proposes that people do not create society as it always pre-exists them and is a necessary condition for their actions. Society is an ensemble of structures, practices and conventions which individuals reproduce or transform, but which would not exist unless they did so (ibid.).

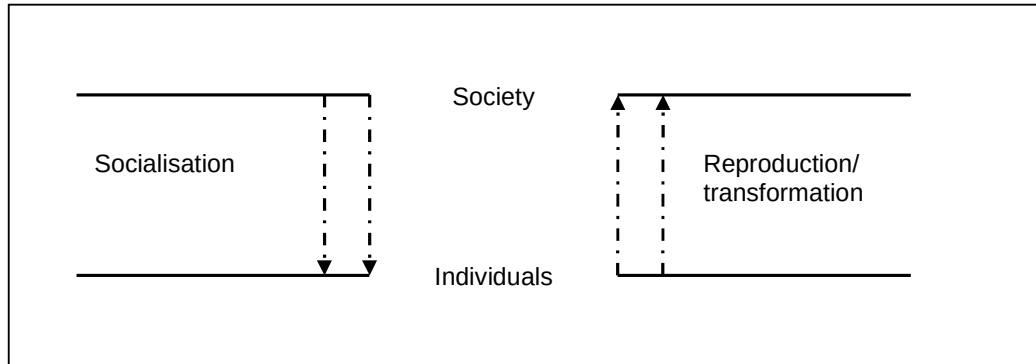


Figure 3.9 Bhaskar's transformational model of social activity

In a university ESD context this would mean that a university as a structure pre-existed its employees (including sustainability professionals) which were only employed after it was already running. However, these sustainability professionals have the ability to modify the university structure through introducing sustainability initiatives, for example (see chapter 4, section 4.2).

According to Archer (2003) 'structure' and 'agency' can be analytically distinguished as separate strata of reality, as the bearers of quite different properties and powers. Archer (1995) goes on to argue that

... properties and powers of some strata are anterior to those of others precisely because the latter emerge from the former over time, for emergence takes time since it derives from interaction and its consequences which necessarily occur in time (Archer, 1995, p. 14).

This makes it necessary to study social strata separately so as to be able to examine how the properties and powers that people possess causally interlink with those of parts (Archer, 1995). Explanation must attend to both structure and agency as any explanation that excludes one of these may be inadequate (Archer, Sharp, Stones and Woodiwiss, 1999). Critical realism's stratified view of social reality is not compatible with upward, downward or central conflationism, meaning people cannot be reduced to society or vice versa, and the duality of structure and agency, but social structures, cultural systems and human agents each have their own emergent powers which have to be considered when analysing social phenomena (Archer, 1995; Wikgren, 2005). Structure and agency each possess distinct properties and powers in their own right (*sui generis* powers). Social structures are pre-existing

features into which people are born, they are relatively enduring and possess powers of enablement and constraint (Archer, 1995). People possess powers relevant to agency, for example, reflexivity, self consciousness and intentionality among others, enabling them to develop plans and have aspirations among other things. They are capable of finding ways to modify or strengthen the appropriateness of social arrangements for the recognition of their own interests (Carter and New, 2004). In the MESA Universities Partnership context, the powers relevant to agency can be said to have influenced members to join the partnership and some to engage in unique mainstreaming initiatives.

3.3.7 The morphogenetic cycle

This study draws from Margaret Archer's social realist theory, in particular, the morphogenetic approach, to analyse the historical emergence of sustainability initiatives at Rhodes University (see chapter 4, section 4.2). Archer's morphogenetic approach is an analytical theory which draws from critical realism philosophy (Greener, 2005) and, according to Goodman and Ritzer (2004), from systems theory.

Archer (1995), like Bhaskar, argues that reality is stratified into levels which can not be reduced to one another. For example, an individual within a university community cannot be reduced to the community, while, the university community cannot be reduced to the individual. Individuals and their social context, that is structure/culture, are interdependent where individuals create structure/culture but the structure/culture is more than the individual as it is an emergent structure which cannot be reduced to the individual who created it (Archer, 1995).

Archer argues that there are three unique characteristics of society, the first one being that society is inseparable from its human components because its existence depends in some way upon human activities. The second one is that society is characteristically transformable, has no immutable state or preferred state and depends upon human activity. The third one is that society and the effort of human beings to transform it, affect the activity of social beings (Archer, 1995). According to Wheelahan (2007, p. 15),

Archer distinguishes between agency and social structure in arguing that social structures are the outcome of past social interaction between agents which condition the context in which current agents find themselves, and the

way in which current agents respond to their context shapes the social structures in which future agents find themselves.

This brings in the dimension of time and the repetitiveness of the process that, with time, creates a cycle which Archer termed the morphogenetic cycle. The morphogenetic cycle uses analytical dualism to explore interactions between structure/culture and agency (Wheelahan, 2007). Analytical dualism is used to separate structure/culture and agency so as to study the interactions between them using the morphogenetic cycle (ibid.).

Archer's morphogenetic theory focuses on how structural conditioning affects social interaction and how interaction leads to elaboration of structures (Ritzer and Goodman, 2004). Morphogenesis implies change in the process by which complex interactions lead to changes in both the system structure and the end product, that is, structural elaboration; while morphostasis implies the absence of change (ibid.). The morphogenetic approach divides analysis into three interrelated stages which are:

- analysis of the structural and cultural 'conditionings' that act as an influence on human actors, and which create 'emergent properties' and 'situational logics' for their interactions with them,
- exploring how these conditioning factors influence actors within the system through their interactions with them, primarily in the form of their behaviour in vested interest groups, and
- analysing the result of these interactions, and the resulting conditioning effects that will feed into the next morphogenetic cycle (Greener, 2005, p. 8-9).

Greener (2005) cited Ackroyd and Fleetwood, and Reed who argued that Archer's morphogenetic social theory appears not to have been empirically tested in institutional approaches even though it is being utilised in organisational theory.

3.3.8 Abstraction

Social systems are complex and messy open systems and are therefore difficult to isolate and examine under controlled conditions (Sayer 1984) despite the models created to guide such examinations (discussed in section 3.2.6). According to Sayer (2000), in open social systems, there is a possibility of different causes producing similar effects, hence a risk of misattributing causality as there may be more than a single mechanism at work. Therefore, to be practically adequate, knowledge must grasp the differentiation of the world, implying that there is need for individuating

objects, their attributes and relationships. Sayer (2000) suggested abstraction and a research design geared towards identifying such possibilities as ways of dealing with this. Knowledge must abstract from particular conditions, excluding those which have no significant effect in order to focus on those which do. Even where we are interested in wholes, we must select and abstract their constituents (Sayer, 1984). The method of “abstraction posits a rich ontology which seeks to discover the structured, layered and necessary properties and relationships of the person, context or object in question” (Roberts, 2001).

According to Yeung (1997), iterative abstraction is probably the most well-known method in critical realism to conceptualise generative mechanisms and is a central and necessary tool. He supported his argument with the following reasons:

- It is a practically adequate method to mirror social structures and generative mechanisms (individuating objects).
- It serves as a first sound step towards conceptualising and theorising the real essence, power and mechanism of an object.
- It helps to distinguish external/incidental/contingent from internal/essential/necessary relations between objects and events since neither objects nor their relations are given to us transparently; their identification is an achievement and must be worked for (Sayer cited in Yeung, 1997, p.58).

He concluded his argument by saying that abstraction is therefore extremely useful for the identification of causal mechanisms.

Objects are constituted by a combination of diverse elements or forces; likewise, an institution or a person combines influences from a variety of sources (e.g. personality and intelligence) each of which might be abstracted as a step towards conceptualising their combined effect (Sayer, 1984). The purpose of abstraction is to isolate causal mechanisms in relation to a concrete phenomenon to obtain knowledge of real structures or mechanisms which give rise to or govern the phenomenon (Lawson cited in Yeung, 1997). Abstraction and careful conceptualisation allows individuating or isolating objects, their attributes and relationships and considering how they combine and interact before returning to the

many-sided object to analyse it (Sayer, 1984). Where each of the abstracted aspects has been examined, it is possible to combine the abstractions so as to form concepts which grasp the concreteness of the object (Sayer, 1984, p. 81). In this study for example, the contribution of various departments to sustainability were examined separately but a holistic picture of university performance was built from these individual abstractions (see chapter 4, section 4.3).

Sayer (2000) suggested that research design also requires thought about how we abstract. Using examples of intensive and extensive research designs, he explained that an extensive design is geared towards showing how extensive certain phenomena and patterns are in a population while intensive designs are concerned with what makes things happen and hence are strong on causal explanation. An intensive design would start from the individual (be it a person or an institution) and follow up connections to situate the individual within the wider context thus illuminating “part-whole relationships” (resonates with the systems-environment model (section 3.2.6.2) and the nesting systems model (section 3.2.6.5), while an extensive design would follow the successionist theory of causation and seek formal similarities and differences rather than connections (ibid., p. 22). This therefore means an intensive research design is more likely to yield explanations of causal mechanisms than an extensive research design.

Yeung (1997, p. 59) suggested criteria to verify whether the abstraction is realistic and whether a proposition can be considered a causal mechanism, that is:

- When this mechanism is activated under appropriate circumstances or contingencies, will the proposed phenomenon occur?
- Can this phenomenon be caused by other mechanisms? If yes, the proposition cannot be a generative mechanism because it is not exclusive.

The process of abstraction should continue until further abstraction brings no significant additional theoretical rigour to the generative mechanisms and when empirical evidence is strong enough to support the practical adequacy of the postulated mechanism in explaining a phenomenon (theoretical saturation) (ibid.). According to Yeung (1997), abstraction is embedded within the broader realist method of retrodution (retrodution is discussed in section 3.5.6.4). This study uses abstraction to isolate individual objects of focus from complex and messy open social

systems, so as to study them as individual components before building the whole picture again (Sayer, 1984, see chapters 4, 5 and 6).

3.3.9 Some critiques of critical realism

Cruickshank (2004, p. 567) critiqued critical realists for tending to have two mutually exclusive definitions of ontology, the first of which pertains to “the ‘transitive domain’ of fallible theoretical interpretations of reality”. The second ontology is said to imply “a direct representation of the ‘intransitive domain’, (the reality beyond our knowledge) (ibid.). Defining ontology in terms of the transitive domain was said to mean committing the epistemic fallacy as it implies that the ontology is fallible and subject to revision (Cruickshank, 2004). Claiming that ontology in critical realism is a direct translation of reality beyond our knowledge implies claiming a privileged position which allows the definition of the features of a reality beyond our knowledge (ibid.). This would mean arguing that one has transcended transitivity to know reality which lies beyond what we know. Critical realists are said to slide between these two exclusive definitions of reality. Bhaskar’s critical realism has also been critiqued for being “an extravagant and presumptuous enterprise”, due to its emphasis on the intransitive dimension of knowledge which claims some absolutist position (Baehr, 1990, p. 768). It however distinguishes between events and the conditions and mechanisms necessary for those events to be triggered (ibid.). This study employs Roy Bhaskar’s version of critical realism and takes cognisance of the distinction between reality and the theories of knowledge. It recognises and regards theories of reality as fallible interpretations of reality, which is what Cruickshank (2004) argues for.

The other critique levelled against critical realism is that realists have “not adequately resolved the issue of method in critical realist research” (Yeung, 1997, p. 51). Yeung (1997), by citing Pratt, critiqued critical realism by arguing that realist philosophers are more concerned with the refinement of their philosophical positions at the expense of how the philosophy can be practised (methodology). Critical realism is said to leave theoretical and methodological work to substantive disciplines. Yeung (1997) argued that “method in critical realism is underdeveloped and misunderstood resulting in a methodologically handicapped philosophy” (p. 56). Three methodologies were suggested to complement philosophy in critical realist research, that is, abstraction, grounded theory method and use of triangulation (ibid.). This

study employs abstraction in isolating causal mechanisms in relation to experienced reality (section 3.3.8). The study also employs theoretical and methodological triangulation (see section 3.5.7), as well as Archer's (1995) analytical dualism (see chapter 4, section 4.2).

3.4 SYSTEMS APPROACH AND CRITICAL REALISM

Critical realism provides ontological depth for interpreting and describing systems (e.g. a university system) and addresses some of the relativist problems of postmodernism by arguing that while the world can be understood under particular conditions and within available discourses as postmodernism argues, judgement can be made of these discourses, and by accepting that knowledge can be wrong at any point in time (as discussed in section 3.2.7). It also provides methodological tools to explain the emergence of systems (Archer's morphogenesis and causality (abstraction) thus allowing for an historical and contextually located analysis of systems. The following commonalities were established between systems thinking and critical realism, which indicates that critical realism can be used as an underlabouring philosophy for systems analysis:

- Both critical realism and systems theories were developed in reaction to the problem of reductionism in science especially in dealing with complex objects of social science.
- Critical realism and at least some proponents of systems theory consider society to be an open system (though Luhmann argued that it is a closed system as discussed earlier) characterised by numerous webs of relationships.
- Both theories concur on the fact that open social systems are complex. Critical realism argues that in the social world the same causal powers can produce different outcomes or different mechanisms can produce similar results. Systems theory argues that in open social systems, a similarity in the final state may be reached from different initial conditions and in different ways, a phenomenon Bertalanffy (1968) termed equifinality.
- Both theories are in agreement on the proposition that the world is characterised by emergence. They both argue that integration or joining of two or more parts creates emergent properties, meaning that the properties

of component parts cannot explain their combined effect (Banathy, 1997; Gilbert and Sarkar, 2000; Sayer, 2000; Danermark, et al., 2002).

- Where the systems thinking approach argues for definition of a system through defining its boundary in relation to its environment, critical realism argues for the use of abstraction in individuating objects in order to study their properties. Both therefore rely on abstraction in defining and studying social systems.

3.5 RESEARCH DESIGN AND METHODOLOGY

3.5.1 Theoretical vantage points

As mentioned already, this study employs systems thinking as an epistemology (chapter 1, section 1.7 and this chapter section 3.2). It takes cognisance of critiques of systems thinking that argue that there is still poor development of systems thinking due to a lack of agreement on defining, validating and measuring systems (Davidz, Nightingale and Rhodes, n.d.). It also acknowledges some of the tensions in systems thinking development in the social sciences, for example, whether society is a closed or open system and how to classify social systems (discussed earlier in section 3.2.4 and 3.2.5). Another challenge is that the definition of system is relative and there are many understandings of the term (Davidz et al., n.d.). Even the hierarchy of systems that Boulding (1956) proposed shows that a system is not something that is well defined as it can be a cell, an animal or an organisation. According to Davidz et al. (n.d.), this makes it difficult to distinguish between a holistic and reductionist approach. Taking this study as an example, the university (RU) is defined as a system, but, from another point of view, the same university can be a subsystem and hence a component part of a larger social system. This makes it necessary to clearly define the level of analysis of the system of concern.

Throughout the study, the concept of holism is a guiding principle. The concept was used to build a picture of sustainability at Rhodes University. Using the concepts of systems thinking defined earlier (chapter 4, section 4.3.2), the study defines the system of concern as Rhodes University. It is classified after Banathy (1997) as a human activity system purposefully created to fulfil a special need. A point to note here is that, while the university has broad objectives, this study is confined to the role of the university with regard to sustainable development challenges.

In relationship to the environment, the university is considered an open system as it is in exchange of information with the society it is situated within (Sayer, 1984; Banathy, 2000) (discussed in section 3.2.6). The system boundary was defined in accordance with hierarchy theory. The systems-environment model provides an important epistemology for explaining and representing relations between the university and its environment. It is utilised in this study with cross reference to the nesting systems model (Sterling, 2004) in determining how RU is influencing and being influenced by the socio-economic system in its response to contextual sustainable development issues of the society in which it is located. Interaction between RU and other higher education institutions was pursued in the study through the theme of university partnerships in addressing sustainability issues. This was informed by the work of Walton (2004) in his paper *Modeling [sic] organisational systems: Banathy's three lenses revisited* (section 3.2.6.2).

The functions/structure model was employed in determining the components of the RU system which are involved in sustainability initiatives and the roles they are performing in relation to/in response to the key themes associated with the roles of universities in sustainable development (section 3.2.6.3). The study adopted a whole systems view of the themes forming the role of universities in sustainability (Sterling, 2004) to build the system structure and facilitate establishing the existence of systemic coherence or fragmentation and contradiction. It does this through considering to what extent sustainability planning and change at RU is systemic and collaborative, bearing the issue of emergence in mind (chapter 4, section 4.2 and chapter 5, section 5.3.2). This was achieved through adaptation of Sterling's (2003; 2004) model representing interrelationships among the operational dimensions of education systems with the component parts of interest in the study being the core functions of universities including teaching, research, community engagement and other activities like operations, management and student activities. Through modifying Sterling's (2004) model, a whole systems view of these dimensions was possible. In analysing sustainability initiatives in the various operations identified above, interrelations among departments, units and divisions were considered and this facilitated establishment of areas of coherence and differentiation and other systemic issues affecting mainstreaming at RU (see chapter 5, section 5.3.2).

The three lenses developed by Banathy (1992) (sections 3.2.6.2-4) were employed in data recontextualisation, that is understanding the data (RU sustainability initiatives) in relation to the context in which the university is operating (see chapter 5). They were also employed in proposing a systems approach to mainstreaming of sustainability in university functions and operations.

This study investigates how a systems thinking approach at the university can inform mainstreaming of sustainable development in response to contextual sustainable development challenges (see chapter 1, section 1.6.1.1). It, however, takes cognisance of Archer's (1995, p. 14) argument that component parts of a structure may differ in their influence on the whole system with some strata having "anterior" powers different to the powers of other strata, thus having unique "independent causal influences" (see section 3.3.6). The units of study at the university (teaching departments, research units/institutes, management sections etc.) were therefore investigated on an individual basis before a whole picture of the university was established. The intention was to establish systemic issues, whether in the form of dissonances or coherences, which may need to be addressed or mobilised for the university to move towards a systems approach in its sustainability initiatives. The same argument by Archer (1995) also influenced the development of the USAT which was designed, not only for wide use across the university (as is the case with the Sustainability Assessment Questionnaire), but for use in individual departments, but which still allows a whole picture to be built from these assessments (chapter 4, section 4.3.2).

Archer's (1995) theory of morphogenesis was employed in the study to trace the emergence of sustainable development initiatives at RU and to explain the continuous structural changes at the university in relation to the emergence of sustainability challenges (chapter 4, section 4.2). This facilitated extending and explaining the whole picture further providing perspective on the links and influences across the system.

As mentioned earlier, critical realism provides ontological depth for interpreting the university system. Reality in the study is therefore considered to be constituted beyond experiences. As a result, stratified ontology was used to probe the causal factors influencing the systemic emergence of sustainable development initiatives at

RU so as to identify systemic issues that have to be addressed in developing a systems approach to mainstreaming. The empirical level informed the development of a sustainability picture at the university through use of data from the sustainability assessment and the morphogenetic analysis (chapter 4). It was also the guiding principle in the description of sustainability initiatives at the university (reported in chapter 4).

Examining the actual level enabled identification of the events, processes and flows enabling and/or constraining mainstreaming at the university. It also formed the basis for probing processes which respondents thought could improve mainstreaming (chapter 4, section 4.5.4). Abstraction and causal analysis allowed probing of the real level of reality characterised by mechanisms, powers and tendencies to determine the causal factors influencing the observed events, processes and flows; and experiences populating the empirical and the actual levels. At the same time, it facilitated determining systemic issues to be addressed in developing a systems thinking approach to mainstreaming, and in establishing preconditions that may be necessary for developing a holistic approach to sustainability at the university. This enabled the study to achieve an emancipatory intent (chapter 6), characteristic of critical theories in education. As argued earlier (chapter 2, section 2.3.5), the contextual nature of sustainability challenges in Africa and transformation of the university systems in response to contextual sustainability issues require critical engagement, which critical realism allows for.

3.5.2 Research design

A case study research design was adopted to facilitate intrinsic examination (as explained by Sayer (2000), see section 3.3.8). As mentioned in chapter 1, the research is a case study of Rhodes University. A number of definitions of the case study research approach have been developed. Jupp (2006, p. 20) defined the case study method as “an approach that uses in-depth investigations of one or more examples of a current social phenomenon, utilising a variety of sources of data” and a ‘case’ as “an individual person, an event, or a social activity, group, organization or institution”. According to Merriam (2001) the most important characteristic that defines a case study is delimitation of the unit of study. From the three types of case studies that Kyburz-Graber (2004) outlined, that is, descriptive, explorative and

explanatory-causal case study, this study adopted the explanatory approach which answers the why questions from a theoretical point of view.

I selected the case approach because it is appropriate for the kind of questions the research endeavoured to answer, that is, identifying the factors influencing sustainability at RU and determining how sustainability initiatives at the university relate to sustainability challenges in the university's context among others (see chapter 1, section 1.6.1). According to Cohen, Manion and Morrison (2007), case studies can help establish cause and effect relationships and, because they do not seek frequencies of occurrences, they replace quantity with quality and intensity and hence emphasise significance rather than frequency. They are holistic in both description and explanation, and are naturalistic as they take place in the real life context of the case (Merriam, 2001), features which are significant for both systems thinking and critical realism (as pointed out in chapter 3, section 3.2.3 and chapter 2, 2.3.5.3 respectively). Cohen et al. (2007, p. 253) argued that case studies "investigate and report the complex dynamic and unfolding interactions of events, human relationships and other factors in a unique instance". They are a preferred strategy when pursuing the 'how' and 'why' questions (Yin, 2003), which are some of the questions the research is addressing (chapter 1, section 1.6.1). They are compatible with intensive research designs which trace causal relationships starting from the individual case (Sayer, 2000). Cohen et al. (2007) indicated one of their strengths as being strong on reality.

While individual case studies are said to be insufficiently representative to allow generalisations to other situations, Jupp (2006) and Yin (2003, p. 10) argued that they are generalisable "to theoretical propositions and not to populations and universes". Danermark et al. (2002, p. 76) argued that generalisations are usually based on empirical extrapolation but when engaging critical realism, generalisation has a second meaning, that is, the "realist concept of generality". This is the generalisation of the "universal preconditions" that makes an object what it is (ibid., p.77), what Bhaskar (1978, p. 227) referred to as "lying in the hidden essence of things". The case study approach was also selected in view of this strength when working with critical realism. The study takes cognisance of the other weaknesses of case studies mentioned by Cohen et al. (2007, p. 256), that is, case studies may be

“selective” and “subjective” and are prone to problems of observer bias despite attempts to address reflexivity.

Corcoran, Walker and Wals (2004) alleged that case studies are ideal for investigating sustainability in higher education. However, several critiques of case studies in this context include the following:

- not improving practice in institutions moving towards sustainability,
- not making available the data supporting “stories of successes” for public critique,
- not including information on the theoretical approach, and
- being grounded in a single institution (Corcoran et al., 2004, p.8).

Kyburz-Graber (2004, p. 48) argued that case studies should follow certain criteria of objectivity, reliability and validity and drew the following from Yin:

- a theoretical basis including research questions is described;
- triangulation is ensured by using multiple sources of evidence (data collection and interpretation);
- a chain of evidence is designed with traceable reasons and arguments;
- the case-study research is fully documented; and
- the case-study report is compiled through an iterative review and rewriting process.

This study attempted to address the critiques of Corcoran et al. (2004) through the research process. It closely followed the propositions made by Kyburz-Graber (2004) as will be explained in the research process section (section 3.5.3 and 3.5.7).

3.5.3 The research process

The research process commenced with the development of research tools that were employed in data collection. This was then followed with data presentation, processing and analysis. Merriam (2001) argued that case study research has no specific data collection methods hence all methods of data collection can be used. At the same time critical realism does not prescribe methods but is characterised by methodological pluralism (Danermark et al., 2002). According to Gillham, (2000) case

studies primarily use qualitative research designs including interviews. In this study data was collected using a variety of methods including a sustainability assessment, interviews, content analyses of documents and observations. Table 3.2 shows the sampling frame for the study and the methods used in each of the departments and units.

Table 3.2 Sampling frame and data collection methods

Department/Unit	Data collection method			
	Sustainability assessment	Interview	Content analyses	Field observations
Teaching departments				
Accounts	X	X	X	
Management	X	X	X	
Anthropology	X	X	X	
History	X	X	X	
Biochemistry	X	X	X	
Chemistry	X	X	X	X
Environmental Science	X	X	X	X
Geography	X	X	X	
Ichthyology/DIFS*	X	X	X	
Education	X	X	X	X
Law	X	X	X	
Pharmacy	X	X	X	
Research Units				
Institute for Water Research (IWR)		X	X	
Environmental Biotechnology* Research Unit (EBRU)		X	X	X
Institute for Social & Economic Research (ISER)		X	X	
Southern African Institute for Aquatic Biodiversity (SAIAB)		X	X	
Management Units/Offices				
Environmental Committee		X	X	X
Community Engagement Division		X	X	
Human Resources		X	X	
Planning		X	X	
Research Office		X	X	
Operations				
Grounds and Gardens	X	X	X	X
Student groups				
SRC* Environmental Office	X	X	X	X

Biochemistry* Department of Biochemistry, Micro-biology and Biotechnology
DIFS* Department of Ichthyology and Fisheries Science
SRC* Student Representative Council

Not all departments/units/divisions at the university were included in the study as is shown in Table 3.2 above. This was meant to contain the scale of the inquiry owing to time and other resource limitations. However for the study sample to be as

representative of the case study as possible, teaching departments from all RU faculties were included in the sample. Selection of departments was based on stratified random sampling where departments were grouped under their faculties (stratification) and those to be included in the study were then chosen by employing the random sampling technique. Table 3.3 is an outline of the 2007 RU faculties and departments showing teaching departments that were selected for the study (emboldened).

Table 3.3 Structure of Rhodes University faculties and departments, 2007

Faculties	Science	Humanities	Commerce	Education	Law	Pharmacy
Departments sampled	▪ Biochemistry ▪ Botany ▪ Chemistry ▪ Computer Science ▪ Environmental Science ▪ Geography ▪ Geology ▪ Human Kinetics and Ergonomics ▪ DIFS* ▪ Mathematics ▪ Physics and Electronics ▪ Statistics ▪ Zoology and Entomology	▪ Anthropology ▪ Drama ▪ English ▪ English Language and Linguistics ▪ Fine Art ▪ History ▪ Journalism and Media Studies ▪ Music and Musicology ▪ Philosophy ▪ Political Studies ▪ Psychology ▪ Sociology and Industrial Sociology	▪ Accounting ▪ Economics and Economic History ▪ Information Systems ▪ Management	▪ Education	▪ Law	▪ Pharmacy

DIFS* Department of Ichthyology & Fisheries Sciences

Four research Institutes and Units (identified in Table 3.2) out of a total of 24 at RU were selected. In addition, the study also included important divisions which are responsible for the smooth running of the university in performing its functions, e.g. the Human Resources Division, Research Office/Management Division, Planning Office, and Community Engagement Division among others. Reported sustainability initiatives are not comprehensive but are adequate for responding to the research questions as all the data categories ended up theoretically saturated and no new data regarding each category was emerging (see chapter 4, section 4.4.6). This was also employed as one of the validity checks on the data (section 3.5.7). I was also able to establish networked relations between the study sample and other departments and divisions which are not part of the study through use of documents

like Minutes of the Environmental Committee and the Community Engagement Committee (see chapter 4, section 4.2).

3.5.3.1 Sustainability assessment

Developing an assessment tool

I developed a sustainability assessment tool for assessing the level of integration of sustainability issues in university functions and activities. I started by critically reviewing of some of the international sustainability assessment tools (SAQ; AISHE; and GASU) (Chapter 2, section 2.4) to determine their suitability in the context of this study. The major issue which arose is that the tools audited sustainability at university level and did not capture initiatives taking place at departmental level well enough, except as examples. Since the university tends to be managed via departments and unit heads in a broader management system, I found it necessary to develop a tool that allowed for a unit-based framework, but which could also produce systems-wide data.

Such a tool needed to give an insight into the 'whole' picture of sustainability in universities. It needed to allow for flexibility so that it could be used at department, faculty, division (or unit) level to guide assessment of university wide change initiatives so as to identify potential areas of intervention. The SAQ, AISHE and GASU were used as a basis for developing indicators for a **unit-based** sustainability assessment tool (USAT, see Appendix 2, no. 1 and 2), with built-in flexibility to be used at departmental or unit level and across the entire institution.

The driving factor behind the development of the USAT was the need to establish university responses to the sustainability agenda through their activities. It was intended to determine to what level universities have integrated sustainability concerns into teaching, research and community service, but also considers organisational level and management unit contributions, as well as student initiatives.

Like the SAQ and the GASU, the developed tool is indicator-based. It is divided into three parts for ease of administration:

- **Part A** of the USAT pays particular attention to the core mission of universities and covers curriculum, teaching approach, research and

community service activities, examinations/assessment and staff expertise. It is targeted at heads of teaching departments who respond to the indicators.

- **Part B** deals with other university operations and the management of the university. The idea is to benchmark or get a snapshot of the institution's sustainability performance in the identified areas.
- **Part C** deals with student activities which may be linked to, or are independent of the other parts.

The tool was developed into a draft booklet for wider use in the MESA Universities Partnership (see Appendix 2, no.1). It was also later extended to include a **Part D** which focuses on policy issues (not included in the Appendix). When I used the USAT at Rhodes University, I had to slightly change some of the indicator codes initially defined in the booklet to avoid confusion, for example, WR2 was changed to W2 (USAT Part B) as the first indicator also started with WR (WR1). I also had to reorganise USAT Part C indicators, for example, career counselling which was originally the sixth indicator in the booklet (Appendix 2, no. 1) became the second indicator (Table 3.6 below, see also Appendix 2, no.2). Repetition of numbering was identified and corrected. There were two indicators numbered 6 (CC6 and VS6) and two numbered 9 (SM9 and CSI9) (Appendix 2, no. 2). I therefore stretched the numbering in Part C of the USAT to 12 (see Table 3.5 below). Only USAT Part A indicators were not revised as no problems were identified with them.

While the whole systems approach (Sterling, 2003; 2004) argues that the whole institution is of concern, Archer (1995), in her theory of social change, argues that different strata (or units) may possess different emergent properties and powers thus influencing the whole in different ways (see section 3.3.6). For example, one faculty or unit may have different structures, histories, cultures, priorities, resources, leadership styles, visions, philosophies (including understandings of sustainable development), actors etc. to another, and may therefore influence the whole system in a different way to other faculties, departments or units. To get an in-depth and more complex picture of the different emergent powers that may co-exist in various relationships in one broader system (the university and its community), I developed the USAT in such a way that it can be used to study teaching departments and other institutional units at a university separately as performance may differ due to different influences and emergent properties of these departments or units, resulting in unique

impacts or influences on the whole institution. If these are not differentiated in the analysis, areas of success and areas of possible intervention may be overshadowed, and may remain poorly understood in the context of the whole.

The USAT facilitates a quick identification of departments' responses to sustainability and allows for rapid detection (through use of indicators) of specific areas of strength and areas that may require future development in relation to sustainability concepts and principles. It therefore simplifies more complex emergent properties, but helps to identify areas of change and success through a relatively rapid assessment technique. Though the USAT is designed to be used at departmental/institutional unit level, the results representing the performance of various departments can be averaged for the overall performance of the institution. Not all the teaching departments or institutional units at a university need necessarily be included in the survey though it is important to have all faculties represented if the results are to represent overall university sustainability performance. However, it can be used to assess sustainability in individual departments and to benchmark them for comparative analysis with time or against other departments.

As mentioned above, the first part of the USAT (Part A) is for use in academic departments, or research and teaching units. It makes use of twenty indicators (see chapter 2 section 2.4 for the criteria used in identifying indicators) grouped under five clusters including curriculum, teaching approach, research/community service and scholarship activities, examination/assessment of sustainability topics, staff expertise and willingness to participate in sustainability teaching and research (see Table 3.4).

Table 3.4 USAT Part A indicators

Code	Description
	Curriculum
C1	The extent to which the department offer courses that engage sustainability concerns
C2	The level of integration of sustainability topics in courses referred to above
C3	The degree to which local sustainability issues and challenges form part of the department's teaching programme
C4	The degree to which global sustainability issues and challenges form part of the department's teaching programme
C5	The extent to which the department enrolls students in courses that engage sustainability concerns
	Teaching approach How far the teaching approach contributes to development of the following characteristics among students:
T6	The capacity to make informed decisions
T 7	Critical thinking skills
T 8	A sense of responsibility
T 9	Respect for the opinions of others
T 10	Integrated problem solving skills
	Research/service and scholarship activities
R11	The extent to which the department (staff and students) is involved in research/service and scholarship in the area of sustainability
R12	The degree to which global sustainability issues and challenges form part of the department's research and service
R13	The degree to which local sustainability issues and challenges form part of the department's research and service
R14	The extent to which your department is collaborating with other institutions and stakeholders in pursuit of solutions to sustainability problems
R15	The extent to which aspects of sustainable development are used in selection/execution of research/service
	Examination of sustainability topics
E16	The extent to which sustainability aspects are examined during course
E17	The extent to which sustainability aspects are considered in evaluating projects/traineeships
	Staff expertise and willingness to participate
S18	The level of expertise of staff members in the area of sustainability
S19	The extent to which staff members are willing to carry out research and service activities on sustainability aspects/topics
S20	The extent to which staff members are willing to teach sustainability topics

Indicators under 'Curriculum' are meant to establish if the department offers courses which deal with sustainability concerns and the integration of sustainability topics in such courses. They also determine the degree to which local and global sustainability issues and challenges form part of the department's teaching programme and the extent to which the department enrolls students in courses that engage sustainability concerns (Table 3.4). The curriculum cluster is meant to establish if there is promotion of ecological and sustainability literacy at the university through empowering learners to make better informed decisions in life.

The **'Teaching Approach'** cluster of indicators (Table 3.4) determines to what extent the teaching approach contributes to the development of critical thinking skills, the capacity to make informed decisions, a sense of responsibility, respect for the opinions of others and integrated problem solving skills among students. Selection of these characteristics to inform indicators in the USAT was guided by the AISHE. According to Roorda (2001), these are characteristics that are essential for enabling people to engage in sustainability practices and actions. They facilitate building capacity for learning and adaptation; that is resilience (chapter 2, section 2.3.4).

The **'Research, service and scholarship'** cluster of indicators (Table 3.4) determine the extent to which staff and students in the department are involved in research, community service activities and scholarship in the area of sustainability and the degree to which local and global sustainability issues and challenges form part of their research and community service activities. They are also meant to establish if there is collaboration between the department and other stakeholders in pursuit of solutions to sustainability problems. The last indicator in this set attempts to determine the extent to which aspects of sustainable development are used in the selection/execution of research and/or community service. All this gives an idea of how far sustainable development challenges are given visibility in research and community service activities in the concerned departments or units.

The indicators under **'Examination (assessment) of sustainability topics'** (Table 3.4.) attempt to establish how far sustainability issues are examined or assessed and how far they are considered in evaluating projects or traineeships. According to Roorda (2001), if a clearly visible examination or assessment of sustainable development issues and topics is absent, students may get the impression that sustainability is a kind of secondary consideration. It is therefore important to examine and assess sustainability issues and activities to encourage students to consider them seriously within the institutional practices of the university.

The intention of indicators under **'Staff expertise and willingness to participate in sustainability issues'** cluster (Table 3.4) is to determine staff expertise in the area of sustainability and establish their willingness to carry out sustainability research and community service and to teach sustainability topics. Expertise in the area of

sustainability is essential in improving integration of sustainability issues in a department's activities. Without that expertise it becomes difficult to carry out sustainability research and to teach sustainability topics. At the same time, that expertise will be put to good use if complemented with a willingness to do that kind of research or teaching among staff. Sustainability issues are relatively 'new' in the context of longer term university traditions and curricular practice, and may therefore require staff development.

The first part of the USAT, by design, targets teaching departments and hence emphasises the core functions of the university leaving out other management practices. This made it necessary to develop Part B of the USAT which is dedicated to other university operations and management practices (Table 3.5; see Appendix 2, no. 1 and 2 for an outline of all the USAT Part B aspects). The design of the USAT Part B was modelled on the operations section of the SAQ (ULSF, 1999). It covers practices outside teaching, research and service and these include waste management practices, air pollution, energy, water conservation, landscaping, pest management, transportation programmes, purchasing, and gives an option to add any other sustainability operations not mentioned. These, among others, are, according to ULSF (1999) some of the operational practices emphasised by institutions moving towards sustainability internationally. The interest was to adapt and use them in the context of African universities. The various practices were coded for easier representation in tables or graphs. The same assessment criteria as for the USAT Part A are used in Part B (discussed later in this section).

Table 3.5 USAT Part B indicators

Code	Description
WR1	Waste reduction practices
W2	Recycling of solid waste (including paper, plastic, metal, etc.)
TW3	Source reduction of toxic materials and radioactive waste
AP4	CO ₂ and air pollution reduction practices (including alternative fuel use, renewable energy sources, emission control devices, etc.)
AQ5	Indoor air quality standards and practices
BC6	Building construction and renovation based on ecological design principles
EC7	Energy conservation practices (in offices, laboratories, libraries, classrooms and dormitories)
LP8	Local food purchasing programme
PE9	Purchasing from environmentally and socially responsible companies (including buying and using 100% post consumer chlorine free paper)
OP10	Organic food purchasing programme
TP11	Transportation programme (including bicycle/pedestrian friendly systems, car pools, bus pass programs, electric/natural gas campus vehicles)
BF12	Use of bio-fuel
WC13	Water conservation practices (including efficient shower heads and irrigation systems)
PM14	Integrated Pest Management practices (including reduction of pesticides to control weeds)
SL15	Sustainable landscaping (emphasizing native plants, biodiversity, minimizing lawn, etc.)
OE16	Integration of operations into the educational and scholarly activities of the university
	Others (please specify):

The operations section also requires the assessor to indicate prime project areas and to show where he/she does not have adequate information regarding the practice. Another column asks for reasons for the implementation of the practice. This aims to find out if the practice was driven by the need to respond to sustainability concerns or by other factors despite the fact that it has sustainability implications. The purpose of the last column is to establish if the university is doing all it can in response to sustainability challenges, or whether there is still room for improvement (see Appendix 2, no.1 and 2).

Another aspect to consider in university wide sustainability assessment is the way students are involved in the operational management of the university (e.g. are student groups involved in recycling, waste management or energy saving initiatives on campus?), and how students think about and participate in sustainability issues. Part C of USAT (Table 3.6) draws on the SAQ to design a set of indicators for student involvement in sustainability issues. Such initiatives can be linked to other activities (outlined in Part A and B of USAT), or they can be self-initiated,

independent initiatives taken by students outside of the mainstream teaching, research and management activities of the university. For this reason it was necessary to consider student involvement in a separate indicator framework within the USAT.

The indicators in the USAT Part C (Table 3.6), include assessment of student involvement in voluntary activities related to sustainability, student orientation programmes and career counselling, student politics and governance for sustainability, collaboration of students and management on sustainability issues, and student involvement in sustainability practices in residences (amongst others). The USAT Part C indicators therefore cover voluntary activities by students, as well as student support, student organisations and governance systems (Table 3.6).

Table 3.6 USAT Part C indicators

Code	Activities and opportunities
SC1	Student Environmental Centre
CC2	Career counselling focused on work opportunities related to environment and sustainability
ES3	Environmental societies or other Student Group(s) with an environmental or sustainability focus
SD4	Sustainability practices in residences or dormitories by students (e.g. recycling)
OP5	Orientation programme(s) on sustainability for students
SA6	Student environmental and sustainability awareness programmes
VS7	Voluntary community service by students related to sustainability issues and concerns
SI8	Involvement of student groups across campus in sustainability initiatives
SR9	SRC* involvement in environmental and sustainability initiatives
SM10	Student collaboration with management in the area of environmental and sustainability
ES11	Environmental and sustainability activities initiated by students themselves (independent of departments, lecturers, management etc.)
SW12	Students' willingness to take responsibility in the environmental and sustainability area
	Others (please specify):

SRC* Student Representative Council

Almost along the same lines as USAT Part B, Part C also requires the assessor to indicate key areas and to show where he/she does not have adequate information regarding the practice, and, in addition, to give an outline of the actual activities on the ground (see Appendix 2, no. 1 and 2).

The rating of identified activities (for all USAT parts) was based on evidence indicating the presence of the identified indicators and practices. This results in

ordered response levels (Uebersax, 2006) loosely based on the Likert scale. Explanation and translation of the scales into percentages was based on the GASU (Lozano, 2006). Respondents selected the score from 6 choices ranging from X to 4 where:

- **X (don't know)** indicates a lack of information concerning the practice but not necessarily an absence of such information.
- **0 (none)** indicates the absence of information regarding the indicator in question; this is an equivalent of about 0% of such information.
- **1 (a little)** indicates that the evidence shows poor performance in the concerned indicator and this is about 25% of full information regarding the indicator.
- **2 (adequate)** indicates that the evidence shows regular performance, about 50% of full information required by the indicator.
- **3 (substantial)** indicates that the evidence shows good performance, about 75% of full information required by the indicator.
- **4 (a great deal)** indicates that the evidence shows excellent performance, more than 75% of full information required by the indicator.

The rare X was used as a quality checking mechanism where a response rate of more than 40% of the total responses (more than 40% of indicators being rated X) would indicate the need to identify another, more knowledgeable main respondent. In this study however, no new respondents were identified as X was barely used in rating indicators.

While the USAT was developed for use in this study, it was also meant to inform the MESA Universities Partnership (as mentioned earlier in this section) by providing a tool that would facilitate identification of change projects by participating members in their institutions. About 18 universities in the MESA Universities Partnership used it in different ways (some used only one part) and in various contexts which facilitated obtaining important feedback to the study on its applicability in other contexts and possible improvement of the tool to suit a broader context (for example, the addition of a Part D which focuses on policy issues). This was used as another quality checking mechanism. Feedback on its use in other contexts was obtained during the Swedish/Africa International Training Programme 'Education for Sustainable

Development in Higher Education' in Africa workshop hosted by the Environmental Education and Sustainability Unit (EESU) at Rhodes University in July 2008 (see chapter 7, section 7.3.2).

RU Sustainability Assessment

According to Lozano (2006), sustainability reporting is important as it communicates the efforts and progress of the institution thus making it necessary to carry out sustainability assessments. In this study, I used the USAT to assess sustainability in departments and divisions identified in Table 3.2. Heads of the selected teaching departments were involved in assessing their departments using the USAT Part A. For USAT Part B, the manager of the grounds and gardens division undertook the assessment. For USAT Part C, the Student Representative Council Environmental Officer was responsible.

The sustainability assessment, guided by critical realism's levels of reality, was meant to establish the sustainability initiatives taking place and the level of integration of these in selected departments and divisions at RU (the empirical level of observed events). The procedure followed in the assessment was that of going through the relevant part of the USAT together with the assessor so as to clarify some of the indicators (where necessary). Two printed copies of the USAT were used with both the assessor and myself recording the scores that the assessor allocated for each of the indicators. The assessment was also tape recorded (with prior consent) and this helped both to verify the scores later and to capture the discussion surrounding the assessment for possible elaboration and justification for the scores. The time taken to complete the assessments differed with each Part of the USAT. Assessment using Part A on average took between 10 to 15 minutes depending on whether there was need for clarification on some of the indicators or not. Part B took the longest time, about 30 minutes, and this was attributed to the fact that there were other aspects which needed elaboration (like giving reasons for the initiation of practice among others) besides rating the indicators. Assessment using Part C took about 20 minutes as there was also the need to clarify other aspects of the indicators even though the number of indicators were fewer than those of Part B of the tool.

3.5.3.2 Interviews

Interviews are one of the qualitative data collection methods that are primarily employed in case studies (Gillham, 2000). Cohen et al., (2007, p. 353) identified four types of interviews, namely, informal conversational interviews, interview guide approach or semi-structured interviews, standardised open ended interviews and closed quantitative interviews. In this study, an interview guide approach was used specifically for its advantages in terms of comprehensiveness of the data and systematic collection between interviews (ibid.) and the opportunity to probe responses (Frey and Fontana, 1991).

I conducted interviews with 23 heads of departments/institutes/divisions outlined in Table 3.2. In the Institute for Social and Economic Research (ISER), Faculty of Education and Student Representative Council, an additional person was interviewed besides the principal interviewee. In the Faculty of Education, one of the interviews was the pilot which was carried out with a lecturer in the department but turned out to have invaluable information for the study. In the ISER, the second interview was meant to get more elaborate information on one of the institute's research involvement from the second interviewee. The first respondent from the student division did not have adequate information about student activities and this necessitated bringing in another more knowledgeable person recommended by the first respondent. A total of 26 interviews were conducted, each of about 40 minutes on average.

In the study, interviews were meant to establish the extent of involvement of the departments/units/divisions in sustainable development initiatives to supplement and extend USAT data. For those departments that were involved in the sustainability assessment, interviews allowed for both triangulation and elaboration on the nature of their activities and involvement. Before visiting a department/unit/division, I went through its website to familiarise with their activities. This helped me to adapt the interview to suit the department as explained below.

In teaching departments, questions asked were more or less similar. I developed a general interview guide (Appendix 3, no. 1) though in most instances, I had to adapt it in accordance to prior knowledge obtained from the departmental websites. For example, question 1 which asks whether a department teaches sustainability topics

was not asked in the same manner in departments where this data was available on the websites, but would be adapted to focus only on elaboration and examples of topics. The questions were intended to establish presence of sustainable development topics in departmental activities (with elaboration on topics) including teaching, research, community engagement and existence of partnerships in sustainable development with other universities or other stakeholders like local governments, and establishing whether sustainability courses were mandatory or if all students in the department were exposed to them. In addition, the interview also established if students were allowed to specialise in sustainable development. At the same time, it was meant to identify influential factors behind mainstreaming sustainability including the influence of the Decade of Education for Sustainable Development (and contextual relevance of responses through cross reference to literature, section 2.3.5, chapter 2).

I used the same approach in research institutes and units where I developed a standard interview guide and then adapted it to suit various institutes (Appendix 2, no. 2). Even the questions were more or less the same except that those relating to teaching were excluded as the institutes and units were basically research oriented, though staff members might teach courses in other RU departments.

For the remaining management units and other divisions, I had to develop different interview guides in relation to their activities. However, a common trend was that the interviews intended to establish the extent to which divisions had mainstreamed contextual sustainability issues (the issue of contextual relevance was to be determined later through literature, see chapter 2, section 2.3.5), opportunities for promoting sustainability and room for improvement in that regard (Appendix 2, no. 3-9).

I tape recorded the interviews with prior consent (see section 3.5.8) and later transcribed them verbatim. Interviews elaborated on the nature of topics and sustainability initiatives identified from the sustainability assessment. Interview data was then used in determining processes and events populating the actual level of critical realism, and the causal mechanisms influencing sustainability initiatives.

3.5.3.3 Content analyses

Jupp (2006, p. 40) defines content analysis as “a method of analysing the contents of documents that uses quantitative measures of the frequency of appearance of particular elements in the text”. Cohen et al. (2007, p. 475) use a more simple definition of content analysis which involves “the process of summarising and reporting written data – the main contents of data and their messages”. In the context of this study, I employed content analysis to extract information from documents and departmental websites which relate to their policies, activities, approaches in mainstreaming sustainability, for example, sustainability topics in the curriculum, research etc. Data was extracted against pre-defined themes used in the case records (see Appendix 5) thus allowing sorting for further analyses. Examples of these themes include curriculum and examinations, research, community engagement, partnerships in sustainable development, mainstreaming process and challenges. Documents used in content analyses are outlined in Table 3.7.

Table 3.7 Documents used in content analyses

Department	Documents
Accounting	Rhodes University (2007). Calendar 2007. Grahamstown. Rhodes University Research Report (2007). Retrieved December 29, 2008, from https://www.ru.ac.za/documents/Research/Rhodes_University_Research_Report_2007_WEB.pdf
Management	Financial Management course outline (2007) Psychology Department, 2007. Retrieved 5 November 2007, from: http://www.ru.ac.za/community/ . Rhodes University Research Report (2007). Retrieved December 29, 2008, from https://www.ru.ac.za/documents/Research/Rhodes_University_Research_Report_2007_WEB.pdf
Anthropology	Owen, J. (n.d.). Research in Anthropology. Retrieved from: http://campus.ru.ac.za/index.php?action=category&category=1016 on 27 February 2007. Environmental Anthropology course guide (2007). Anthropology of Tourism course guide (2007). People and Parks course guide (2007). Environmental Anthropology examination paper (2007). Anthropology of Tourism examination paper (2007). People and Parks examination paper (2007). Rhodes University (2005). Community Engagement Review 2005/6. Grahamstown. Rhodes University Research Report (2007). Retrieved December 29, 2008, from https://www.ru.ac.za/documents/Research/Rhodes_University_Research_Report_2007_WEB.pdf .
History	Department of History handbook (2007). Rhodes University, Grahamstown. Rhodes University (2005). Community Engagement Review 2005/6.

	Grahamstown. Why Study History at Rhodes? (n.d.) Retrieved 24 January 2007 from http://campus.ru.ac.za/index.php?action=category&category=1291 Overview of History at Rhodes University (n.d.) Retrieved 24 January 2007 from http://campus.ru.ac.za/?action=category&category=51 South African Environmental History examination paper (2007). Rhodes University Research Report (2007). Retrieved December 29, 2008, from https://www.ru.ac.za/documents/Research/Rhodes_University_Research_Report_2007_WEB.pdf
Biochemistry, Microbiology and Biotechnology	Microbiology 302 examination papers (2007). Microbiology 302 third year lectures (2007). Rhodes University (2005). Community Engagement Review 2005/6. Grahamstown. Rhodes University Research Report (2007). Retrieved December 29, 2008, from https://www.ru.ac.za/documents/Research/Rhodes_University_Research_Report_2007_WEB.pdf.
Chemistry	Chemistry 1 General information and course contents (2008). Chemistry 3 course outline (2008). Chemistry 102 examination paper (2007). Rhodes University (2005). Community Engagement Review 2005/6. Grahamstown. Rhodes University Research Report (2007). Retrieved December 29, 2008, from https://www.ru.ac.za/documents/Research/Rhodes_University_Research_Report_2007_WEB.pdf.
Environmental Science	Introduction to Integrated Environmental Systems (Env 201) course outline (2008). Environmental Issues of Global Concern (Env 202) course outline (2007). Environmental Monitoring and Monitoring Systems (Env 301) course outline (2008). Environmental Management Concepts and Methods (Env 302) course outline (2007). Environmental Science 201 examination paper 1 (2007). Environmental Science 201 examination paper 2 (2007). Environmental Science 301 examination paper 1 (2007). Department of Environmental Science. (2006). Annual Review. Rhodes University: Grahamstown. About Environmental Science at Rhodes University, (2007). Retrieved June 06, 2008, from http://www2.ru.ac.za/academic/departments/environsci/about.html Recycling and waste at RU, (n.d.). Retrieved February 13, 2008, from http://campus.ru.ac.za/index.php?action=viewarticle&articleid=7186 Rhodes University. (2005). Community Engagement Review. Grahamstown. Rhodes University Research Report (2007). Retrieved December 29, 2008, from https://www.ru.ac.za/documents/Research/Rhodes_University_Research_Report_2007_WEB.pdf.
Geography	Environment and Development in Africa examination paper (2007). Geography 102 handbook (2007). Geography 2 handbook (2007). Geography 3 handbook (2007). Rhodes University (2005). Community Engagement Review 2005/6. Grahamstown. Rhodes University Research Report (2007). Retrieved December 29, 2008, from

	https://www.ru.ac.za/documents/Research/Rhodes_University_Research_Report_2007_WEB.pdf .
Ichthyology and Fisheries Science	Britz, P. and Davies, M. (2007). Review of the department of Ichthyology and Fisheries (DIFS) experimental fish farm. Unpublished. Rhodes University, Grahamstown. Ichthyology 201 handout (2007). Ichthyology 201 Theory examination paper (2007). Ichthyology 301 handout (2007). Ichthyology 301 Theory examination paper (2007). Ichthyology Honours handout (2007). Ichthyology Honours Theory examination paper (2007). Rhodes University (2005). Community Engagement Review 2005/6. Grahamstown. Rhodes University Research Report (2007). Retrieved December 29, 2008, from https://www.ru.ac.za/documents/Research/Rhodes_University_Research_Report_2007_WEB.pdf.
Education	The Environment, Environmental Issues and Sustainability Module (2007/8). Rhodes University (2007). Community Engagement Review 2007/8. Grahamstown. Rhodes University (2005). Community Engagement Review 2005/6. Grahamstown Rhodes University Research Report (2007). Retrieved December 29, 2008, from https://www.ru.ac.za/documents/Research/Rhodes_University_Research_Report_2007_WEB.pdf. Professional qualifications (n.d.). Retrieved December 31, 2008 from http://www.ru.ac.za/eesu/courses/professionalqualifications. RUEESU Annual Report (2007). Rhodes University, Grahamstown. Lotz-Sisitka, H. (2008). Education for Sustainable Development in Higher Education International Training Programme: Unpublished Rhodes University partnership report. Faculty of Education, Rhodes University, Grahamstown.
Law	Environmental Law elective course outline (2007). Environmental Law examination paper (2007). Rhodes University (2005). Community Engagement Review 2005/6. Grahamstown. Faculty of Law (2007). Faculty size and shape. Rhodes University, Grahamstown Rhodes University Research Report (2007). Retrieved December 29, 2008, from https://www.ru.ac.za/documents/Research/Rhodes_University_Research_Report_2007_WEB.pdf.
Pharmacy	Pharmacy Administration and Practice 3 examination paper, 2007. Pharmacy Administration and Practice 4 examination paper (2007). Research handbook, (2007). Faculty of Pharmacy Research handbook, fifth Ed. Rhodes University, Grahamstown. Syllabuses for the Bachelor of Pharmacy Degree, (n.d.). Retrieved 17 April 2008 from: http://www.ru.ac.za/academic/departments/pharmacy/syllabus.htm#PA Rhodes University (2005). Community Engagement Review. Grahamstown. Rhodes University Research Report (2007). Retrieved December 29, 2008, from https://www.ru.ac.za/documents/Research/Rhodes_University_Research_Report_2007_WEB.pdf.
Environmental	The Rhodes Bio-sure Process flyer (n.d.).

Biotechnology Research Unit (EBRU)	Rose, P. D. (2002). Salinity, sanitation and sustainability: A study in Environmental Biotechnology and integrated wastewater beneficiation in South Africa. Volume 1: Overview, Water Research Commission. Rhodes University (2005). Community Engagement Review 2005/6. Grahamstown.
Institute for Water Research (IWR)	Institute for Water Research (2007). Annual Report 2007. Rhodes University, Grahamstown. Institute for Water Research (n.d.). Retrieved 10 June 2008, from http://www.ru.ac.za/institutes/iwr/index.html . Rhodes University (2005) Community Engagement Review 2005/6. Grahamstown. Rhodes University Research Report (2007). Retrieved December 29, 2008, from https://www.ru.ac.za/documents/Research/Rhodes_University_Research_Report_2007_WEB.pdf .
SAIAB*	SAIAB (2007). Annual Highlights Report 2006-7. SAIAB: Grahamstown.
Institute for Social and Economic Research (ISER)	Policy and governance, (n.d.). Retrieved 22 May 2008, from: http://www.ru.ac.za/community/policy.htm . Rhodes University, 2007 Community Engagement Review 2006/7. Rhodes University Research Report (2007). Retrieved December 29, 2008, from https://www.ru.ac.za/documents/Research/Rhodes_University_Research_Report_2007_WEB.pdf . Institute for Social and Economic Research (2005). Fifty-first annual report: 1 January – 31 December 2005. Rhodes University, Grahamstown. Institute for Social and Economic Research (2006). Annual report. Rhodes University, Grahamstown. Institute for Social and Economic Research (2007). Annual report. Rhodes University, Grahamstown. Makana Research Group list of clusters (n.d.). Rhodes University, Grahamstown
Institutional Planning	Rhodes University Policy relating to environmental sustainability (n.d.). Retrieved 18 September 2008 from http://www.ru.ac.za/environment/policy . Rhodes University institutional HIV and AIDS policy (2006). Retrieved December 31, 2008 from http://www.ru.ac.za/documents/Hiv-aids/AIDS%20policy.pdf .
Human Resources	Rhodes University recruitment and selection policy and procedures: Academic posts (n.d.). Retrieved 18 September 2008 from http://oldwww.ru.ac.za/intranet/policies/Recruitment&Selection%20PolicyandProceduresAcademicStaff.doc
Research	Research and innovation relating to environmental sustainability (n.d.) Retrieved 18 September 2008 from http://www.ru.ac.za/environment/research
Community Engagement Division	Rhodes University (2005). Community Engagement Review 2005/6. Grahamstown Extended Studies Unit (n.d.). Retrieved December 312 from http://oldwww.ru.ac.za/academic/departments/exstudies/ . Minutes of Makana Schools Partnership workshops. Community Engagement Committee Minutes.
Environmental Committee	Rhodes University Environmental Policy (1998). Rhodes University (2005). Community Engagement Review. Grahamstown. Minutes of the Environmental Committee.
Grounds and gardens (Estates Division)	RU-Gtn Recycling & Waste (n.d.) retrieved May 06 2008, from http://campus.ru.ac.za/index.php?action=viewarticle&articleid=7186 Rhodes University – Grahamstown/iRhini (South Africa) Recycling and

	Waste Disposal Activities (2008) retrieved May 06 2008 from, http://campus.ru.ac.za/download.php?actionarg=9562#INVENTORY
Students' initiatives	Rhodes University Student News (2008a) SRC Environmental Week. Retrieved June 03, 2008 from: http://www2.ru.ac.za/studentzone/news/2008/05/08/12-19052008-src-environmental-week/ Department of Water Affairs and Forestry (2008). Working for Water. Retrieved June 03, 2008 from: http://www.dwaf.gov.za/wfw/default.asp Rhodes University Student News (2008b). Rhodents Collaborative Fundraising Initiative. Retrieved 03 June 2008 from: http://www2.ru.ac.za/studentzone/news/2008/04/01/rhodents-collaborative-fundraising-initiative/ Rhodes University (2005). Community Engagement Review 2005/6. Grahamstown. Rhodes University (2007). Community Engagement Review 2007/8. Grahamstown Student Community Engagement Initiatives (n.d.). Retrieved June 03, 2008 from http://oldwww.ru.ac.za/community/student_community_engagement/

SAIAB* Southern African Institute for Aquatic Biodiversity

A number of factors influenced the selection of the documents captured in Table 3.7. These are as follows:

- **Recommendation by heads of departments:** some documents like course outlines and examination papers (teaching departments) were recommended by, and in most cases obtained from interviewees. After each interview, I asked respondents to identify one course which had a strong focus on sustainability issues and requested for a course outline and the 2007 examination paper for that course. While in some case only one course was recommended (for example in the Faculty of Law), in others, more than one course were identified and the course outlines were made available, for example in the Department of History and Ichthyology and Fisheries Science (also referred to as DIFS/Ichthyology Department).
- **Accessibility:** I also asked all the interviewees for any documents which would show the level of integration of sustainability in their activities. This is how most of the departmental research handbooks, annual reports and other documents were obtained, for example in the Faculty of Pharmacy, the Southern African Institute for Aquatic Biodiversity (SAIAB) and the Environmental Biotechnology Research Unit (EBRU).

- **Websites:** Departmental/division and unit websites were also searched for any material that reflect on the department's sustainability initiatives. In some instances (like in the case of syllabi for the Bachelor of Pharmacy Degree in the Faculty of Pharmacy and the RU Research Report (2007)) other documents with relevant information were also identified and downloaded for content analysis.
- **Data verification:** A few documents were identified and provided by interviewees as part of the data verification process, for example the Faculty of Law Size and Shape (2007) document and the Environmental Committee minutes.

The Community Engagement Reviews and the RU Research Report provided core data sources for most of the departments/divisions/units. This is because the documents provided comprehensive information on community engagement and research outputs across most of the departments. They were therefore used both as way of triangulating and extending data obtained through other means. These were identified through recommendations by interviewees.¹⁹

3.5.3.4 Observations

Observations have a unique strength in that they allow the investigator “the opportunity to gather ‘live’ data” in situ hence increasing the possibility of obtaining authentic data (Cohen et al., 2007, p. 396). In this study, the need for field observations emerged during the course of data gathering in the Chemistry Department and the EBRU. In the Chemistry Department, I was guided through the department in order to see their sustainability related facilities and took notes in the process. Elaborations and explanations regarding some of the facilities observed were provided straight after the tour before the start of the interview and this provided me with an opportunity to record them verbatim. At EBRU, observations were made of the unit's pilot sewage treatment plant and in the grounds and gardens (Operations Division) during an informal tour. Informal observations were also made

¹⁹ 2005/6 Community Engagement Review was recommended by the Community Engagement Manager and the 2007 one by a member of staff in the Biochemistry department (not one of the interviewees). Similarly, the RU Research Report (2007) and the Environmental Education and Sustainability Unit Annual Report were also recommended by a member of the Faculty of Education who was not an interviewee.

in the Faculty of Education and Department of Environmental Science. In all the cases I recorded field notes and in one instance took a picture. I attended some of the events organised by the Environmental Committee and the Student Representative Council Environmental Office in collaboration with a student environmental society and also recorded field notes. These included environmental awareness campaigns, lectures and video films and are as follows:

- A video entitled 'Inside the poison trade' about the export of toxic waste from developed countries to Africa,
- A talk about Acid Mine Drainage and water quality by the Director of EBRU which followed shortly after the above mentioned video, and
- Lectures organised by the Student Representative Council Environmental Office and the student environmental society during the RU Environmental Week; these were entitled 'Vegetarians do not eat children' and 'Corporate Social Responsibility'.

The purpose of attending these events was to triangulate information collected through interviews on how environmental awareness was created at the university and to get a sense of the size of the audience which such events draw from the RU community. Information from all observations were combined with all other data in developing case records for each of the departments/divisions/units (see Appendix 5).

3.5.4 Data organisation

All the data collected was electronically captured in preparation for data analysis. Results of the sustainability assessment were captured using Microsoft Excel and radar diagrams were constructed for each of the departments (Chapter 4, section 4.3). Data from interview scripts, field notes and documents were captured in Microsoft Word and files containing such data were organised into folders.

Sustainability initiatives emerging from the data for each department were identified by reading through the different data sources. They were then grouped under categories representing university functions of teaching, research and community engagement, and other emerging themes, for example, collaborations/partnerships in sustainable development, factors influencing sustainability, how to improve

sustainability, etc. Initiatives from all the sources were then collated to produce a report of sustainability initiatives for each of the departments/units/divisions, starting with the results of the sustainability assessment (where relevant).

A compilation of these departmental reports formed case records (Appendix 5) in which some of the verbatim conversations were captured so as “to keep the flavour of the original data” (Cohen et al., 2007, p. 462). Case record data syntheses were used as the basis for reporting on the findings of the study in chapters 4 and 5.

3.5.5 Data verification

In this study, verification of data was performed at departmental or unit level. The report of sustainability initiatives in each of the departments, which resulted from collation of departmental data from different sources including the sustainability assessment, interview(s), documents and observations (where relevant), was sent by email to participants from the departments for verification. This was meant to capture all of the department’s sustainability initiatives thus making it possible for data from documents and observations (where relevant) to have a chance to be verified and updated. I made this decision because documents are static and may contain outdated information. Internet sites may also not be updated at the same rate as new information is generated. A good example from the study is the Anthropology Department community engagement initiatives which were captured in community engagement reviews and the departmental website but were, through data verification, reported to have long been abandoned. At the same time, there were new initiatives in place which had not yet been captured in documents and on the departmental website; for example, changes in the structure of the Environmental Committee (see Appendix 5, case record 21). Capturing the latest information facilitated correcting the data which improved data quality.

The verification process involved a careful read of the case records for each department/unit by the respondent during which the validity of the data was checked through determining whether it was representative of the department/unit’s sustainability activities. Most of the interviewees responded by email but in some instances meetings were arranged (e.g. Chemistry Department and Faculty of Education). Three broad groupings of the outcomes of the process can be defined as follows:

1. No changes or very minimal alterations to the case record suggested.

Most departments/units fall under this category with the identified errors largely being a result of typing errors. Departments/units under this category are represented in Table 3.8 below.

Table 3.8 Departments/units with minimal/no changes after data verification

No changes	Minimal changes
Biochemistry	Environmental Science
Ichthyology	Geography
ISER	Chemistry
Human Resources	EBRU
Accounts	SAIAB
Management	Pharmacy
IWR	Education
History	Students
	Estates

2. New information generated through the verification process.

In a few departments/units, new information was generated from the data verification process through the introduction of extra documents mainly with the intention of correcting outdated information or extending the captured data to give a fuller picture of sustainability initiatives as described below.

Faculty of Law: I was given the Faculty Size and Shape document to clarify and elaborate on the nature of commitment to community initiatives in the faculty.

Anthropology Department: Some of the community engagement information collected through documents and the website was outdated and new information had not been publicised anywhere. I was therefore referred to individual staff members to obtain information on their involvement in community engagement which generated new information.

Environmental Committee: New information to extend what I had was suggested from Minutes of the Environmental Committee. Some of the interpretations of the interview were corrected. At the same time, changes within the structure of the Committee between 2007 and 2008 had to be indicated in the case record. All these resulted in modification of the original case record.

3. Data verified by different people from the interviewees: Several of the interviewees left RU before data verification was possible. Verification was therefore done by different individuals who, in all instances made new suggestions which altered the original content of the case records. This took place in the following units:

Research: the interviewee (Dean of Research) retired before data verification. Data was therefore verified by the Deputy Vice Chancellor Research and Teaching and new information was added to the case record.

Institutional planning: Similarly, the Vice Principal who was initially interviewed with regard to institutional planning had retired soon after the interview and data had to be verified by the Deputy Vice Chancellor Research and Teaching who also expanded the available data in the case record.

Centre for Community Engagement: The Community Engagement Manager who was the interviewee left the university soon after the interview. Data was verified by the new Director of Community Engagement which resulted in clarification and elaboration on some of the information in the case record. At the same time I was given new documents (Makana Schools Partnership workshop minutes and Community Engagement Minutes) with more information to extend what was in the case record.

All the suggestions made during the data verification process were worked into the case record of each department/unit. Appendix 5 therefore represents the best possible evidence after verification. The verification process formed a crucial step in the research process as it led to improvement in the validity and trustworthiness of the data (see section 3.5.7).

A major challenge which I faced during the data verification process relates to verification of data generated with people who had since left the university. In all the instances, the new heads of these departments were busy which resulted in delays, but in the end, all the data was verified. Another challenge was faced with EBRU data verification because of communication problems at the Unit's offices in terms of both email and telephone. At the same time, the interviewee was also retired and tracking him down took time. In the Faculty of Pharmacy, the case record was argued not to be representative of the Faculty, and was said to be misinterpreting the

context in which the department operates. The case record had to be altered before it was accepted and verified as representative of the Faculty.

3.5.6 Data analyses

The case records (Appendix 5) provided a comprehensive source of data which was then analysed further so as to respond to the research questions (see chapter 4, 5 and 6). Jorgensen (cited in Seidel, 1998, p. 34) defined qualitative data analysis as a process involving “disassembling” of research materials, sorting and sifting them to identify “sequences, processes, patterns” with the intention of reconstructing the data in a comprehensive fashion. These steps provided guidance in analysing data in the case records.

Morphogenetic analysis of social transformation was employed in understanding and explaining the emergence of sustainability initiatives at Rhodes University (section 3.5.6.1). Danermark et al. (2002, p. 73) argued that “critical realism does not claim to develop a new method for social science” and that “there is no such thing as the method of critical realism”; however, abduction and retroduction are “indispensable” modes of inference when using critical realism. This study made use of induction, abduction and retroduction modes of inference in making sense of the data and relied on conceptual abstraction to individuate the structure of concern (see sections 3.5.6.2 to 3.5.6.4 where this was discussed in more detail).

3.5.6.1 Morphogenetic analysis

Archer’s (1995) morphogenesis was employed to investigate changes in the structure of Rhodes University over time. The focus was to establish factors behind the changes or lack of these changes in the structure of the Rhodes University system in relation to the emergence of sustainability challenges and responses, and to establish influential structural and agential factors behind the changes (see chapter 4, section 4.2).

3.5.6.2 Induction

Induction, like deduction, takes place at the empirical level of observed events. However, where deduction involves drawing conclusions from an abstract pre-existing theory, induction entails developing conclusions (theory) from observations

of a small/limited number of events/phenomena and then generalising these to a larger population. Danermark et al. (2002, p. 77) referred to this as “drawing conclusions about all from knowledge about a few, without leaving the empirical level”.

In this study, induction facilitated generation of themes/conclusions regarding the major operations and levels of integration of sustainability in the functions of the university (see Appendix 5). As mentioned earlier, the purpose of the sustainability assessment was to establish a picture of the extent to which the university had integrated sustainability issues in its operations. A trend analysis of the indicator scores from the sustainability assessment in teaching departments was performed to determine departments with high and those with low integration of sustainability initiatives in their activities (see chapter 4, section 4.3). Assessment results were first used to construct radar diagrams for each of the teaching departments (chapter 4, section 4.3.1). Histograms representing departmental scores for each of the indicators and a radar diagram of the average scores were then constructed (chapter 4, section 4.3.2). Building the whole picture of institutional performance by averaging scores for each of the indicators (chapter 4, section 4.3.2) facilitated identification of university activities with low and those with high integration of sustainability initiatives and hence potential areas of intervention in promoting a systems approach at the institution. The same process was employed in the case of operations and students' initiatives (chapter 4, section 4.3.3 and 4.3.4).

Comments were made in relation to the operations and functions of the university through which it is mainstreaming sustainability as a way of responding to sustainable development challenges. This, in conjunction with the trend analysis, enabled constructing a picture of sustainability initiatives at the university (chapter 4, section 4.4). This allowed for developing an understanding of the full picture of sustainability activities at RU hence making it possible to develop conclusions at a local level regarding mainstreaming and the university's responses to sustainability (chapter 4, section 4.4).

While induction (and deduction too) is a valid and most widely used mode of inference, its major weakness is that it based on empirical generalisations and regularities and gives no guidance as to how we can reach knowledge of the

underlying structures from the observable characteristics of phenomena (Danermark et al., 2002). It is therefore unable to go beyond the empirical to answer questions relating to the structures and mechanisms populating the actual and real level of events and mechanisms. These cannot be measured as some of them remain unexercised and, as a result, are not experienced. This made it necessary for the study to employ abduction and retroduction as modes of inference to answer some of the research questions which go beyond the empirical level. Danermark et al. (2002) also argue in favour of a methodological approach based on abduction and retroduction. They describe the aim of social science as explaining events and processes, and, from a critical realist perspective, this entails “describing and conceptualising the properties and causal mechanisms generating and enabling events ... and then describing how different mechanisms manifest themselves under specific conditions” (Danermark et al., 2002, p. 74). The purpose of such emphasis is emancipatory, hence the ‘critical’ in Roy Bhaskar’s critical realism.

3.5.6.3 Abduction

Abduction involves the re-description or re-contextualisation of phenomena where phenomena are observed, described, interpreted and explained “within the frame of a new context” (Danermark et al., 2002, p. 91). The fundamental structure of abduction was defined by Danermark et al. (2002, p. 80) as “to interpret and recontextualize individual phenomena within a conceptual framework or a set of ideas” so as to understand them in “a new way by observing and interpreting this something in a new conceptual framework”. This enables gaining new knowledge of already known phenomena. Sterling (2003) argued that abduction facilitates looking for patterns and connections between elements thus allowing seeing connections and patterns not observable in empirical data. It enables interpretation of phenomena in relation to a wider context (Danermark et al., 2002).

Umberto Eco (cited in Danermark et al., 2002, p. 93) distinguishes three different forms of abduction as overcoded, undercoded and creative abduction and described them as follows:

- Overcoded abduction – interpretations which are made automatically from cultural/social contexts but may differ with context,

- Undercoded abduction – interpretations based on the choice of one frame of reference (theory) from a number of others, and
- Creative abduction – interpretation of phenomena within a frame that nobody has used before or which opposes conventional interpretations.

The case study of concern in this research was recontextualised (chapter 5) within current sustainability challenges facing the surrounding community (chapter 1, section 1.2 and chapter 2, section 2.3.5.2) within which RU is situated and the current international debates on mainstreaming sustainability in higher education and the role of universities (chapter 2, section 2.3.7). Both overcoded and undercoded abduction were used with whole systems thinking providing the conceptual framework (chapter 3, section 3.2.6). This enabled an understanding of sustainability practices and the processes at RU in relation to the broader environment in which the university is situated. It helped establish the relevance of these activities in relation to the university's immediate society (chapter 1, section 1.2) and to the roles of universities defined through sustainability declarations (chapter 2, section 2.3.7).

3.5.6.4 Retroduction

Retroduction enables going beyond the empirical level of reality towards “conceptualization of transfactual conditions” or towards “transcendental argumentation” (Danermark et al., 2002, p. 96). In other words, it facilitates exploring the necessary characteristics for particular conditions to exist, that is, according to Danermark et al. (2002, p. 80), “what qualities must exist for something to be possible?”

Danermark et al. (2002) proposed a number of strategies that can be utilised to attain better insight into the conditions necessary for certain phenomena. These include counterfactual thinking; social experiments and thought experiments; studying pathological and extreme cases; and comparisons of different cases (p. 101-106). Counterfactual thinking taps into existing “experience”; “knowledge of social reality” and “the ability to abstract and to think what is not, but what might be” (Danermark et al., 2002, p. 101). Through employing counterfactual thinking, retroduction facilitated identification of causal mechanisms (chapter 6, section 6.2) which influenced (constrained or enabled) sustainability initiatives at RU, thus identifying systemic issues that the university has to address and the conditions

necessary for a systems approach in addressing sustainability at the institute to flourish (chapter 6 and 7).

3.5.7 Validity and trustworthiness

Jupp (2006) defined validity as the extent to which conclusions drawn from research provide an accurate or a correct explanation of what transpired. According to Maxwell (2005, p. 106), validity is “the correctness or credibility of a description, conclusion, explanation, interpretation or other sort of account”. Three types of validity relevant to realist qualitative research are descriptive, interpretive and theoretical validity (Maxwell, 1992; Johnson, 1997). These were all considered in dealing with data in this study. I endeavoured to ensure descriptive validity to maintain the “factual accuracy” of the account and hence truth and reliability (Maxwell, 1992, p. 285). Including original verbatim conversations from interviews and quotations from documents, and construction of the case records helped enhance descriptive validity in the study (see Appendix 5).

Interpretive validity, that is, how accurately the participants’ viewpoints, thoughts, feelings etc, are understood by the researcher and portrayed in the research (Maxwell, 2005; Johnson, 1997), was addressed through data verification by participants. Maxwell (2005, p 111) regarded data verification/respondent validation as:

... the single most important way of ruling out the possibility of misinterpreting the meaning of what participants say and do and the perspectives they have on what is going on as well as being an important way of identifying your own biases and misunderstanding of what you have observed.

Data verification was therefore an important part of the research process which facilitated ruling out misinterpretations (discussed in section 3.5.5 above).

Theoretical validity was addressed through developing as credible explanations as possible from the study using systems theory and critical realism causal explanations, and morphogenetic explanations. This was achieved by making continuous reference to the data in developing explanations. One of the threats to validity in a study like this one arises when dealing with open systems which are characterised by complex interactions among structures and mechanisms (Sayer,

2000): there is risk of misattributing wrong mechanisms to events. This calls for a way of judging the quality of retroduction. The study therefore assessed the practical adequacy of mechanisms through iterative abstraction (Yeung, 1997) (see section 3.3.8). Theoretical saturation (Glasser and Strauss, 1967) of all the data categories in the study helped to check the representativeness of the sample where data from all the sources ended up being repetitive with no new information emerging for each of the categories (see chapter 4, section 4.4.6).

Researcher bias was one of the validity threats which I had to guard against in this study. Given that environmental and sustainability challenges are emergent from the natural environment, it was easy to carry out the study with an assumption that natural sciences have a better focus on those issues than social sciences. Such an assumption can possibly cloud one's judgement about the nature of the study findings. Reflexivity (engaging in self reflection about one's potential biases and predispositions) (Johnson, 1997; Grbich, 2004) helped me to be self aware and to monitor and try to control that kind of bias all the time, as did understanding environmental science from a critical realist perspective, as discussed in chapter 2 (section 2.3.5.3). Data analysis was also conducted in what O'Leary (2004, p. 184) called "a critical reflexive and iterative fashion" to enable linking findings to the overall research project.

The study also took cognisance of Bourdieu's (2004) argument regarding reflexivity in which he claims that knowledge in social sciences is a social construct making it subject to controversy. Reflexivity was therefore said to be necessary to avoid naivety in understanding reality. Bourdieu (2004) however argued against what he termed narcissistic (singular) reflexivity which only focuses on overcoming one's biases and recommends field-based reflexivity which is a collective venture where there is strong communal censorship. Owing to these arguments, this study was located within the MESA Universities Partnership (chapter 1, section 1.5) in which participants are involved in mainstreaming sustainability in their universities in response to sustainable development challenges. The USAT developed as part of this study (section 3.5.3.1) was also used by members of the MESA network which facilitated field-based reflexivity through sharing experiences (chapter 7, section 7.3.2), as did the extensive literature review and the contextual descriptions of sustainability challenges in context, ESD and mainstreaming of sustainability in

university contexts. Chapters 1 and 2 therefore provide important capital to ensure field based reflexivity as shown in chapters 5, 6 and 7 where these perspectives are used to interpret the findings.

While generalisation of results to populations or universes was not possible, case studies, as argued earlier, are generalisable to theoretical propositions (Yin, 2003). I therefore tried to develop propositions that can be useful in making sense of similar situations (see chapter 6 and 7). The study also employed methodological triangulation with at least two methods having been employed in each of the departments (see Table 3.2, section 3.5.2). In some instances it was also possible to triangulate data capture e.g. sustainability assessments as discussed earlier in section 3.5.3.1.

3.5.8 Ethics

Ethical considerations are important in research and should be undertaken within “an ethic of respect for persons, respect for knowledge, respect for democratic values and respect for the quality of educational research” (Bassey and BERA cited in Murray, 2006, p. 1). Keeping in mind and where necessary, considering all the other ethical issues, for the purpose of this research, I paid special attention to negotiation of access, prior informed consent and confidentiality as explained by Pring (2000), O’Leary (2004) and Murray (2006). Before the study commenced, a letter was sent to negotiate permission to carry out the study from the university managers and this was granted (see Appendix 4, no.1). Data collection only started after negotiating access at departmental level. Heads of all the identified departments agreed to take part in the study. Participation was on a voluntary basis where respondents had the right to withdraw at any time. They were all briefed about the purpose of the study and their roles as participants and written consent was obtained from all of them (Appendix 4, no.2). The names of participants are not mentioned anywhere in the study to maintain privacy.

3.6 CONCLUSION

This chapter has outlined the theoretical framework underpinning the study, that is critical realism which is providing the ontological perspective and systems thinking which is providing the epistemological perspective. The commonalities between the

two theories are also elaborated. The chapter went on to discuss the methods used in data collection and analyses, and issues of validity and ethics.

In the next chapter (chapter 4) data collected in this study will be presented. The chapter will outline and elaborate on sustainability initiatives at the university and discuss factors affecting mainstreaming activities.

4 SUSTAINABLE DEVELOPMENT INITIATIVES AT RHODES UNIVERSITY

4.1 INTRODUCTION

The purpose of this chapter is to present the data. The chapter was guided by Margaret Archer's morphogenetic cycle (chapter 3, section 3.3.7 and 3.3.7) and the empirical and the actual levels of critical realism (chapter 3, section 3.3.2). Section 4.2, guided by the morphogenetic cycle, summarises the historical emergence of sustainability initiatives at Rhodes University. Underpinned by the empirical level of observed events, the chapter describes the sustainability picture at RU through presenting results of the sustainability assessment (section 4.3) and goes on to explain initiatives at the university (section 4.4) which contributed to the sustainability picture. Section 4.5, which is guided by the actual level of reality, elaborates on the factors influencing mainstreaming sustainability, the approaches being used and the obstacles that are faced in the process. The chapter responds to the research question investigating how the university is responding to sustainability challenges through its functions and operations. Conclusions from the data were reached through an inductive process, which is only possible with actualised and experienced reality as explained in chapter 3.

4.2 SUMMARY OF THE HISTORY OF SUSTAINABLE DEVELOPMENT AT RHODES UNIVERSITY

The purpose of this summary is to outline an historical framework of the emergence of sustainability initiatives at Rhodes University. The information in this section was gathered through content analysis of documents, notably minutes of the Community Engagement Committee and the Environmental Committee. The university's engagement with sustainable development issues at management and curriculum levels gained momentum in the early 1990s following the Talloires Declaration and the establishment of the Murray and Roberts Chair of Environmental Education, which paralleled increased national and international institutional development in relation to environment and sustainable development challenges following the Rio Earth Summit in Rio De Janeiro in 1992 (see chapter 2, section 2.3). A variety of networked and interconnected initiatives related to the various operational dimensions of the institution have since been emerging showing a continuous re-

orientation of the university system to emergent sustainability challenges. Using Archer's social realist theory, this can be explained in terms of "sequences and cycles of structural change, alterations in action and interaction, and structural elaboration" (Ritzer and Goodman, 2004, p. 238). Table 4.1 summarises the history of the emergence of sustainability issues at Rhodes University.

Table 4.1 An historical framework of the emergence of sustainability at RU

Year	Sustainability event	Structure/Agency Interactions and structural elaborations
Prior to 1990	Rhodes University had an established reputation for the teaching and research of environmental sciences in mainstream disciplines such as Zoology, Botany and Ichthyology and Fisheries Sciences.	A strong disciplinary structure and culture of research related to environmental topics in the sciences exists in the university.
1990	- RU Vice Chancellor attended a conference in Talloires (France) where university rectors, presidents and vice chancellors convened to discuss the role of universities in environmental management and sustainable development. - The university establishes the Murray and Roberts Chair of Environmental Education (the only Chair of Environmental Education in Africa). - In late 1990, the university established an Environmental Education programme in the Faculty of Education and the first Environmental Education coursework Masters' Degree in Africa, showing early signs of inter-disciplinary environmental work.	- Interaction (attending the conference) leading to the development of structural aspects (establishment of the Murray and Roberts Chair) which commits the university to a path of sustainable development. - The university shows flexibility and willingness to introduce new areas of study (e.g. Environmental Education in the Education Faculty).
1997	- The Murray and Roberts Chair is requested by the Vice Chancellor to coordinate an Environmental Policy consultation process and to lead development of the first Environmental Policy at RU. - The Murray and Roberts Chair is extended to include a community-based service unit, called the Gold Fields Environmental Education Service Centre which gets involved in regional and national policy making, and local development initiatives.	- Existence of the Chair as a structure enabling the policy process, and the establishment of a service centre. - Existence of the Service Centre brings a focus on community relevance to environmental initiatives, and the policy process.
1998	- Rhodes University signed the Talloires Declaration. - Establishment of an Environmental Policy. - Establishment of an Environmental Sciences programme as a cross	The signing of the declaration was an action on the part of the university which paved the way for RU to respond to the requirements of the declaration exemplified by the establishment of an Environmental Policy thus elaborating the structure.

	departmental programme (1 senior full time staff member was appointed in Environmental Science). Grounds and Gardens staff and Environmental Education Unit staff attend the first Environmental Management for Sustainable Universities Conference in Sweden.	- The policy thus emerged from the signing of the declaration but has the potential to influence emergence of other sustainability initiatives through its implementation. - The existence of pure science courses such as Botany, Ichthyology, Zoology and Social Science courses such as Geography and Anthropology, and an Environmental Economics programme in the Commerce Faculty (which were showing signs of interest in environmental aspects) among others as structures enabled the development of Environmental Science as a cross departmental programme which emerges and leads to elaboration of the existing structures through enhancing the sustainability focus of the university's curricula. - The establishment of Environmental Science at the university was also influenced by external forces, such as a growing awareness of environmental issues following the Rio Earth Summit (1992), and the growing field of Environmental Science research supported by large institutions such as the United Nations Environment Programme and the Global Environmental Fund (amongst others).
2001	- Review of Environmental Science Department. (Two senior additional staff members appointed for Environmental Science and Administration staff). - Establishment of the Rhodes University Environmental Forum for cross disciplinary collaboration on environmental teaching and research.	- The review as an action intended to provide feedback on the activities of the department, and to establish whether its structure should be changed. - Existence of the Environmental Science programme enabled interaction leading to emergence of a new sub-system (the Environmental Forum) hence elaboration of the existing structure through enhancing networking. - The Environmental Forum provides the first mechanism for cross-faculty interactions, and two products result: an inventory of environmental research at Rhodes University, and a marketing booklet outlining environmental study options at the university in a range of different faculties.
2002	- Environmental Science established into a full department. - Environmental Science initiates a business programme for Masters in Business Administration, in partnership with the Environmental Education Unit, and the Commerce Faculty. - RU hosts the environmental Management for Sustainable Universities (EMSU) international conference enabled through collaboration of the Grounds and gardens, Environmental Education	- Positive feedback from the Environmental Science review process informing practices and leading to committing of more resources (through employing more staff members) hence improving structural performance in sustainability issues. - Existence of Environmental Science and links to UNEP enables the emergence of a Masters in Business Administration programme in environmental management and sustainability for business and government leaders at the university, located in the Investec Business School but teaching

	Unit, and Environmental Science. The EMSU Conference is hosted as an event linked to the World Summit on Sustainable Development. ▪ Murray and Roberts Chair hosts the UNESCO International ESD Teacher Education Network meeting at Rhodes University as an event linked to the World Summit on Sustainable Development.	provided mainly by staff from Environmental Sciences with support from Environmental Education and Environmental Economics, showing a cross-disciplinary initiative. ▪ Existence of relevant structures in the form of Grounds and Gardens (Estates Division with an interest in managing the university sustainably), Environmental Education and Environmental Science enabling the hosting of the EMSU which facilitates more cross-university interaction in sustainable development issues.
2003	▪ Establishment of the university's Centre for Community Engagement (as a sub-unit of the Centre for Social Development). ▪ Establishment of the Rhodes Community Development Committee which includes representatives from the community-based service centre in the Environmental Education Unit and other faculties. ▪ Review of the Environmental Education Unit. ▪ The Murray and Roberts Chair hosts the Global Higher Education for Sustainability Partnership resource development workshop for universities in Africa, which is opened by the Vice Chancellor.	▪ Existence of the Centre for Social Development as a structure which enabled the emergence of a sub-system (the Centre for Community Engagement) hence elaboration of the university structure through improving community interactions and enhancing its capacity to engage with sustainability issues in its local context. This also resulted from growing pressure from funders and the Department of Education for the university to be a primary agent for social change in the community. (Note that the university was already involved in community engagement initiatives through collaborative work with the Centre for Social development). The need for the Community Development Committee then emerged from the Centre for Community Engagement. ▪ The review of the Environmental Education Unit as an appraisal of the activities of the unit intended to provide feedback on its activities and establish a more sustainable structure for the unit in the university (outside of a self-funded model). ▪ Interaction in sustainability initiatives enabled by the existence of the Murray and Roberts Chair in response to the emerging roles of universities in sustainability, highlighting sustainability at university level.
2004	▪ Murray and Roberts Chair invited to participate in establishing a network of African Academics involved in Environmental and Sustainability curriculum, which gave birth to the MESA Universities Partnership. ▪ Rhodes University Environmental Education Unit integrated into the staffing structures and programmes of the university (four staff members, two of them at senior level). ▪ The Masters in Business Administration programme offering modules on environmental management and sustainable development (the only of its kind in Africa) was established by the Rhodes	▪ Existence of structures (the Chair) enabling interaction in the form of participation in establishing the network leading to the establishment of new structures (MESA Universities Partnership) which further contribute to sustainability at the university. ▪ Structural elaboration through integration of another structure (Environmental Education Unit), involving allocation of resources for salaries and administration. ▪ The introduction of the MBA in Environment and Sustainability was enabled by the existence of two structures, the Investec Business School and the Environmental Science Department representing emergence of a new structure which widens the university's platform to address

	- University Investec Business School. Release of funds by the National Botanical Institute and the local municipality for a training project of local people as a job creation initiative and for managing the botanical gardens (which the university had agreed to manage for the municipality on a 99 year lease basis as part of a university-municipality partnership agreement). - Launch of the Rhodes University community website, coordination of community engagement initiatives and a task force put in place to develop the community engagement vision and mission statement.	sustainability challenges (elaborating the university structure). - Release of funds for the Botanical gardens project was enabled by the capacity within the university to handle such a project and will lead to elaboration of the university systems through the widening of mechanisms in response to sustainability (currently a new facility is being built out of this project which will house the Murray & Roberts Chair and the Gold Fields Service Centre and other community-based projects to allow for integrated teaching, research and community engagement around issues of sustainable development in Makana District). - The emergence of the Rhodes University Community Engagement Centre as a structure made it necessary to put in place systems (new staff) to shape its objectives and facilitate ways of meeting them.
2005	Environmental Education Unit has its name re-oriented to Environmental Education and Sustainability Unit to mark its interest in participating in research oriented towards understanding the implications of sustainability for Environmental Education teaching and research.	Re-orientation (elaboration) of the existing structure so as to facilitate responding to sustainability challenges through raising consciousness about the environment and providing a platform for the unit to reorient its courses to address sustainability and for students to take up sustainability related research.
2005	Establishment of the Makana Environmental Forum supported by staff in the Rhodes Environmental Education Unit as part of their community engagement activities. This same unit also contributed to the inclusion of environmental objectives in the Integrated Local Development Plans of the Municipality together with Environmental Science Department and the IWR. Staff and associates of this unit also assisted the Municipality to raise funding from the Development Bank of Southern Africa to develop a Local Environmental Action Plan and Sustainable Development Framework.	The Makana Environmental Forum emerged as a platform for communication of environmental and sustainable development information with the municipality, which later led to the establishment of a Local Environmental Action Plan and Sustainable Development Framework for the municipality, creating a platform for university-community interactions around sustainable development initiatives.
2005	- Community Engagement initiatives audit posted on the Rhodes Community website. - Community Engagement Policy developed and approved. - New appointments made by the Community Engagement Centre (e.g. Community Engagement Manager and Administrative Assistant). - The Community Development Committee changes its name to Community Engagement Committee. - Environmental Education Programme begins the process of applying for	- The auditing of Community Engagement initiatives was made possible by the establishment of the Community Engagement Centre of which coordination of Community Engagement is one of its roles. - Both the Community Engagement Policy and new appointments emerged to accomplish the function of the Community Engagement Centre thus elaborating the structure. - International Initiatives linked to the United Nations Decade of ESD (United Nations University RCEs and the World Summit on Sustainable Development (Millennium Ecosystem Assessment) provide external

	recognition as a United Nations University Regional Centre of Expertise in Education for Sustainable Development. Environmental Science Programme involved in the Millennium Ecosystem Assessment showing links to UN and other international initiatives.	structures for engagement and further internal elaborations of structures at RU.
2006	- Review of the Masters in Business Administration programme in Environmental Management by the Council for Higher Education. (Staff member allocated to business school, part time at senior level). - Bio-diesel production and use at the university. - Initiation of water recycling and proposal for rain water harvesting using water tanks. - The student volunteer programme is initiated through Community Engagement. - The goal for a partnership (Makana Schools Partnership) between the university and seven high schools in Grahamstown East is shared by the Vice Chancellor. - Murray and Roberts Chair invited to serve on the International Reference Group of the United Nations Decade of Education for Sustainable Development, showing links to UN and other international ESD initiatives.	- Interaction through an appraisal of the Masters in Business Administration degree programme so as to acquire information which can possibly inform the practice. - The bio-diesel project was made possible through networking with a business organisation (Makana Meadery) outside the university which is doing the production for free, and the recycling initiative at RU where the raw material is used cooking oil from the kitchens. - The existence of the Community Engagement Centre as a structure enabled the launch of the student volunteer programme leading to elaboration of its structure. - Emergence of the Makana Schools Partnership can be traced to the Education Department policy and pressure from funders for universities to establish community links. It partly emerged from the sustainability challenges facing former black schools in Grahamstown and the availability of expertise at the university to assist through such an intervention. This also results in elaboration of the structures at the university. - Existence of the Chair as a university structure enabling interaction through contribution to the Decade of Education for Sustainable Development.
2007	- Establishment of the Makana Regional Centre of Expertise in Education for Sustainable Development which is hosted by the Faculty of Education with participation from several disciplinary areas at the university. - Review of community engagement and appointment of a Director of Community Engagement. - Vice Chancellor's Distinguished Community Engagement Award established. - Establishment of the Makana Research Group to co-ordinate research initiatives taking place in Makana and to enhance synergies and research impact on local development (the Centre for Higher Education Research, Teaching and Learning supports one of its staff members to conduct research	- The Makana Regional Centre of Expertise represents the emergence of a new structure which originally emanated from the desire by the United Nations University to respond to the global sustainability discourse. It was therefore a result of interaction between the RU system and other systems in the environment. - Existence of the Centre for Community Engagement as a structure which enabled the employment of the Director of Community Engagement. - The Vice Chancellor's Community Engagement Award was enabled by the definition of community engagement as a third pillar of university functions and was intended to give a signal to the university community that community engagement is an important institutional activity. - The Makana Research group represents an

	- into service learning at RU). - Appointment of a part-time Environmental Officer to give impetus to Environmental Policy implementation and communication. - Establishment of an Environmental Portfolio in the Students' Representative Council and election of the Environmental Councillor who will be sitting in the Environmental Committee. - Establishment of a student environmental society (GRASS: Green Revolutions and Social Solutions) - Environmental website launched. - University commissions an in-depth study to establish how departments are responding to HIV/AIDS through teaching, research and community engagement. - Growth of the Environmental Science Programme which led to the appointment of a new staff member.	initiative which emerged out of interactions between the university and its local/immediate environment where the municipality has tasked the university with coordinating as well as carrying out research related to local economic development. - The existence of the Students' Representative Council as an enabling structure and agency within students enabled establishment of the Environmental Portfolio and election of an environmental councillor which both represent elaboration of the Student Representative Council structure and emergence of a platform to contribute in addressing sustainability challenges. This was supported by the existence of the Environmental Science Department in the university. - Student agency and support from the university and the SRC enabled the formation of GRASS. - The launch of the environmental website was a result of the desire to communicate environmental information more effectively and was enabled by the existence of the Information technology web unit who happened to be working on revamping the RU website.
2008	- The Environmental Education and Sustainability Unit host an International Training Programme workshop related to the MESA Universities Partnership, and involves a range of disciplines and units engaged with ESD across the university. - Hosting of Makana Schools Partnership Workshops to specify initiatives and expected outcomes of the partnership among other issues. - Makana Municipality appoints an Environmental and Sustainability Manager emerging from LEAP recommendations in 2005.	- The existence of the Unit as a relevant structure supporting training activities in the area of sustainability leading to promotion of the capacity of participants to engage with sustainability issues. - The existence of the Community Engagement Directorate to enable university-wide response to schools in Makana. - The appointment of the Environmental and Sustainability Manager was enabled by the existence of the Makana Environmental Forum and LEAP (supported by the university).

This historical outline of the emergence of sustainability initiatives at the university (shown in Table 4.1 above) serve to show Rhodes University as a complex emerging system in response to sustainable development challenges, with many different programmes, units, committees, decisions and networks shaping an emergent trajectory over a twenty year period. Key among them are: the Environmental Education and Sustainability Unit (EESU), the Environmental Sciences Department, the Environmental Economics Programme (Faculty of Commerce), the Estates Division and most recently the Investec Business School initiatives. These have

collaborated with each other and the university management, Environmental Committee, the Estates Division and the Community Engagement Division (and the municipality and schools in Makana which represent external links to the university). This history of intersecting collaboration and cross-disciplinary and cross-sectoral work has been significant to the emergence of the sustainable development initiatives at RU.

Some critical features of this pattern of emergence appear to be:

- the existence of enabling structures,
- agents who are willing to co-operate and drive new initiatives,
- a willingness with support from top management to regularly review progress being made and to re-orient and/or initiate and establish new initiatives and structures as necessary, and
- a willingness to commit resources to the emergent process with its ideals and objectives (which themselves are emergent and changing).

As can be seen from the description above, regular reviews were critical for enabling the allocation of additional resources and for re-orienting or creating new structures, as are cross-disciplinary and cross-unit collaborations. A mix of theoretical and practical interventions also characterises this pattern of emergence and change over time with participation in conferences, research initiatives, collaborative teaching, links to the United Nations mechanisms and programmes, and campus-based action projects being seemingly significant.

From this process, significant initiatives have emerged through various departments and divisions which attempt to align and re-orient the university's activities in line with emerging local and global sustainability trends. These have been strengthened by university participation in international activities such as the Millennium Ecosystem Assessment research that the Environmental Science Department was involved in, and the international Global Higher Education for Sustainable Development Partnership for which the Environmental Education Unit hosted a regional workshop at Rhodes University. Also emerging are a number of networks in environmental and sustainability issues at the university through collaborative work, committees and forums. With the emergence of initiatives from the student body (the establishment of

the Student Representative Council Environmental Portfolio and GRASS), the composition of the networks has expanded to include students, and through the Makana Environmental Forum, the municipality and the community.

The collective impact of these inter-related sustainability initiatives and their emergent powers are, however, not particularly pronounced or immediately noticeable at the university as they are emergent from the work of various professionals and structures, and may thus be seen as fragmented, inconsequential or 'naturalised'. Introducing a top-down approach to addressing this invisibility may, however, run counter to the university culture and management system, which is structured according to committee-based decision making (i.e. change from 'bottom up', in consultation and with direction from top management as shown in Table 4.1 data), rather than 'top down'). What might be necessary therefore is a way of making these initiatives, and their emergence as an open and changing system more centrally visible, which may require further co-ordination (but this should not detract from the emergent adaptiveness of the existing system and its functioning). Such a co-ordination effort should ideally provide a platform for deliberation on further development of systems approaches to embracing new issues such as sustainable development in the university (see chapter 6 and 7).

4.3 THE SUSTAINABILITY PICTURE AT RHODES UNIVERSITY

Data presented in this section is located in the changing context described above, but is primarily based on the sustainability assessment that was performed in selected teaching departments (USAT Part A), the Estates Division (USAT Part B) and the Student Representative Council Environmental Office (USAT Part C). The raw data from the assessments is contained in Appendix 5 (case record 1-12 for teaching departments, case record 22 for Estates Division and case record 23 for students' involvement).

4.3.1 Teaching departments

This section mainly illustrates levels of integration of sustainability in the major activities at RU, that is, teaching, research and community service, and examinations. Also included are aspects pertaining to staff expertise and willingness to participate in sustainability teaching and research and the teaching approach

employed by departments, as discussed in the context of the USAT indicators (chapter 3, section 3.5.3.1). It is based on Part A of the modified USAT (Appendix 2, no. 2). Table 4.2 is an outline of the description of USAT Part A indicator codes (already included as Table 3.4 (chapter 3, section 3.5.3.1) but included here again for ease of reference and interpretation).

Table 4.2 USAT Part A description of indicator codes

Code	Description
	Curriculum
C1	The extent to which the department offer courses that engage sustainability concerns
C2	The level of integration of sustainability topics in courses referred to above
C3	The degree to which local sustainability issues and challenges form part of the department's teaching programme
C4	The degree to which global sustainability issues and challenges form part of the department's teaching programme
C5	The extent to which the department enrolls students in courses that engage sustainability concerns
	Teaching approach How far the teaching approach contributes to development of the following characteristics among students:
T6	The capacity to make informed decisions
T 7	Critical thinking skills
T 8	A sense of responsibility
T 9	Respect for the opinions of others
T 10	Integrated problem solving skills
	Research/service and scholarship activities
R11	The extent to which the department (staff and students) is involved in research/service and scholarship in the area of sustainability
R12	The degree to which global sustainability issues and challenges form part of the department's research and service
R13	The degree to which local sustainability issues and challenges form part of the department's research and service
R14	The extent to which your department is collaborating with other institutions and stakeholders in pursuit of solutions to sustainability problems
R15	The extent to which aspects of sustainable development are used in selection/execution of research/service
	Examination of sustainability topics
E16	The extent to which sustainability aspects are examined during course
E17	The extent to which sustainability aspects are considered in evaluating projects/traineeships
	Staff expertise and willingness to participate
S18	The level of expertise of staff members in the area of sustainability
S19	The extent to which staff members are willing to carry out research and service activities on sustainability aspects/topics
S20	The extent to which staff members are willing to teach sustainability topics

To guide departments on the kind of issues implied by sustainability 'concerns' and 'topics', an introductory text box was part of the score sheet (Appendix 2, no.2; USAT Part A) and contained the following information:

Institutions/departments committed to sustainability often prominently feature certain topics in their course offerings, e.g. globalization and sustainable development; environmental philosophy; nature writing; land ethics and sustainable agriculture; health promotion, urban ecology and social justice; population, intercultural understanding and peace, women and development; human rights, overcoming poverty, sustainable production and consumption; the role of information and communication technologies and many others (ULSF, 1999). Sustainability would be integrated into faculty and student research on topics such as renewable energy, sustainable building design, ecological economics, indigenous wisdom and technologies, population and development, total environmental quality management, etc. (ibid.) ... [The USAT] requires you to give your impression on the identified dimensions ...

USAT data however does not show whether a department has a weak or strong conception of sustainable development (see chapter 2, section 2.3.3, Figure 2.1). Departments like Ichthyology which emphasise ecology more than other sustainability dimensions therefore rated highly, which made it necessary to triangulate USAT data with other sources. More sustainability initiatives were established through content analysis than was reflected by the rating of USAT indicators in the Faculty of Law research and service, Accounting curriculum, Anthropology research and Pharmacy service activities.

4.3.1.1 Accounting Department (case record 1, Appendix 5)

There were no explicit sustainability topics in the Accounting Department but a little awareness was created in relation to rehabilitation provisions which enable students to choose environmental issues at the workplace. The department also has an Ethics course which addresses sustainability related issues. At the time of the interview there was no research, community engagement work and partnerships in the area of sustainable development.

The Accounting Department obtained low scores across all indicator clusters except for the teaching approach. All the indicators belonging to the curriculum (C1 – C5) and research (R1 – R5) clusters scored zero indicating the absence of information regarding the indicators. Examinations (E17 – E17) and staff (S18 – S20) indicator clusters rated 1 except S20 focusing on willingness of staff members to participate in sustainability initiatives which scored 2. The total score was 23 out of 80 (28.8%) and the average score for the department was 1.2 (Figure 4.1; see Appendix 5, case record 1, Table 1 for raw data).

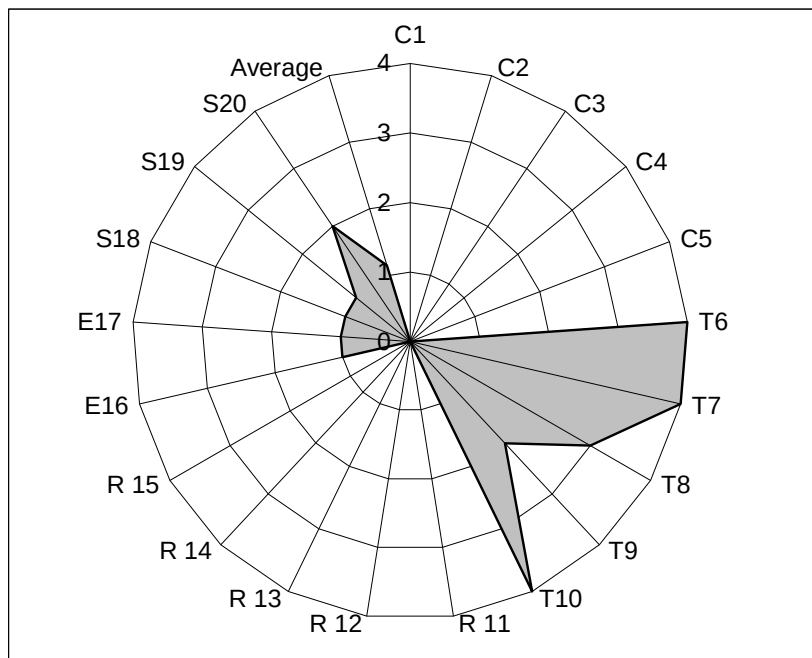


Figure 4.1 Sustainability performance of the Accounting Department

4.3.1.2 Management Department (case record 2, Appendix 5)

Sustainable development issues are not directly taught in the Management Department curriculum except in the context of corporate social responsibility. The department does not have any research activities in the area of sustainability. Community engagement in the department is centred upon corporate social responsibility around issues of profitability and equality in terms of wealth. The department interacts with the local community and municipality through offering management development courses.

In the Management Department, low scores were obtained across all the indicator clusters except teaching approach. All indicators forming part of the examinations and research clusters scored zero showing an absence of evidence on the indicators. The highest score under staff and curriculum clusters was 1. The scores for indicators belonging to the teaching approach cluster ranged between 2 and 3. The total score out of 80 was 19 (23.8%) and the average score was 1 (Figure 4.2; see Appendix 5, case record 2, Table 1 for raw data).

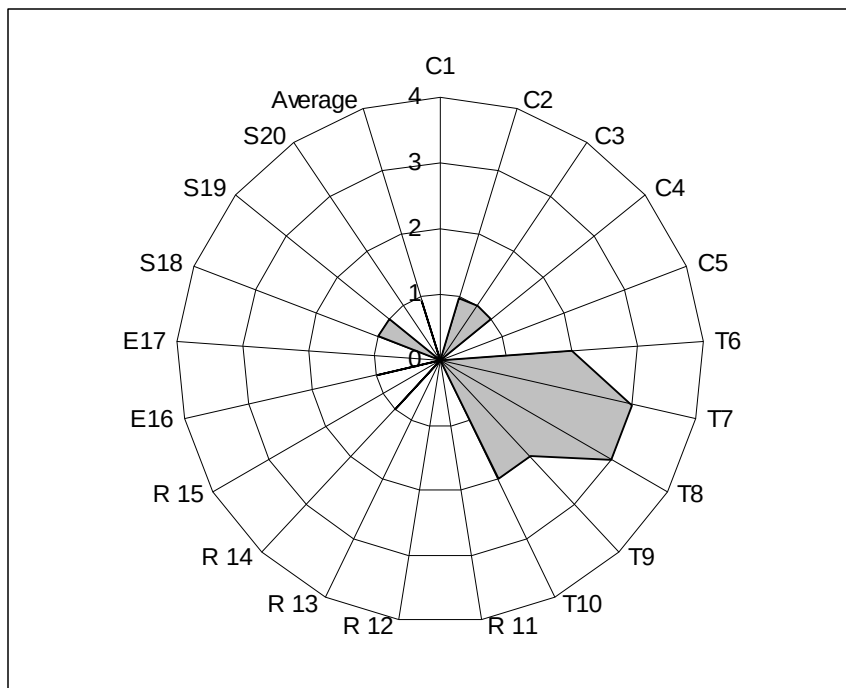


Figure 4.2 Sustainability performance of the Management Department

4.3.1.3 Anthropology Department (case record 3, Appendix 5)

The Anthropology Department offers a number of modules which address sustainable development issues. There are also some research activities taking place in the area of sustainability including studies of how people obtain *muti* (medicinal) plants and the trade in those plants, tourism related issues, people-environment relations and medicinal plant use. Some of the members of the Anthropology Department were/are involved in community engagement work in which sustainability issues are embedded at various levels.

In the Anthropology Department, scores obtained were average with most indicators rating between 2 and 3. The department scored highest in the teaching approach cluster where indicators rated between 3 and 4. Only the examination and research clusters had some indicators scoring below 2 (Figure 4.3). Its total score was 49 out of a possible score of 80 (61.3%). The average score was 2.5 (see Appendix 5, case record 3, Table 1 for raw data).

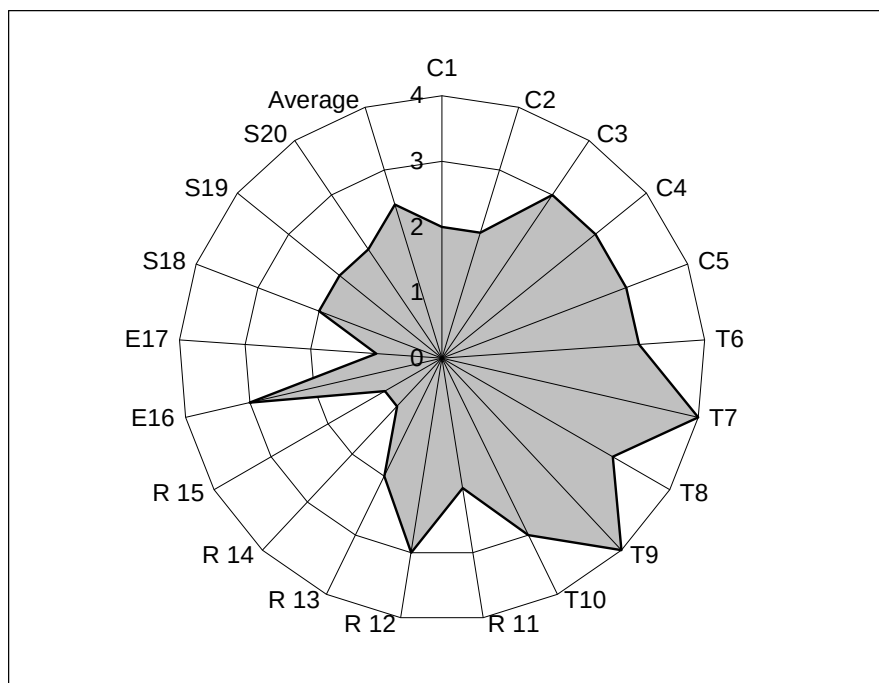


Figure 4.3 Sustainability performance of the Anthropology Department

4.3.1.4 History Department (case record 4, Appendix 5)

The History Department has various courses which address environmental and sustainability issues (social, economic, political and ecological issues). Research on sustainability related topics touch on sustainability issues like gender, apartheid, the environment and social justice. A staff member in the department was involved with a community project which among other things had a focus on job creation, education and tourism, in which s/he was working closely with the municipality.

Data generated from the sustainability assessment show a substantial integration of sustainability issues in the department's activities. All indicators under the teaching approach cluster obtained the maximum score of 4. This was followed by integration of sustainability issues in the curriculum and staff clusters, both of which scored 3 across all indicators. Research and examinations clusters obtained low scores (Figure 4.4). The department obtained a total score of 56 out of 80 (70%) and an average of 2.8 (see Appendix 5, case record 4, Table 1 for raw data).

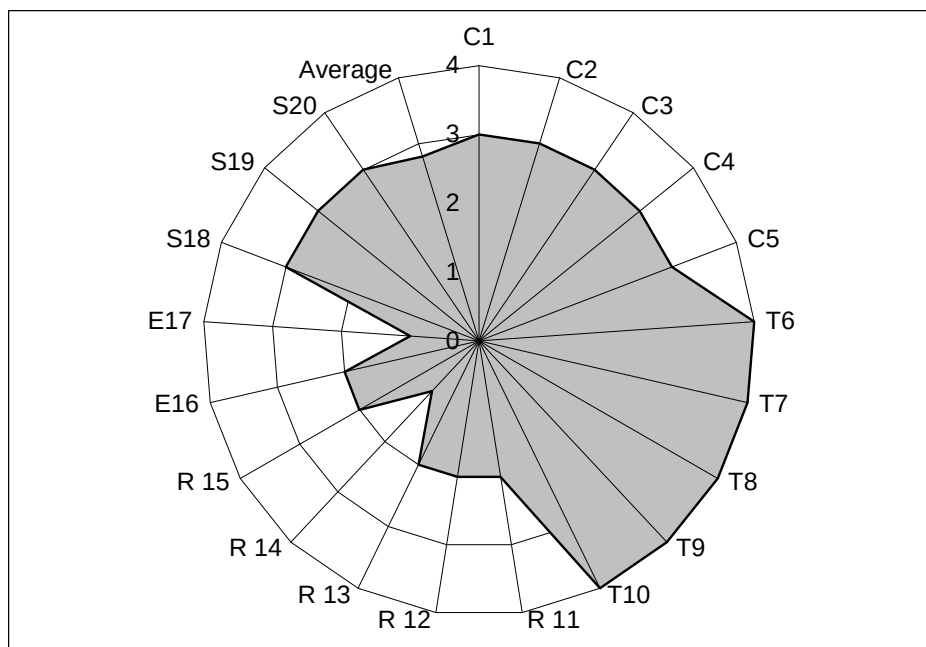


Figure 4.4 Sustainability performance of the History Department

4.3.1.5 Biochemistry, Microbiology and Biotechnology Department (case record 5, Appendix 5)

Some courses offered in the Biochemistry, Microbiology and Biotechnology Department (also referred to as the Biochemistry Department) have sustainable development issues embedded in them (environmental biotechnology and bioremediation) though they are not explicit. Most of the research activities in the department by both staff and students have a sustainability dimension with some of the researches having applied aspects in the community. Partnerships with a focus on sustainability existed between individual department members and industry in the area of bioremediation and environmental waste clean up.

The department obtained scores above average across all indicator clusters in most instances. The curriculum and examination indicator clusters had scores ranging from 2 to 4. Teaching approach and research cluster indicators were in the range of 3 to 4. All indicators under the staff cluster rated 4; the maximum score (Figure 4.5). The total score was 67 out of 80 (83.8%) and the average rate was 3.4 (see Appendix 5, case record 5, Table 1 for raw data).

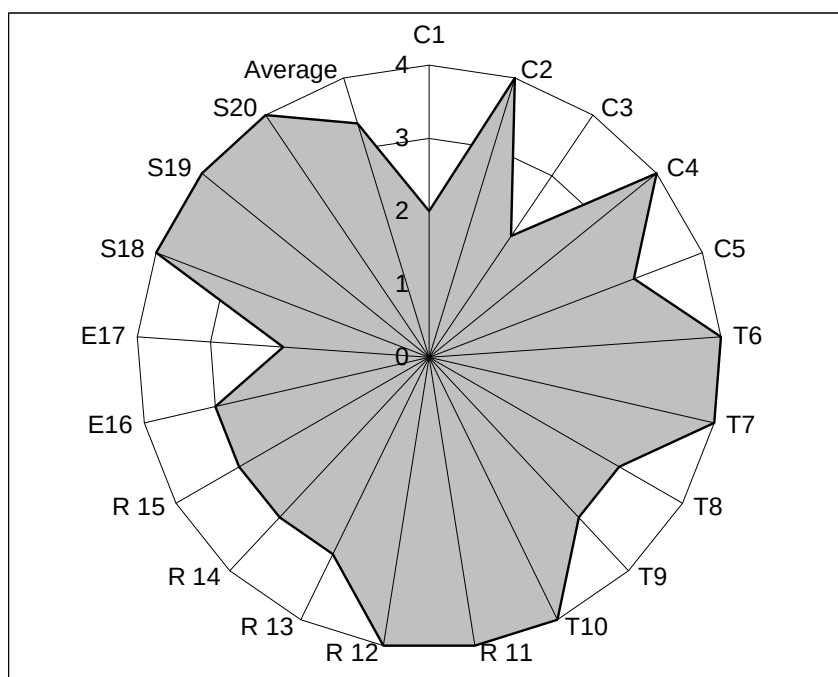


Figure 4.5 Sustainability performance of the Biochemistry Department

4.3.1.6 Chemistry Department (case record 6, Appendix 5)

The Chemistry Department have very few courses which teach sustainability topics (in the form of the physical environment rather than socio-economic and/or political issues). While research in the department does not directly address environmental and sustainability issues, there is a major emphasis on medicinal chemistry. Staff members in the department were involved in coordinating and running the Khanya Maths and Science Club as part of their community engagement. There are no existing sustainable development partnerships between the department and other universities and/or other stakeholders

High scores in the Chemistry Department were obtained in research and teaching approach indicator clusters. In research, scores ranged between 3 and 4 while in the teaching approach cluster all indicators scored 3 (Figure 4.6). These were followed by the staff cluster with a score range of 2-3. Low scores were obtained in the curriculum and examinations clusters of indicators. The total score, out of 80 was 51 (63.8%) and the average score was 2.6 (see Appendix 5, case record 6, Table 1 for raw data).

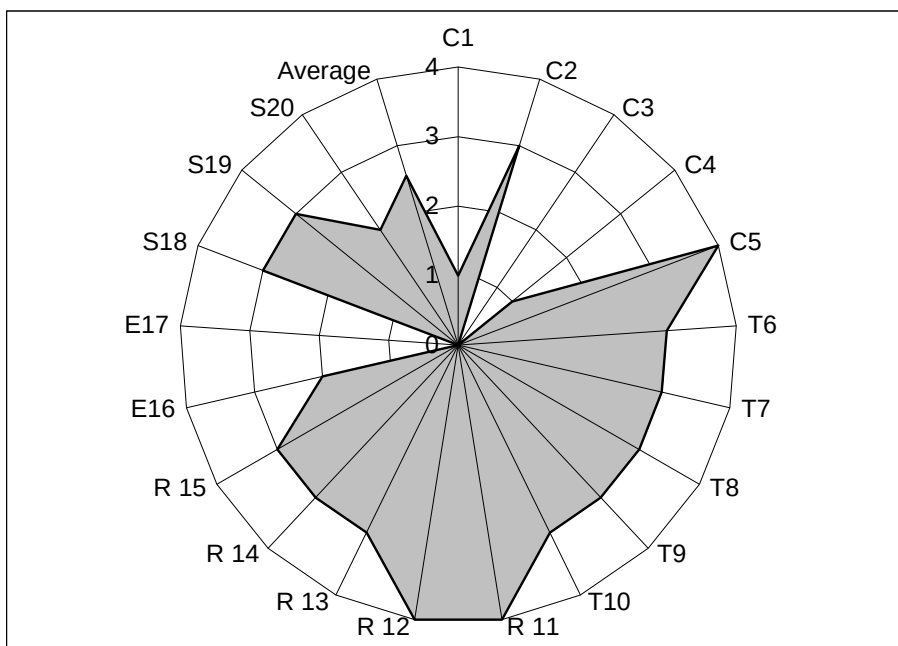


Figure 4.6 Sustainability performance of the Chemistry Department

4.3.1.7 Environmental Science Department (case record 7, Appendix 5)

The Department of Environmental Science has a strong focus on sustainable development (social, economic and ecological) issues across its courses. All the research in the department relates to sustainability in one way or another. The department is involved in applied research mostly by students, projects which inform policy, and in sustainability related charity work through donations. The department is part of collaborative relationships with various organisations through which they address sustainability issues, for example, by means of joint funding of programmes, joint research programmes and joint teaching of courses.

In Environmental Science, all indicators under curriculum, teaching approach and examinations clusters were allocated the maximum score of 4. Research and staff expertise clusters of indicators had score ranges of 2-4 and 3-4 respectively. In total, 17 out of 20 indicators were rated 4 (Figure 4.7). The total score out of 80 was 76 (95%) and the average score was 3.8 (see Appendix 5, case record 7, Table 1 for raw data).

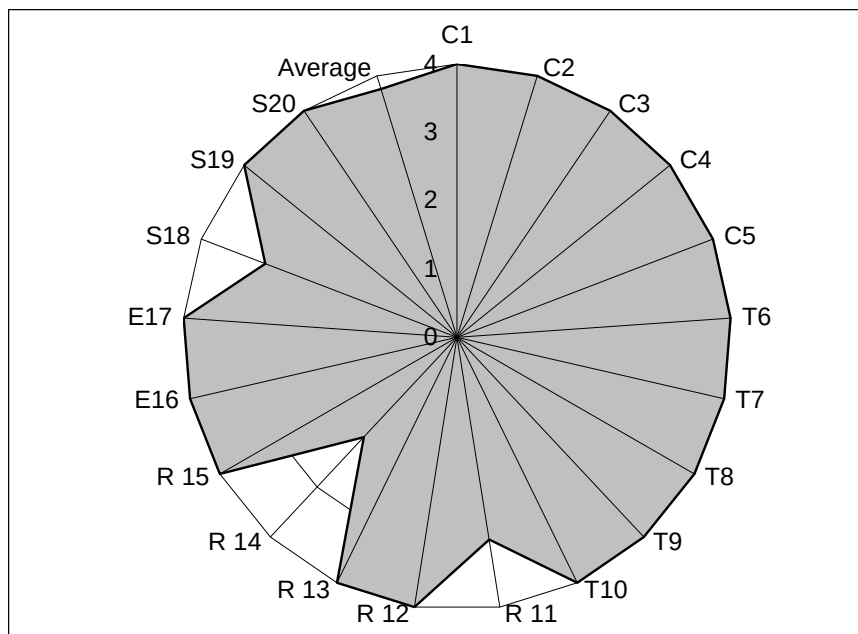


Figure 4.7 Sustainability performance of the Environmental Science Department

4.3.1.8 Department of Geography (case record 8, Appendix 5)

Sustainability is the main focus of the Geography Department with its central concern being linking development to the environment; hence it is integrated in most of the department's courses. Considerable research takes place in the area of sustainability in the department e.g. in water management, local economic development and rural development with some of the research projects having a community applied dimension. Sustainability related partnerships are in water issues (with the Department of Water Affairs and Forestry) and local economic development issues.

The majority of indicators scored 3 with curriculum and teaching approach clusters having a few of their indicators scoring 4. Only two indicators, one under teaching approach and the other under examinations cluster, scored 2 (Figure 4.8). The average score for the department was 3.1 with the total score being 62.5 (78.1%) out of a possible total of 80 (see Appendix 5, case record 8, Table 1 for raw data).

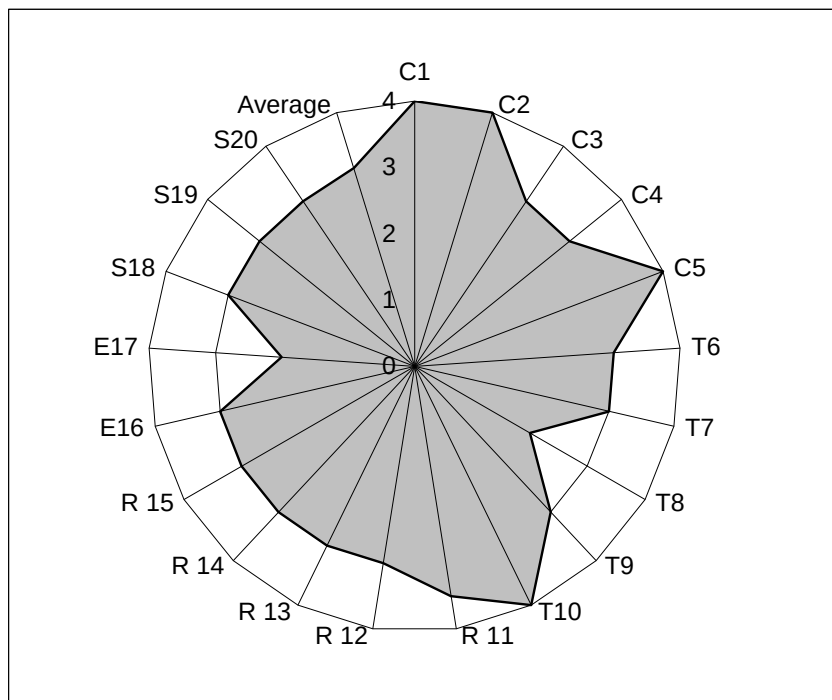


Figure 4.8 Sustainability performance of the Geography Department

4.3.1.9 Department of Ichthyology and Fisheries Science (DIFS) (case record 9, Appendix 5)

The curriculum of the Department of Ichthyology and Fisheries Science (also referred to as the DIFS or Ichthyology Department) is strongly focused on sustainability issues especially in the area of fish and fish environments. The department is also involved in direct projects looking at managing the environment sustainably as well as applied work. In the community the department looks at livelihood opportunities in aquaculture and fisheries projects. The department is involved in a partnership with the National Department of Agriculture to promote aquaculture as part of sustainable development in rural areas.

The department obtained high scores with most indicators rating between 3 and 4 except C3 which scored 2 and E17 which scored 0 (Figure 4.9). Out of the total number of indicators (20), 13 obtained the maximum score of 4 (figure 14). The average score for the department was 3.6 and the total 69 out of 80 (86.3%) (see Appendix 5, case record 9, Table 1 for raw data).

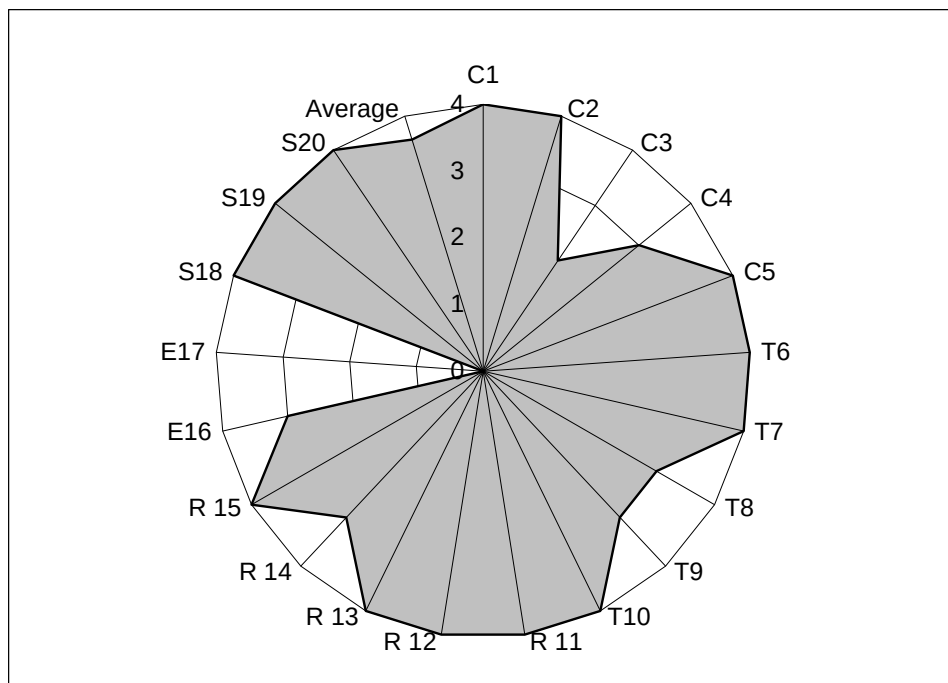


Figure 4.9 Sustainability performance of the DIFS

4.3.1.10 Faculty of Education (case record 10, Appendix 5)

The Faculty of Education has environmental and sustainability topics in most of its courses especially in the Environmental Education and Sustainability Unit (EESU) which focuses on Environmental Education into all its courses. Students in the EESU undertake research that addresses sustainability issues. The faculty works with the community at local, provincial, national and continental levels through policy work, research, and practical interventions with the EESU involved in supporting Eco-Schools, the Cape Action for People and the Environment Conservation Education project and the Makana Regional Centre of Expertise. The Makana RCE and the MESA Universities Partnership which the faculty is also involved in, were both initiated to address sustainability issues.

The Faculty of Education obtained high scores with most indicators scoring between 3 and 4. All indicators under the teaching approach cluster scored 4. Indicator scores ranged from 2 to 4 with 3 being the most frequent score (Figure 4.10). The total score was 64.5 out of 80 (80.6%) with the average being 3.2 (see Appendix 5, case record 10, Table 1 for raw data).

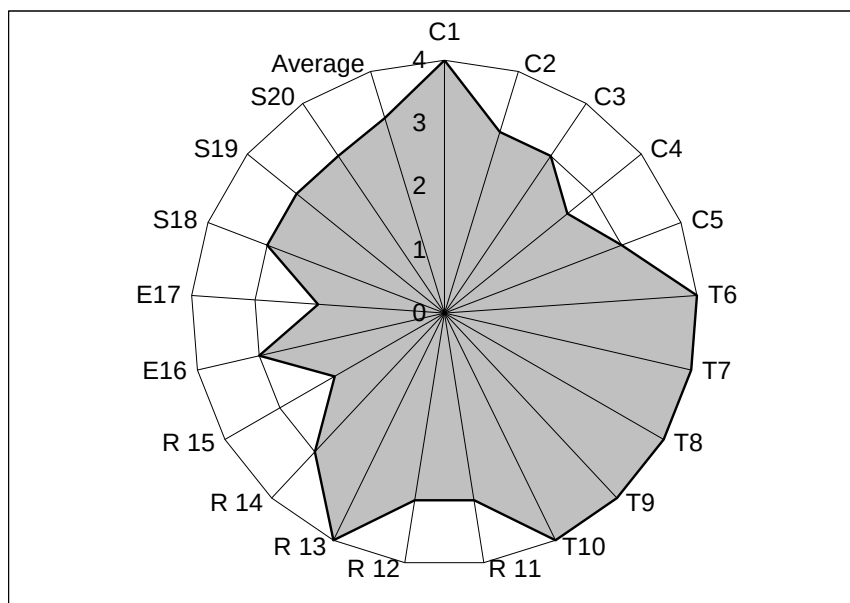


Figure 4.10 Sustainability performance of the Faculty of Education

4.3.1.11 Faculty of Law (case record 11, Appendix 5)

The faculty has a few courses which deal with sustainable development in varying degrees with a major thrust on social justice issues. Research in the area of sustainable development is not one of the faculty's themes and is done by a single lecturer (in Environmental Law) at any one time with other members picking on other sustainability related issues including social justice. The faculty reaches out to the community through the Legal Aid Clinic which provides free legal services to poor people. The faculty was not formally involved in any sustainable development partnerships at the time of the interview.

Highest scores in the Faculty of Law were obtained in the teaching approach indicator cluster where indicators scored between 3 and 4. Low scores were however obtained in all other indicator clusters. Curriculum had only one indicator with a score of 2; all others scored 1. Indicators belonging to the research and examinations clusters scored between 0 and 1 while the staff cluster had all indicators scoring 1 (Figure 4.11). The total score obtained was 32 out of 80 (40%) and the average score was 1.6 (see Appendix 5, case record 11, Table 1 for raw data).

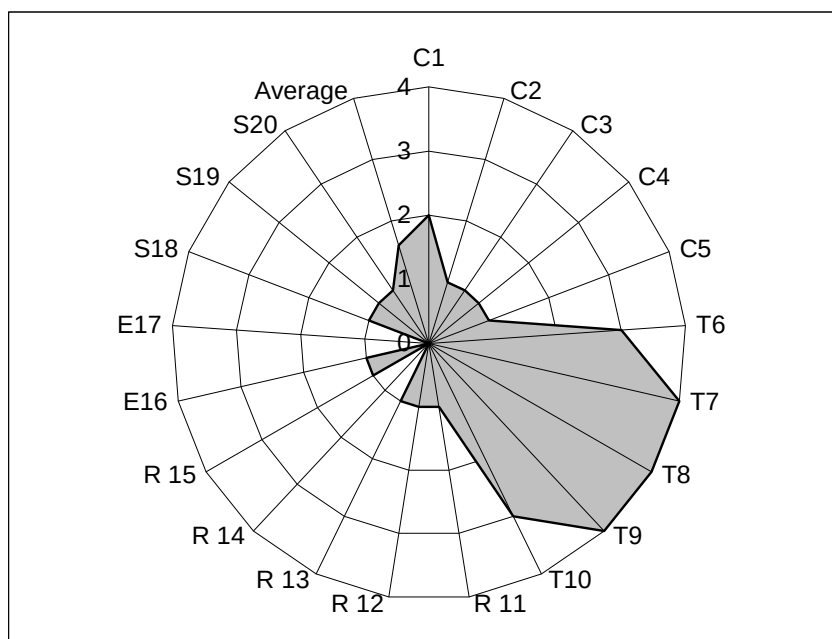


Figure 4.11 Sustainability performance of the Faculty of Law

4.3.1.12 Faculty of Pharmacy (case record 12, Appendix 5)

The Faculty of Pharmacy teaches about health promotion and sustainable production and consumption as part of the Pharmacy Administration and Practice course. Students in the faculty focus on health promotion and health literacy issues in their research. The faculty has a credit bearing Community Experience Programme which is part of the fourth year Pharmacy Administration and Practice course which also touches on sustainability related issues. The faculty is not involved in purely sustainable development partnerships, but collaborates with the Bisho government and the Day Hospital as part of its students' experiential learning programme.

The faculty had low scores in most indicator clusters except the teaching approach cluster where scores were between 3 and 4. All indicators under the research cluster scored 1, while those under examinations and staff, except S18 which scored 1, obtained a score of 0. The curriculum cluster of indicators scored between 0 and 1 (Figure 4.12). The faculty obtained a total score of 26 out of 89 (32.5%) and the average score was calculated to be 1.3 (see Appendix 5, case record 12, Table 1 for raw data).

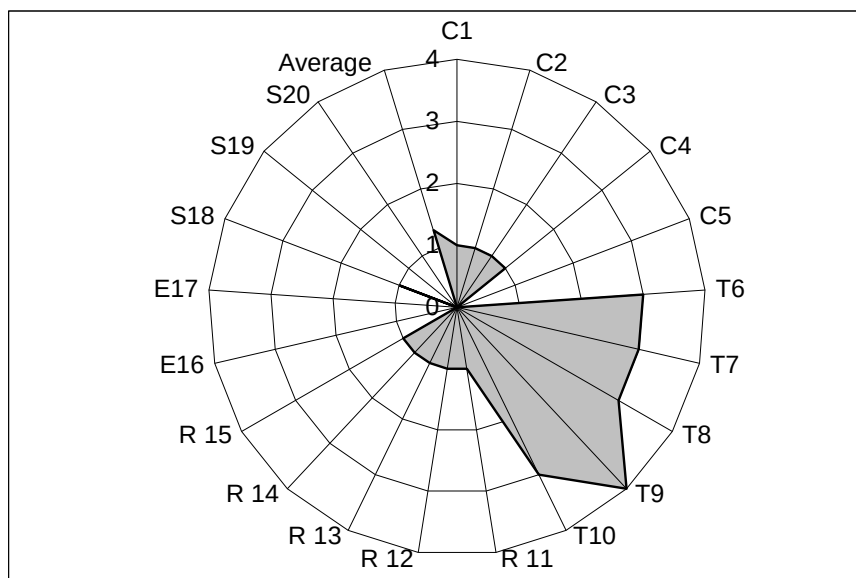


Figure 4.12 Sustainability performance of the Faculty of Pharmacy

4.3.2 Overall university performance

4.3.2.1 Performance by indicators

As shown in section 4.3.1, there were variations in levels of integration of sustainability in the identified indicator clusters among departments. In the Chemistry Department higher scores were obtained in the research cluster as compared to curriculum. The opposite is true for Environmental Science where higher scores were in the curriculum rather than the research cluster. In Accounting, both clusters had all their indicators scoring 0. The same was also noted for the examinations and staff clusters where no general pattern could be established across all departments. Indicators within the teaching approach cluster are the only ones which seem to score consistently highly even in those departments and faculties which had very low scores in other clusters, for example, Accounting, Law and Pharmacy among others.

Overall the university obtained high average scores in the teaching approach cluster in which all indicators obtained average scores of more than 3. T7 (How far the teaching approach contributes to development of critical thinking skills among students) had the highest average score of 3.7. Average scores for curriculum, research and staff clusters were moderate and clustered around 2. The examinations cluster obtained lowest scores with E17 (The extent to which sustainability aspects are considered in evaluating projects/traineeships) obtaining the lowest score of 1.1 (Figure 4.13). The total score for the university was 49.5 out of 80 (62%) with its overall performance being 2.5 out of 4 (for raw data, see Appendix 5, introduction to case records, Table 1).

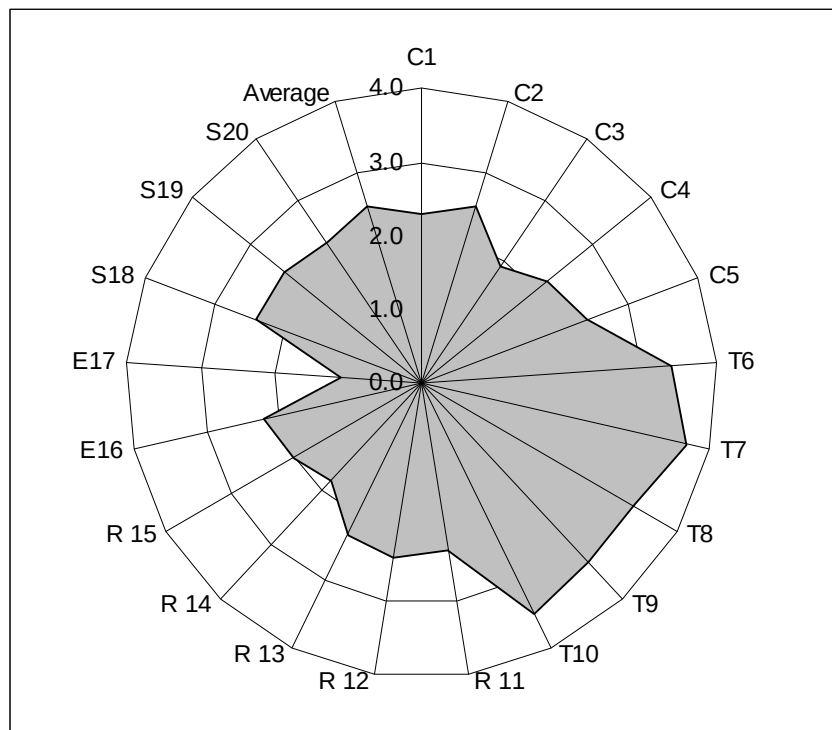


Figure 4.13 Overall university performance: average sustainability performance per indicator

4.3.2.2 Performance by Departments

When comparing cumulative departmental performance, the Environmental Science Department with a total score of 76, obtained the highest cumulative score among all participant departments. Closely following Environmental Science is the Department of Ichthyology with a cumulative score of 69, and after that, the Biochemistry Department. The Management Department obtained the lowest cumulative score of 19 (Figure 4.14, for raw data, see Appendix 5, introduction to case records, Table 1).

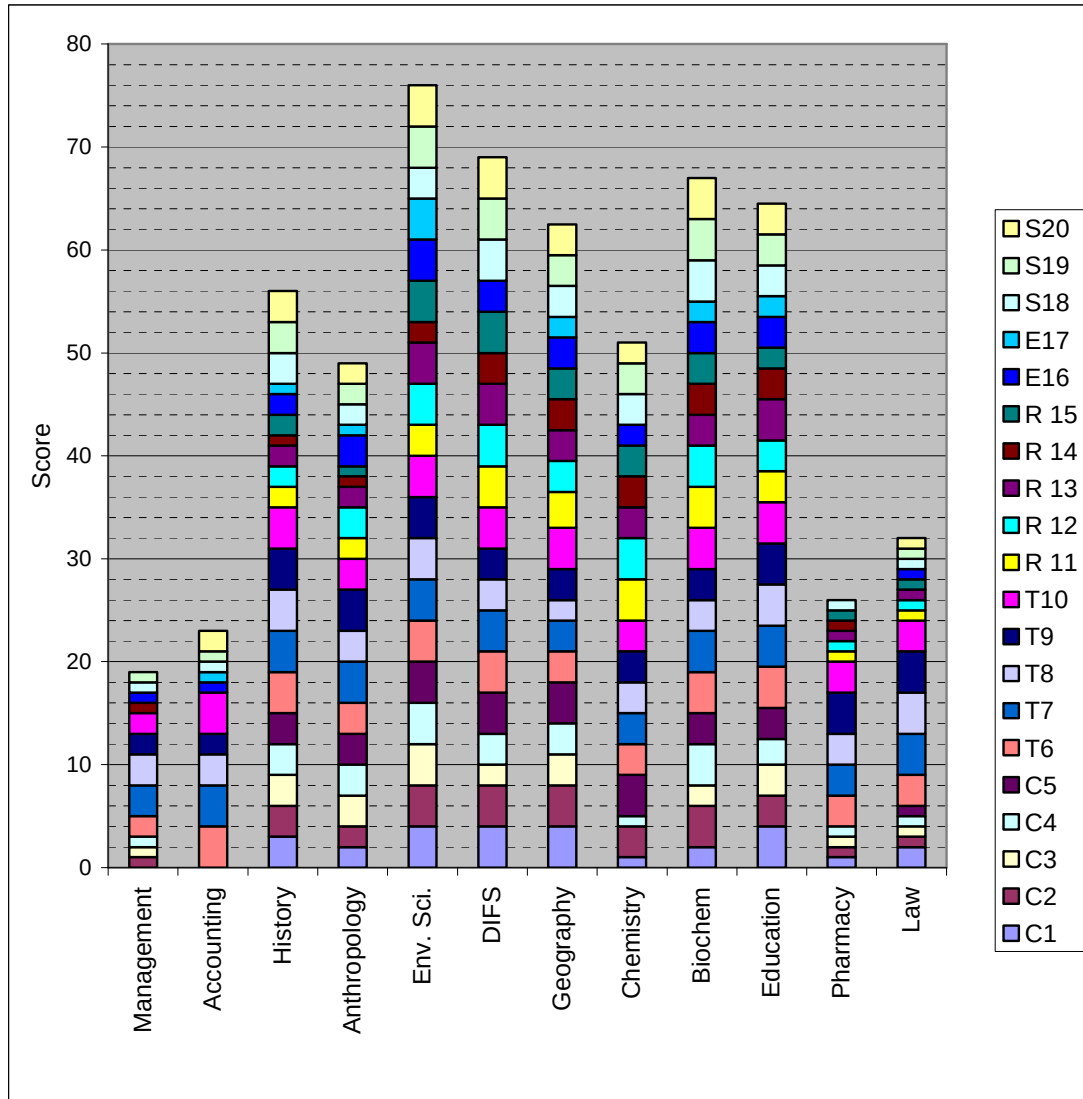


Figure 4.14 Cumulative scores for departments

Proportionally two thirds of the departments obtained scores of more than 50%. From a Faculty point of view, departments in Science, Education and Arts faculties represent the two thirds which went over the 50% rate of integration. Commerce²⁰, Pharmacy and Law Faculties constitute the one third with a less than 50% integration rate (Figure 4.15, for raw data, see Appendix 5, introduction to case records, Table 1).

²⁰ The focus on the Accounting and Management Departments does not, however, provide a complete picture of sustainability in the Commerce Faculty as there exists a Masters Programme in Business Administration offering specialism in environment and sustainability in the Investec Business School which is part of the faculty (described in 4.2) and is active in terms of emergence of sustainability mainstreaming at the university.

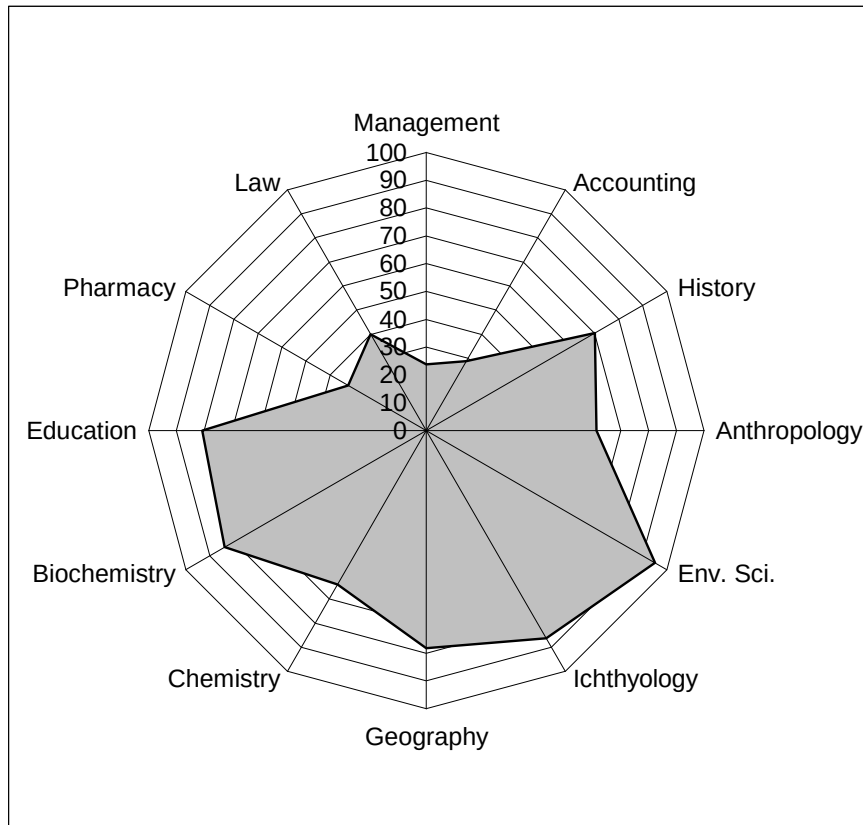


Figure 4.15 Average sustainability performance per department

4.3.3 Estates Division: Operations and Management (case record 22, Appendix 5)

Table 4.3 outlines and describes USAT Part B indicators (see Appendix 2, no. 2 for the full picture of USAT Part B) that were used to generate the data graphically presented in this section. A more detailed description of the practices which the indicators denote is in section 4.4.4. (The indicators are also listed in Table 3.5 but are included here for ease of reference and interpretation).

Table 4.3 USAT Part B indicator codes and descriptions

Code	Description
WR1	Waste reduction practices
W2	Recycling of solid waste (including paper, plastic, metal, etc.)
TW3	Source reduction of toxic materials and radioactive waste
AP4	CO ₂ and air pollution reduction practices (including alternative fuel use, renewable energy sources, emission control devices, etc.)
AQ5	Indoor air quality standards and practices
BC6	Building construction and renovation based on ecological design principles
EC7	Energy conservation practices (in offices, laboratories, libraries, classrooms and dormitories)
LP8	Local food purchasing programme
PE9	Purchasing from environmentally and socially responsible companies (including buying and using 100% post consumer chlorine free paper)
OP10	Organic food purchasing programme
TP11	Transportation programme (including bicycle/pedestrian friendly systems, car pools, bus pass programmes, electric/natural gas campus vehicles)
BF12	Use of bio-fuel
WC13	Water conservation practices (including efficient shower heads and irrigation systems)
PM14	Integrated Pest Management practices (including reduction of pesticides to control weeds)
SL15	Sustainable landscaping (emphasizing native plants, biodiversity, minimizing lawn, etc.)
OE16	Integration of operations into the educational and scholarly activities of the university
	Others (please specify):

Although Rhodes University is not involved in some of the practices which are said to be emphasised by institutions moving towards sustainability internationally as outlined in part B of the USAT, there are several sustainability practices in place at the university. These include water conservation practices, integrated pest management practices, sustainable landscaping and local food purchasing. All these scored between 3 and 4 during the sustainability assessment. Other practices including recycling of waste, toxic waste reduction at source, sustainable building construction and renovation, energy conservation, among others, obtained scores ranging from 0.5 to 2. Only four practices out of a total of 16 identified by the USAT were non-existent (scored 0) at the university, that is, waste reduction, air quality monitoring, organic food purchasing and a sustainable transportation programme (Figure 4.16). The total score was 24 out of 64 (37.5%) and the average score was 1.5 (raw data is in appendix 5, case record 22, Table 1).

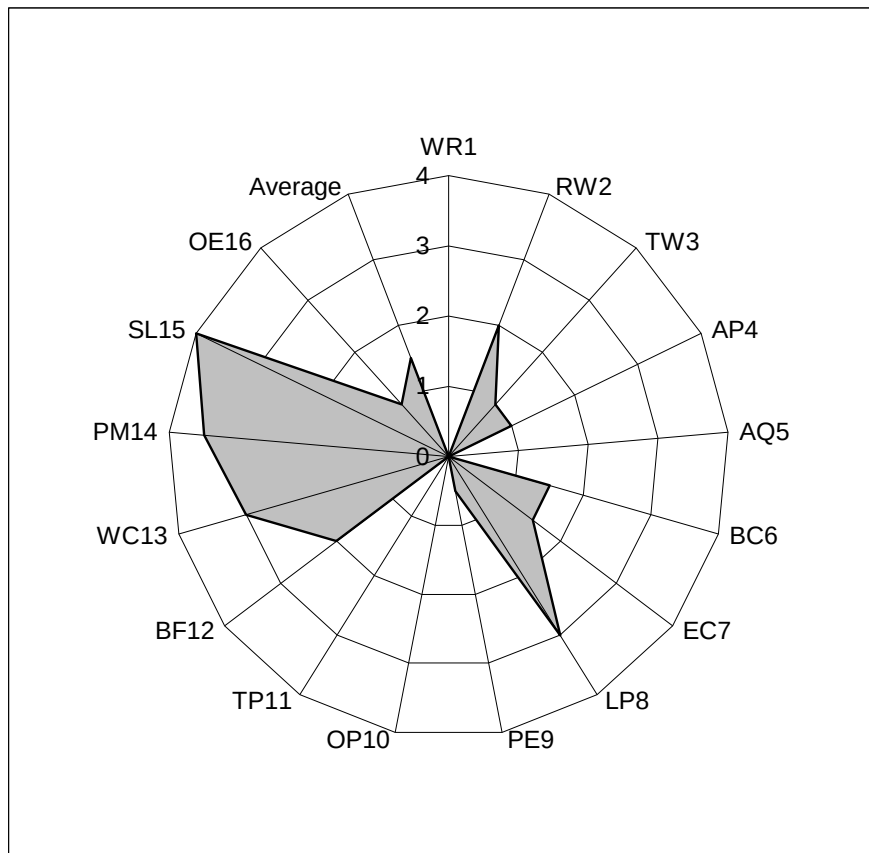


Figure 4.16 Sustainability performance in operations and management

4.3.4 Students' Involvement (case record 23, Appendix 5)

Table 4.4 outlines and describes USAT Part C indicators used for assessing the level of involvement of students in sustainability initiatives (see Appendix 2, no. 2 for the full picture of USAT Part C). Some of the students' initiatives are in the area of community engagement and hence are fully discussed under the broad community engagement theme (section 4.4.3), while others are discussed in section 4.4.6. (The indicators are also listed in Table 3.6 but are included here for ease of reference and interpretation).

Table 4.4 USAT Part C indicator codes and description

Code	Activities and opportunities
SC1	Student Environmental Centre
CC2	Career counselling focused on work opportunities related to environment and sustainability
ES3	Environmental societies or other Student Group(s) with an environmental or sustainability focus
SD4	Sustainability practices in residences or dormitories by students (e.g. recycling)
OP5	Orientation programme(s) on sustainability for students
SA6	Student environmental and sustainability awareness programmes
VS7	Voluntary community service by students related to sustainability issues and concerns
SI8	Involvement of student groups across campus in sustainability initiatives
SR9	SRC* involvement in environmental and sustainability initiatives
SM10	Student collaboration with management in the area of environmental and sustainability
ES11	Environmental and sustainability activities initiated by students themselves (independent of departments, lecturers, management etc.)

SRC* Student Representative Council

The sustainability assessment using part C of the USAT revealed that Rhodes University has a variety of environmental and sustainability activities either meant for or initiated by students. These are operating at different levels as is reflected in the rating of the activities. Among the selected key activities (defined by the USAT) that institutions moving towards sustainability can get involved in, only two were absent and both therefore scored 0. These include a student environmental centre (SC1) and career counselling on work opportunities related to environment and sustainability (CC2). Low scores were obtained for some of the activities including sustainability practices in residences, orientation programmes and awareness programmes. However, some, like community service and Student Representative Council involvement scored 2 (Figure 4.17). The total score was 16 out of 48 (33.3%) and the average score was 1.3 (see Appendix 5, case record 23, Table 1 for raw data).

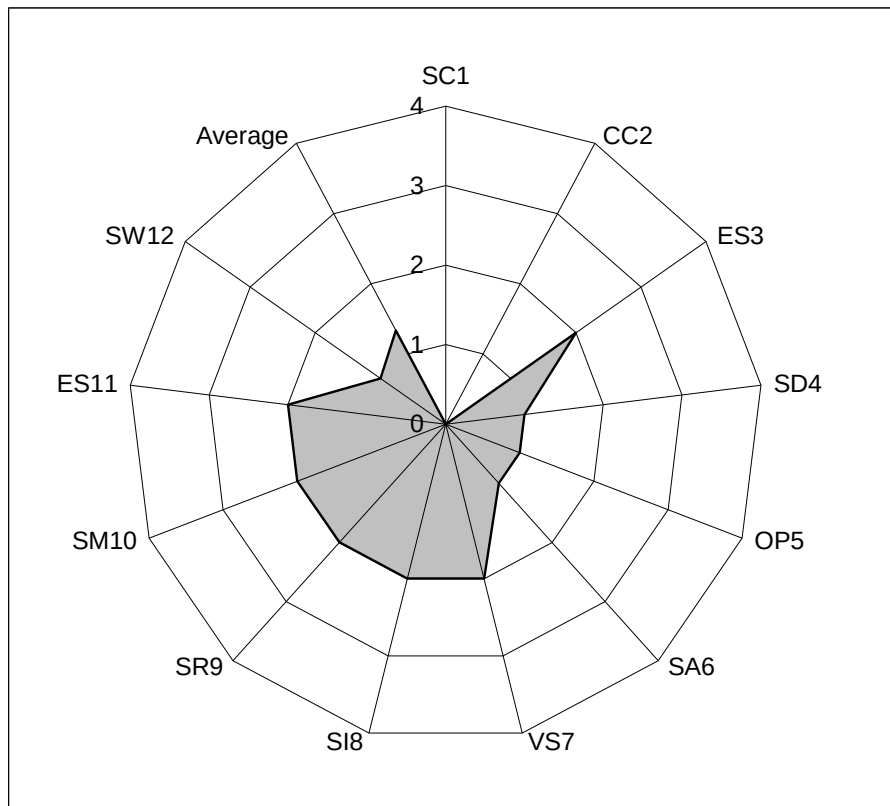


Figure 4.17 The extent of students' involvement

4.4 SUSTAINABILITY INITIATIVES AT RHODES UNIVERSITY

A variety of initiatives which respond to sustainable development challenges are in place at RU. These initiatives are embedded within the core functions and other operations of the university including research, the curriculum, community engagement and campus management practices to mention a few. This section presents those initiatives which were captured through the data collection process. It elaborates on the nature of activities on the ground which contribute to the picture portrayed in section 4.2 and integrates this with data from research units and other divisions which were not part of the sustainability assessment.

4.4.1 Integration of sustainable development topics in curricula

Content analysis of course material revealed that environmental and sustainability topics are integrated in a number of programmes at RU. These are mainly in the Faculties of Science (though there were not many sustainability topics in the

Chemistry curriculum), Education and Arts. This finding triangulates with the results of the sustainability assessment where departments in these three faculties had high scores in the curriculum cluster, with the exception of Chemistry. In other Faculties, sustainability issues are not a major focus of teaching activities even though they have some courses addressing these issues. Evidence from the results of the sustainability assessment show that these faculties obtained low scores in the curriculum cluster of indicators. Table 4.5 outlines examples of courses with sustainability topics in selected teaching departments. (There is more information in Appendix 5, cased records 1-12.)

Table 4.5 Examples of courses with sustainability topics in selected departments

Department	Course code or description	Environmental and sustainability topics in the course
History	The World Crisis and its Historical Origin	Technological changes, diseases, the division of the world into the rich and the poor, the world debt crisis, the demographic explosion, AIDS (why the 1970s?), environmental disaster.
	Africa in Crisis	The African debt crisis and its causes; the demographic explosion, AIDS; problems of the 'peasants' and declining per capita food production; the Ethiopian famine of 1984-85; matters of environmental concern (e.g. water, trees, soil erosion, rainfall); problems of industrialisation and poor export performance, Structural Adjustment and the consequences.
	The Contemporary Global Crisis	Globalization; consumerism; the unequal distribution of global wealth; the global debt crisis; the environment; global warming; other threats to the atmosphere; chemicals; endangered oceans; mass extinctions; population growth relative to food output; water; diseases.
Anthropology	Environmental Anthropology	Focuses on the complex relationship between culture/society and nature/environment and the role of other social institutions like politics and economics in understanding environmental issues.
	Anthropology of Tourism	Impacts of tourism on local economies, culture and society (among other issues).
	People and Parks	Concerned with the complex relationship between people living within or close to parks and the parks in question. The course explores the implications of the concept of sustainable development in the management of parks as administrative policy gradually changes from inhumane policy which dominated nature conservation and is being re-oriented towards rational access for residents and exploitation of park resources for local community development.
Environmental Science	Introduction to Integrated Environmental Systems	Focuses on introducing integrated complex systems and then looks at social, economic and ecological systems. "It teaches learners to view the environment as a dynamic, integrated social-ecological system".
	Environmental Issues of	Teaches application of skills and tools at global, regional and national levels. It also draws from local case studies.

	Global Concern	The major sustainability issues of focus are biodiversity, integrated pollution and waste management, poverty and the environment, water scarcity, land degradation and transformation.
	Environmental Management Concepts and Methods	Deals with the following sustainability topics: local environmental planning for sustainability, business and the environment, terrestrial ecosystem management, integrated water resources management.
Geography	Introduction to Global Development	People and the environment and impacts of HIV/AIDS; urbanisation processes.
	Urban and Rural Structures	The relationship between rural settlement and land use and the biophysical environment; post colonial rural development policies, impact of global processes (agricultural intensification/modernisation) on African development; housing issues, employment and economic development.
	Environment and Development in Africa	Explores the interrelated nature of Africa's environment and its development which are salient aspects of sustainable development.
Biochemistry	Microbiology 3 (Biosensing and Biodegradation Pathways; Exploiting Micro-organisms and Bio-remediation)	Biosensing and biodegradation pathways - the world as a set of related systems, and the effective and critical use of science and technology which show a responsibility towards the environment and others; the importance of sensing technology as the provision of valuable information on how complex and often toxic molecules degrade in the environment. Exploiting micro-organisms - exploitation of microbial interactions for the benefit of man and the environment, potential use of biological control products in agriculture and bio-fertilisation. Bioremediation is focussed on biological remediation of water pollution.
Ichthyology	Ichthyology 201, 301 and Honours	Fundamental information about fish and the environment, for example anatomy, evolution, ecology and genetics; ecosystems, conservation, ichthyology, fisheries and resources management and aquaculture.
Education	Ecology and Environment	The discourse around sustainability at the international level, how people understand sustainability and contemporary issues relating to sustainability, for example global warming, agribusiness, biotechnology and biodiversity.

Table 4.5 outlines only examples of courses in which sustainability content is explicit in some of the departments in the Arts, Science and Education faculties at RU (see appendix 5, case records 1-12 for more detail). Much more is happening on the ground in both the outlined and other departments. In some of the departments that were investigated, sustainability issues are either not a major focus or are not very explicit. Through content analysis, the study ascertained that there was at least a course with topics related to sustainability, or in which sustainability is implied in all the departments that formed part of the study. In the Faculty of Law, sustainable

development is one of the themes of the Environmental Law course, though it is not its prime focus as is explained in the following quote from the interview:

... we touch on quite a whole lot of other sustainable development issues when we teach Law as well, but not through the glasses of sustainable development but through the glasses of the Law and these are topics that you might be able to link to sustainable development issues (P9, pers. comm., 29 November 2007).

In the Accounting Department sustainability content was said not to be explicit and that is why all the curriculum indicators were rated 0. However, awareness of sustainability issues is created among students when they learn about rehabilitation provisions in Financial Accounting:

... there is an awareness that's created but not necessarily an understanding or knowledge of the fundamentals of what it [sustainable development] entails (P12, pers. comm., 5 December 2007).

Content analysis of documents also revealed that the Accounting Department teaches an Ethics course which has a focus on sustainability issues.

Management Department students were said to get exposure to sustainability when they learn about corporate social responsibility. This was however not explicit in the course guide which I obtained from the department (the Financial Management course outline for 2007, see Appendix 5, case record 2).

At the time of the study, the university was considering establishing a cross-disciplinary Masters' Programme in 2010 in the area of integrated social development with a strong focus on sustainability issues to be hosted in the Faculty of Humanities. There were also talks about introducing a compulsory course for all first years in citizenship and ethics aimed at promoting social cohesion. The course was said to be in a position to promote appreciation of cultural diversity and at the same time, sustainability issues (Appendix 5, case record 17).

Through content analyses of 2007 examination papers for the courses identified to have sustainability content, the study found that the sustainability topics taught by teaching departments are also examined. This was established throughout all the departments, except Accounting in which I did not manage to access the relevant examination paper and the Management Department in which the examination paper

for the course that was analysed did not have sustainability content (see Appendix 5, case records 2-12).

4.4.2 Integration of sustainability topics in research

The Research Office at RU confirmed that the university does not have a clearly defined research policy in which sustainability issues are reflected.

... although sustainability issues are something that we talk about a lot in terms of our meetings and our discussions, it's not reflected in any (research) policy documents at the moment (P13, pers. comm., 5 December 2007).

An interview with the Dean of Research revealed that sustainable development topics were not part of criteria in allocating research funding. Instead, focus is on young and needy researchers and, in terms of established researchers; research outputs. However, research funders like the South Africa-Netherlands Research Programme on Alternatives in Development, National Research Foundation and the Water Research Commission are funding research initiatives which respond to sustainability issues in various departments and research units at the university. Among the five regional and national challenges which the Department of Science and Technology²¹ identified as critical areas of national well-being are energy, climate change and poverty which are critical environmental and sustainability challenges facing South Africa. It was believed that university researchers (including those at Rhodes University) would be influenced to align their research with the defined issues for them to get funding thereby positively contributing to sustainability in the process (more information on research management at Rhodes University is in case record 19, Appendix 5).

With the exception of the Accounting and Management Departments (both in the Commerce Faculty, interviews with heads of teaching departments and research units and content analyses of documents revealed that all research units and most departments and at RU are involved in various research initiatives which address sustainability issues (detailed information is in Appendix 5, case records 1-16). The levels of engagement with these issues differ among departments as illustrated by scores obtained by indicators under the research cluster in section 4.3. Table 4.6

²¹ The Department of Science and Technology is the main research funding agency in South Africa.

captures the focus of research in sustainable development in some of the departments and research units and is mostly based on the research outputs listed in the 2007 Rhodes University Research Report.

Table 4.6 Research in sustainable development in some of Rhodes University's teaching departments and research units

Department/Unit	Focus of research in sustainable development
Anthropology	How people obtain and trade in <i>muti</i> (medicinal) plants, tourism related issues, people environments and medicinal plant use, land restitution, use value for not-timber forest products.
History	The World Social Forum, green-washing of corporations as they try to staff for or encounter the environmental movement, the production of cannabis, HIV/AIDS, gender politics in pre-colonial Africa, the post-apartheid recovery process in South Africa, social justice and apartheid and the environment
Biochemistry	Bio-fuels and developing technology for bio-fuels; environmental clean-up (e.g. wastewater treatment), bioremediation and beneficiation of effluent, biosensor detection and monitoring of faecal material in water, heavy metal concentrations in sediment and water.
Chemistry	Medicinal chemistry.
Environmental Science	The major focus is on the interface between the social and ecological systems with projects addressing land restoration, land cover change, poverty, fuel wood, natural resources management, alien species, green spaces, medicinal plants, HIV/AIDS, food security, ecosystem services.
Geography	Environmental water management, local economic development and rural development, land reform, alien species, urban agriculture, game reserves, rainfall, climate change issues.
Education	Educational quality, Environmental Education, Education for Sustainable Development, health-environment-poverty-education interface, environmental conservation education, environmental ethics, learning in contexts of socio-ecological risks, indigenous knowledge systems.
Ichthyology	Fish and the environment (e.g. evolution, ecology, genetics), fisheries management, aquaculture production and water quality issues.
Law	Environmental Law and social justice issues e.g. divorce, homelessness, governance, racial discrimination.
Pharmacy	Human health, Pharmaceutical service provision, service learning, quality and safety of generic medicine, healthcare professional practices, and culture and Pharmacy practices.
Environmental Biotechnology Research Institute (EBRU)	Remediation and fixing up degraded environments, establishing sustainable practices so as to move away from unsustainable use of environmental services and biological systems in order to achieve sustainable use of services.
IWR	Sustainable water resources management, promoting the understanding and wise use of natural water resources in Southern Africa, water quality.
SAIAB	Aquatic biodiversity and sustaining biodiversity and conservation.
ISER	Regional social and economic research; quality of life; bio-cultural diversity and conservation; political traditions of the Eastern Cape; and municipal services.

In Chemistry, the interview with the head of department established that the department does not directly address environmental and sustainability issues. However, one emphasis in the department was medicinal chemistry.

... we have projects looking at anti-malarial, developing anti-malarial agents, anti-TB agents, HIV protease and integrated inhibitors, oesophageal and other types of cancer, ... marine natural products with medicinally active components ... medicinal applications (P25, pers. comm., 14 February 2008).

In the Faculty of Law, sustainability was not one of the faculty's themes. However, lecturers in Environmental Law do research on sustainability issues.

... all the lecturers that we have had teaching Environmental Law in the last couple of years have all researched in Environmental Law and have been good researchers in Environmental Law, including issues of sustainable development in some instances (P9, pers. comm., 29 November 2007).

Though sustainability in the Faculty of Pharmacy was not a major focus of research, at the time of this study there were students who were looking at health promotion and health literacy in a Pharmacy Practice environment. Other students were researching solvents and chemicals which included issues of how and when to dispose of them.

The ISER has a strong research focus on contextual sustainability issues in Makana Municipality. The institute is currently working on the five research programmes identified in Table 4.6. Table 4.7 elaborates on these research programmes (see also case record 16, Appendix 5).

Table 4.7 Research programmes in ISER

Research programme	Environmental and sustainability issues addressed
Quality of life research	Contemporary issues of global concern, social indicators and social attitudes, community responses to HIV/AIDS and related communicable diseases, poverty
Bio-cultural diversity and conservation	Use of natural resources, land use and environmental-cultural practices with a strong emphasis on livelihoods
The municipal services project	Restructuring of municipal services and the commercialisation of health care in South and Southern Africa
Regional social and economic research	Policy and critical development issues in the Eastern Cape province and Makana Municipality
Political traditions of the Eastern Cape	Preservation of oral tradition and heritage awareness among other issues

The institute in addition has a CODESRIA-funded (CODESRIA - Council for the Development of Social Science Research in Africa) Southern Africa in Africa Research Initiative (SAARI) and South Africa-Netherlands Research Programme on Alternatives to Development and National Research Foundation thematic projects which have enabled its members to be involved in other sustainability related research initiatives. One of the members of the ISER is involved in local environmental assessments.

4.4.3 Community engagement initiatives in sustainable development

There is a strong sustainable development focus in community work at the university where issues tackled are in the area of education, the environment, development, poverty and use of resources. An interview with the Community Engagement Manager established that departments and units work in collaboration with the Centre for Social Development, a non-governmental organisation (which is co-funded and was commissioned by the university to lead community engagement at RU), but they decide where they can apply their resources in the community on their own (more information on the management dimension of community engagement at Rhodes University is in case record 20, Appendix 5).

Rhodes University has a multi-disciplinary Community Engagement Committee, established in 2003 to enhance, initiate, coordinate and give visibility to community initiatives at the university. At the time of the interview, the Community Engagement Manager, supported by Rhodes University but working under the Centre for Social Development, was responsible for centrally coordinating the university's community engagement initiatives. RU has a Community Engagement Policy (see chapter 1, section 1.4) and a Community Engagement vision and mission statement through which it commits itself to improving the quality of life of individuals in Grahamstown through sharing its knowledge resources.

The community engagement website was launched in 2005. In 2006, the goal for a university/community partnership between Rhodes University and formerly disadvantaged black schools was defined by the Vice Chancellor. His five year vision is a partnership of excellence between the university, Makana government and a broad ranging capacity building relationship with seven high schools in Grahamstown East, the formerly disadvantaged black area still characterised by poverty and high

unemployment rates. The aim of the partnership is to facilitate progress with students who matriculate through direct access with Rhodes University or through the Extended Studies Unit²² which was established by the university to assist students from disadvantaged backgrounds.

Rhodes University is starting its own Community Engagement Centre linked to the Centre for Social Development. It has since introduced the Vice Chancellor's Awards for community engagement and service learning. In 2007, the university appointed the Community Engagement Director who is now spearheading the Makana Schools Partnership and exploring establishing a credit bearing service learning programme in teaching departments at Rhodes University as a way of extending community engagement initiatives.

The focus of community engagement initiatives is basically dependent on the expertise within individual departments and units. According to the interview, departments that have a discipline that can be applied to development or sustainable development issues such as Environmental Education, Environmental Science, Geography and the Institute for Water Research (IWR) therefore can initiate projects related to these issues.

A variety of sustainability initiatives in community engagement work at RU were revealed through interviews and content analyses. Some of these related closely to the expertise within departments and units while others, like fundraising and donations, did not relate to any special skills. The target community for most of Rhodes University community projects is the formerly disadvantaged Grahamstown East community (as discussed in chapter 1, section 1.2). Table 4.7 outlines some of the sustainability projects the university is involved in (full information in case records, Appendix 5).

²² The Extended Studies Unit strives to assist students from educationally disadvantaged backgrounds. This is done through alternative access for students who would not automatically qualify for direct admission. A limited number of students who show potential to succeed are selected and are exposed to a carefully designed supportive learning environment which enhances their ability to succeed at Rhodes University.

Table 4.8 Community projects in the sustainability area

Department/unit	Sustainability projects in the community
Management	Profitability and equality in terms of wealth
Anthropology	Social justice, social welfare, health, infrastructure development, education and training
History	Education, job creation and community tourism development
Biochemistry	River systems and pollution in local river systems, sustainable game industry
Environmental Science	Community vegetable gardens; ecosystem management; establishment of a conservancy, donation of trees to local schools and of food parcels and citrus trees in the Kat River area; funds to build toilets and to repair a bridge; skills transfer in areas such as product development, marketing and client relations where the potential for income generating projects based on natural resources is identified
Geography	Local economic development; developing water management institutions; projects on alien species rehabilitation
Ichthyology	Promoting aquaculture (fish farming); sustainable management of aquatic ecosystems; initiated the Rural Fisheries project which aims to provide sustainable livelihoods for rural communities based on freshwater and marine resources
Education	Building capacity at school and community levels, supporting community based environmental activities, coordinating Makana Regional Centre of Expertise, supporting Eco-Schools, policy work at various levels
Pharmacy	Through service learning, students assist members of the community in terms of health promotion
EBRU	Low cost sewage treatment systems appropriate for small rural or peri-urban communities; beneficiation of the treated waste water in job creation or wealth creation by the local community
ISER	Social and economic development projects in collaboration with the Makana Municipality through research activities that are meant to inform the Local Economic Development Strategy
IWR	Environmental awareness, environmental protection and sustainable development
Environmental Committee	Launching and coordinating the Botanical Gardens Project aimed at preservation of a Botanical Garden for the community. Social upliftment and poverty relief are key components of the project
Students	Tree planting in the community; fundraising efforts in collaboration with the Centre for Social Development in which they collect and distribute food and clothing donations; assisting in provision of water to schools

At the time of the study the Accounting Department did not have any community engagement initiatives. In the History Department, links with the community were said to be weak and only one member was involved in the initiatives identified in Table 4.8. In some departments, community links were said to be through applied research, for example in Biochemistry, Environmental Science, Geography and Education. The following quotation is from an interview with the head of Environmental Science:

... we have postgraduates in rural areas and they are undertaking research and 99% of them in a way that we might call applied research and certainly community sensitive research in that they will feed-back results, they will involve the community in the process and I would think that results go to the community and agencies in the area that reviews those results, like NGOs, government departments and so on (P23, pers. comm., 13 February 2008).

Community engagement initiatives at the time of the interview were mainly in form of volunteerism and outreach. The projects outlined in the table above were therefore mainly run on a voluntary basis and were coordinated by or run in collaboration with the Centre for Social Development.

The Faculty of Pharmacy already has service learning through a credit bearing Community Experience Programme which is part of the fourth year Pharmacy Administration and Practice course. Through service learning, students assist members of the community in terms of health promotion which is a sustainable development issue.

Well, in terms of sustainability concerns in the surrounding communities a pharmacist is a key health care professional, so in terms of health promotion, it's actually straight-forward. I mean, being a pharmacist means that you have to not only know about drugs, but you also need to know what people need to do to prevent the use of drugs or drug products. So good pharmacists will not only dispense for you but will also be a lifestyle counsellor for patients (P24, pers. Comm., 18 February 2008).

Some of the projects student groups were working on show a high level of community involvement in the area of sustainability. An example given during the interview is the "Adopt a Tree Project" where the students are given young succulent indigenous plants to look after for six months before planting them in the community in bare areas. There were also plans for a Rhodes Water Week in 2008 for which students were collaborating with the Working for Water Programme²³ and the Centre for Social Development Galela Amanzi Project²⁴. The plan was to provide some schools with either water tanks or taps for daily use and for irrigating their gardens. Students are also involved in creating environmental awareness through lectures,

²³ The Working for Water (WfW) programme is administered through the Department of Water Affairs and Forestry. It was launched to spearhead the fight against invasive alien plants and works in partnership with local communities, to whom it provides jobs, private companies, government and other organisations (Department of Water Affairs and Forestry, 2008).

²⁴ Galela Amanzi seeks to promote the responsible use of water as well as to make water available to Community Centres and schools that do not have consistent safe running water. The project intended to do this by raising money to buy water tanks for rainwater collection for the community (Rhodes University Student News, 2008).

campaigns and talks. During the 2008 RU Environmental Week, there were environmental awareness lectures, two of which I attended. An observation made from the lectures was that they were not well attended with less than 30 people turning up for both of them (see Appendix 5, case record 23).

Arbor Day celebrations for students were planned to take place in the community and there was a possibility for a planting campaign. Students also use their skills in the community through the Rhodes University Student Volunteer Programme coordinated by the Centre for Social Development staff members and RU. There are other community initiatives by students through their Halls of Residence, the Oppidans²⁵ and other societies and clubs, which have sustainability issues embedded within them. The nature of involvement varies from educational projects for the disadvantaged through various departments at Rhodes University to involvement in fundraising efforts in collaboration with the Centre for Social Development in which they collect and distribute food and clothing donations (see Appendix 5, case record 23).

Two areas of focus in community engagement which the university emphasises are supporting the Makana Municipality in social and economic agendas and supporting education in Grahamstown particularly with a focus on previously disadvantaged Grahamstown East schools. With regard to the latter, the university formed the Makana Schools Partnership with seven high schools in Grahamstown East, the Department of Education (DoE) and a teachers' union. Among other things, the partnership focuses on quality of teaching and learning.

4.4.4 Management and operations

RU is starting to address sustainability through its physical operations. A variety of physical operations which promote sustainable development are already in place. Table 4.9 is a summary of the major initiatives (see Appendix 5, case record 22 for more data)

²⁵ Oppidans at Rhodes University is a union of the community of students who stay off-campus. They form the single largest student body and have an Oppidan committee which, among other things, is responsible for coordinating donations (see <http://www.ru.ac.za/oppidan/>).

Table 4.9 Sustainable physical operations at Rhodes University

Sustainability aspect	Activities
Recycling and re-use of waste	Re-use and recycling of solid wastes including paper, kitchen and garden waste.
Toxic materials and radioactive waste	Proper disposal channels for toxic materials and radioactive waste.
Air pollution reduction	Use of battery powered vehicles (two at the time of the interview) and use of fume hoods to reduce escape of toxic materials into the atmosphere in the Chemistry Department.
Ecological design principles for building construction and renovation	Sustainability issues were increasingly being considered in decisions like renovation or construction of new buildings though the university had not yet adopted a green building design policy.
Purchasing programme	Local food purchasing where the university buys some of its food from local suppliers.
*Use of bio-fuel	The university is using bio-fuel to power its lawnmowers and some of its vehicles.
Water conservation	Use of water conservation showerheads and dual flush toilets; reducing irrigation; plans for rain water harvesting.
Pest management	No use of pesticides except the friendliest herbicides; emphasis on pulling weeds.
Landscaping	Emphasis on indigenous plants, use of compost in place of fertilizer.

***Use of bio fuel** - while use of bio fuel is a controversial issue, at RU it was considered a sustainability initiative mainly because the bio fuel is produced from recycling waste oil from the kitchens. Production is done by a local business at no cost.

Through field observations and interviews, the study revealed the presence of environmentally sound channels for the disposal of toxic wastes in the Chemistry Department. The facilities were also used by the Faculty of Pharmacy and other departments like Biochemistry. The university uses safety guidelines when working with toxic wastes, for example, in the Chemistry Department.

In various departments, a number of sustainability practices are encouraged including recycling, saving water and saving energy through switching off lights. Through observations and an interview with the head of Environmental Science, it was ascertained that the Environmental Science Department, like many others at RU, has recycling bins in all offices and at strategic points around the department and has put up notices about switching off lights. The same practice is also emphasised in the Faculty of Education where the “last to leave, please switch off” notes are stuck near each switch.



Figure 4.18 A note stuck by a switch in the Faculty of Education

The Environmental Science Department put up notices in the washrooms regarding using water carefully. It has also asked the university to link water from the wash-basins to the toilet cistern so that water used to wash hands will then be used to clean the toilet but this hasn't been done. It has also committed itself to buying new printers that can print on both sides of the paper. Two students in the department are currently undertaking a research project on the carbon footprint of the Environmental Science building with the intention of offsetting it (see Appendix 5, case record 7 for elaboration).

The university has an Environmental Committee which is organised into three working groups as follows:

- (i) Environmental Communications – responsible for communicating environmental information,
- (ii) Regional, National and International Links - the arm of the Environmental Committee which reaches out to the community, and
- (iii) Environmental Awards.

(See Appendix 5, case record 21 for more information on the activities of the working groups and the committee at large).

Communication of environmental information takes place through various means including videos, talks and lectures. By attending two of these events, I discovered that attendance was relatively low when considering the size of the university community. The Environmental Committee also contributes to the Environmental Management for Sustainable Universities (EMSU) series of international conferences (it hosted the Environmental Management for Sustainable Universities in 2002 in collaboration with the EESU, see section 4.2, Table 4.1), and implementation, monitoring, and review of the university's Environmental Policy.

From interviews, the university's Research (Appendix 5, case record 19), Human Resources (Appendix 5, case record 18) and Planning (Appendix 5, case record 17) divisions did not have explicit sustainability initiatives integrated in their main activities. For example, an interview with the Human Resources Director revealed that the criteria for hiring were basically the three functions of higher education, that is, teaching research and community engagement, independent of sustainable development initiatives.

4.4.5 Partnerships

A number of partnerships at RU have at least some sustainability initiatives though very few were initiated specifically to address sustainable development. The general features of these partnerships identified as part of this study include the fact that the partnerships varied from those existing among the RU departments, units and divisions, for example between the RU Community Division (in collaboration with the Centre for Social Development) and most departments, to those between RU and other universities, national government, local government, funding organisations or consultancies, etc. In most cases the partnerships did not have an explicit sustainability agenda as part of their focus. At the same time some of them were based with individuals and were not really a departmental initiative, for example in the Biochemistry Department where members were involved in partnerships on an individual basis. Only in the Chemistry and Accounting Departments did interviews reveal that there were no existing sustainable development partnerships or any other partnerships with sustainable development as a dimension of their focus, between the departments and other universities and/or other stakeholders at the time of the study.

Very few partnerships at the university had an explicit sustainable development agenda. The most explicit sustainability partnership at the university was the MESA Universities Partnership in which the EESU is providing leadership and research support. As discussed in Chapter 2, the establishment of the partnership programme was in direct response to sustainability issues with its major drive being mainstreaming of environmental and sustainability issues in universities in Africa. The same department houses and coordinates a Regional Centre of Expertise (RCE) (Makana RCE) for Education for Sustainable Development, an initiative of the United Nations University which is aimed at delivering ESD to local and regional communities. The aim of the Makana RCE is to support ESD processes through enhancing educational quality in both the formal and informal sectors and this entails forging active partnerships between participating educational institutions, research institutes, local government and development organisations. The other partnership with a strong focus on sustainability issues (even though not all the dimensions of sustainable development are evident) is the Makana Schools Partnership which was established as part of the university's community engagement initiatives (discussed earlier in section 4.4.3). The university also collaborates with the municipality on local economic development issues and in the Local Environmental Action Plan process (see chapter 1, section 1.2).

In most of the existing partnerships, there were sustainable development initiatives but these were not something that the partnership was committing to or had agreed to commit to. In such situations, environmental and/or sustainability issues would mostly be part of the focus of the department/institute and hence will naturally form part of the focus of partnerships that the department/institute engages in. An example is the partnership between the Geography Department and the Department of Water Affairs and Forestry in which they were involved in water issues and these are inclusive of sustainability concerns, for example, encouraging a participatory framework in water management and promoting the sustainable management of water. Therefore, while the main focus of the partnership is water, sustainability issues related to water seem to naturally become part of the focus of the partnership. The same is true for the IWR which is collaborating with other university departments, national government, local government, environmental consultancies and consulting engineers on water issues.

In the ISER, collaboration is between the institute and other departments and with partners outside the university, for example, local farmers (Masifunde project) and Umthathi, a non-governmental organisation (NGO) working with food gardens in the townships. They also work with government departments like Water Affairs and Forestry and Agriculture.

The ISER is also coordinating the Makana Research Group (MRG) which involves several university departments and institutes in which they work with the Makana Municipality through research activities that are meant to inform the Local Economic Development Strategy. The main objectives of the MRG are:

... to facilitate and strengthen research engagements between Rhodes University and the Makana Municipality, encourage collaboration between departments and researchers at Rhodes, and establish a resource centre and archive at the ISER to house research conducted in the Makana Municipality (Policy and governance, n.d., unpaginated).

The key local economic development areas of focus include mining, agriculture, tourism and Small, Medium and Micro Enterprises. The focus is more on social and economic development. The MRG also wants to look at how to support post-graduate students in terms of drawing them into research. MRG members are from various departments at Rhodes University and are grouped into different clusters including health, water, education and land. The various research clusters are tasked with developing a research agenda that informs the municipality and, at the same time, negotiates funding.

Current research clusters that were identified from completed, ongoing and future research are outlined in Table 4.10. Also explained in the table are the environmental and sustainability aspects which fall in each of the clusters.

Table 4.10 Research clusters in the Makana Research Group

Research cluster	Environmental and sustainability focus
Health	Diseases (e.g. HIV/AIDS, hypertension, tuberculosis), lifestyle, stigma and care for the sick
Water and the environment	Alien invasive plants and water quality and provision
Land	Agriculture, municipal commonages, game farming, traditional land use and farm working conditions
Politics	Governance and democracy issues
Economic/baseline	Energy in small, medium and micro enterprises, municipal solid waste disposal, social and economic impacts of festivals and conferences, youth development, integrated development planning, tourism-based development, and poverty alleviation
Education	Change in education and Environmental Education
Culture	Identity, job creation and neighbourhood development
Other	Food gardening

It was also established that the Department of Ichthyology often works with government departments and donors to promote policies on responsible fisheries and with an aquaculture context. This is usually done through contract research.

Several other partnerships at the university which have a sustainability focus were not departmental initiatives but were initiated on an individual basis, for example in Accounting, Geography, History, and Biochemistry. One of the staff members in the Geography Department was said to be in partnership with Local Economic Development Organisations in which the sustainability and environmental impacts of local development is part of their focus. This was the same in the History Department where only one member was working closely with the municipality on an outreach project (Egazini) in which some of the key focus areas had to do with sustainable development.

Generally not much was happening in terms of partnerships in sustainable development, most probably because these partnerships (except the MESA Universities Partnership, Makana RCE and Makana Research Group) were not necessarily established to tackle sustainable development issues. There were also no partnerships (save for the three mentioned above) in which members placed an emphasis on sustainability issues.

4.4.6 Other sustainability initiatives at Rhodes University

Interviews revealed several other initiatives which show commitment to tackling environmental and sustainability issues at RU. The university recently appointed an Environmental Officer (on a part-time basis), who is responsible for environmental issues on campus. At the time of the interview, plans were under way to launch an environmental website with the aim of improving communication of environmental issues. The website (<http://www.ru.ac.za/environment>) has since been launched and is currently operational.

Students contributed by initiating the establishment of an environmental society and they now have an Environmental Portfolio in their Student Representative Council. The society in collaboration with the Student Representative Council Environmental Officer organised a number of awareness events for 2008 including walking tours and lectures. The Department of Environmental Science played a role in supporting the creation of the Student Representative Council Environmental Portfolio and ensured one of their students stood for it. The department is committed to ensuring that the Environmental Portfolio works in the Student Representative Council.

Other mentioned initiatives include handing out fewer lecture notes (to reduce paper use), limiting the amount of vegetation trampling, walking to work in the Geography Department, and incineration of biological waste at Settlers Hospital by the Faculty of Pharmacy. Some staff members in the Geography Department cycle to work.

Sustainability initiatives reported in this study do not exhaust everything that is taking place on the ground as the study was based on a sample of departments/divisions/units at the university (see chapter 3, section 3.5.3). There are other significant sustainability initiatives in departments which are not part of the study, for example, teaching departments like Political Studies, Botany, Sociology and Industrial Sociology. The same applies for research institutes where only a few were selected for the purposes of the study. This however does not significantly change the key findings of the study. The study had reached theoretical saturation as no new categories were emerging from the data (see chapter 3, section 3.3.7).

4.5 MAINSTREAMING APPROACHES, INFLUENTIAL FACTORS AND OBSTACLES

This section is guided by the actual level of critical realism. It is intended to give an overview of the processes and flows influencing sustainability initiatives at RU. These processes and flows have been categorised into three sections including factors influencing mainstreaming, approaches used and obstacles or constraining factors. While conclusions are also guided by an inductive process, this section seeks explanations (influential factors) beyond the RU system's empirical experiences to consider the socio/economic context.

4.5.1 Factors influencing mainstreaming activities

A number of factors were mentioned as having influenced or enabled departments and units to integrate sustainability issues in their activities. The most prominent factor (in terms of being common to many departments/units) identified is the international sustainability discourse. Several other factors were also mentioned, for example, personal interest of staff, availability of technology, market demand, to mention a few. These were however not as prominent as the sustainability discourse (more information in Appendix 5 across all case records).

4.5.1.1 The global sustainability discourse

This was the most common factor identified by departments and units as having influenced them to mainstream sustainable development initiatives in their activities. While there were differences in the way departments explained the influence of the sustainability agenda, this was mentioned in the following departments and units:

- Biochemistry
- Chemistry
- Environmental Science
- Geography
- Ichthyology and Fisheries Science
- Education
- Pharmacy
- EBRU
- Southern African Institute of Aquatic Biodiversity.

This was also evident in the description of emergence of sustainability mainstreaming at Rhodes University in section 4.2.

The ensuing discussion explores examples of explanations by departments/units on how the international sustainability discourse has influenced mainstreaming of sustainability into their activities. Departments/units in which the influence was clearly explained include Environmental Science, Geography, EBRU and SAIAB. In Environmental Science, sustainable development was said to be one of its core concepts and has always been part of their focus as the department itself was created to respond to such issues.

This department was created because of the growing lobby on environmental issues and Rhodes therefore wanted to train a generation of professionals who can contribute and address the sustainability issues of the country and southern Africa. So everything we do, that's why we are here, our job is sustainable development (P23, pers. comm., 13 February 2008).

Activities in the department were therefore said to change in light of sustainability debates.

We are kind of encouraging students to engage in debates, to develop those critical thinking skills to interpret what is going on around them. So ... our courses are evolving as debates around sustainability and environmental issues evolve internationally (P23, pers. comm., 13 February 2008).

The Geography Department was said to be most certainly influenced by sustainable development discourses and is continually adapting to what is happening.

We are always aligning our teaching to what's going on in order to have a current agenda so we are going to be bringing in those into our teaching where it's relevant... So our courses change every year (P20, pers. comm., 22 January 2008).

Through an interview with the director of EBRU, it was determined that the unit's projects were established to be closely related to global sustainability agendas and are aligned directly with the Millennium Development Goals. At the World Summit on Sustainable Development in 2002, the EBRU launched a twelve volume series on *Salinity, sanitation and sustainability: A study in Environmental Biotechnology and integrated wastewater beneficiation in South Africa*. It is a summary of a decade of the unit's work. The unit investigated an environmental biotechnology approach in

integrating management of saline and sanitation waste water systems. It was an investigation of enabling technologies based on studies in saline biotechnology initiated in the mid-1980s at the university. The objectives of the programme were mentioned to have been informed and shaped by the emergence of the sustainability agenda during the time of the World Commission on Environment and Development and the period leading to the Rio Earth Summit.

In SAIAB, prevailing international debates/agendas were said to be influential to the institute's research activities.

We are greatly influenced by prevailing international and national imperatives in research, for example, the World Summit on Sustainable Development. A lot of their thinking and the paradigms that have come out of ... the Convention on Biodiversity in 1992, have been influential in the way we conduct and do, and the nature of the research that we do. Certainly we feel that sustainability is an important area and that we are not here in the short-term, or the solutions that we provide society with, the knowledge that we provide society with, should allow them to manage the environment and its biodiversity in the long-term, not short term solutions (P22, pers. comm., 04 February 2008).

The influence of debates does not, however, cause sudden changes in agenda but is said to have taken place over time through the growth of the thought and the paradigm.

The influence of the sustainable development agenda in the Faculty of Education, besides having been mentioned during the interview, is evident in the history of emergence sustainability initiatives at Rhodes University (section 4.2).

In some of the departments, the influence of the sustainability agenda was not that explicit. In the Chemistry Department it was mentioned that the department keeps abreast with new developments alongside the teaching of the fundamentals of the subject. While no clear influence of the sustainability agenda was mentioned, it was acknowledged through the interview that all people are influenced by the sustainability discourse which makes them increasingly aware and sensitive to sustainability issues.

What we are trying to do is to make sure that we actually keep abreast with developments. Many of the topics, for example, that we might teach in Chemistry curriculum today could well be very different from what might have been taught 25 to 30 or 40 years ago because the discipline is advancing all the time and new areas become more and more important, become contemporary issues and so our curriculum has changed in response to those, and green chemistry is an emerging area of interest, it's developing emphasis in terms of these contemporary issues and challenges so we kind of sponsor those as we are able to (P25,

<i>pers. comm., 14 February 2008).</i>
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In the Faculty of Pharmacy, the influence of the sustainability agenda was said to be an indirect influence (ascertained through an interview with the Dean). The faculty is directly guided by rules and regulations that pertain to the pharmaceutical industry. The Drug Administration and Medicines Control Council who are the regulators are the ones who are said to take cognisance of sustainable development issues in terms of, for example, environmental emissions to which the department must conform. The amendments by the regulators are taught to students at undergraduate and post-graduate levels and will have to be considered by students working in various institutions. According to the interview, this leads to an indirect influence of sustainable development agendas on the activities of the department. The courses thus change on an ongoing basis as the laws change although the fundamentals do not change that much.

4.5.1.2 Willing and able staff

In the Anthropology Department, mainstreaming of environment and sustainability was said to have been possible due to the willingness and ability of staff members to teach, supervise and research such issues. While in other departments, this factor can be inferred from the results of the sustainability assessment (staff cluster of indicators), it was however not directly mentioned in interviews as one of the factors that influenced or is influencing integration of sustainability initiatives in departmental activities.

The morphogenetic analysis in section 4.2 shows that willing and able staff are a crucial aspect of enabling agency that in turn creates structural elaborations for further emergence of sustainability initiatives. Section 4.2 also indicates the university's willingness to invest in such staff. In 1998 for example, there was one staff member in the Environmental Science Department but by 2008 the number had increased to five. Similar trends can be observed in the EESU and Community Engagement Division, both of which have a strong focus on sustainability issues.

4.5.1.3 Availability of suitable technology and market demand

The major factors which enabled the Biochemistry Department to move towards sustainability were described in an interview with the head of department as the availability of suitable technologies and the job market demand.

I feel we are ... rapidly moving towards sustainability and the disciplines themselves are uniquely situated, we have the technologies that can enable sustainability, particularly in terms of environmental clean up. ... I think that's where the work lies, and certainly from a future jobs kind of view that's where a lot of our students are going to find jobs, and they need to be trained now to be able to do that (p.16, pers. comm., 11 December 2007).

At the same time, students themselves were also said to have a very strong sense of wanting to make a difference and hence they want their research to have an application. There is therefore a drive towards sustainability enabled by student agency.

4.5.1.4 Availability of funds for research in sustainable development

While in the Biochemistry Department it was mentioned that mainstreaming is influenced by the global sustainable development debate, according to the interview, the biggest driver for this field was the availability of research funding in this area. The funders were said to be encouraging research in projects which are focussed on sustainable development.

While many of us would feel that we would want to do that, one of our major pushes is the fact that there is money, you know, there is research money for projects in that field. And I think that does encourage people to move in that direction (p.16, pers. comm., 11 December 2007).

Research funding for sustainable development related projects from outside funders is supporting sustainability research in many departments and research units at the university. Examples of these are the IWR, EBRU, ISER, the Faculty of Education, and Environmental Science Department among others.

4.5.1.5 Broadening the understanding of sustainability issues

Besides the fact that the Chemistry Department is influenced by the global sustainability agenda in mainstreaming sustainability issues, the other driver mentioned is that staff members were involved in projects which developed from a

realisation of the need to give students a broader view of the application of chemistry in society so that they would go out with ample information about the operations of the industrial sector. This subsequently led to sustainability issues being integrated in the curriculum. However, it was acknowledged that it is difficult to pin down or point out the important factors that influenced the mainstreaming of sustainability issues as they have developed over time. Morphogenetic analysis in section 4.2 shows that Environmental Education research broadened with time to include ESD while the Millennium Ecosystem Assessment and other sustainable development research initiatives have broadened research in the Environmental Science Department.

4.5.1.6 Responding to national and regional needs

In the Department of Ichthyology, the other influential factor besides the global sustainability agenda was said to be national and regional needs. The department is said to consider national needs which include alleviating poverty, looking at how best communities can use available natural resources to sustain livelihoods. Regional needs include responding to and promotion of SADC policies on fisheries and Food and Agricultural Organisational policies on responsible fisheries and aquaculture. This focus in the department has therefore led to high integration of sustainability issues. The department also promotes these policies in particular contexts usually through contract research.

The same factor was also mentioned in SAIAB in which the institute's educational structures are said to be based on a framework of increasing human understanding and involvement with the environment. The research projects the institute is involved in were said to be partly meant to advance an understanding of the processes of biodiversity (and not simply conservation) as will be discussed later (Appendix 5, case record 9).

The MESA Universities Partnership (section 4.2) in the Faculty of Education was also developed in response to the United Nations Decade of ESD and to the call for revitalisation of African universities (see chapter 2, section 2.3.8). The Cape Action for People and the Environment Conservation Education Project in the same department is in response to biodiversity conservation issues in the country (see the community engagement section in Appendix 5, case record 10).

4.5.1.7 Personal interest of individuals

The major factor behind the mainstreaming of environmental and sustainability issues in activities in the Faculty of Law was identified as personal interest (agency) of individuals. The interview found that Environmental Law was established by a lecturer who had expertise in that field hence it was due to that individual's interest and/or expertise. Agency was also found to be significant in other departments like History and is the factor behind some of the sustainability research by students.

4.5.1.8 Promoting sustainability patterns

A number of departments/units mentioned this factor but with specific reference to the context of their work. Part of the focus of the Faculty of Pharmacy was said to be promoting sustainable health care.

I suppose if we improve the quality of health care and are able to encourage people to stay in the public health system then you are providing a sustainable health care system (P24, pers. Comm., 18 February 2008).

This is therefore one of the factors influencing the department to have a sustainable development dimension in their activities.

In EBRU, some of the influential factors were identified as the sustainability of large numbers of people, intensive industrial production and seriously threatened environments, a mix of socio-economic and ecological issues.

... what we look at is a system that we can bring to bear that deals with all three of those triple bottom line items, that will give us, deal with environmental problem, deal with social sustainability and in fact do some form of economic sustainability based on an issue like water treatment. ... the underpinning thing entirely would be driven by sustainability criteria (P7, pers. comm., 26 November 2007).

In SAIAB research projects were also said to be very much about sustainability of the natural environment and biodiversity and this was also apparent in the institute's mission:

To be an interactive hub focussed on serving the nation through generating, disseminating and applying knowledge to understanding and solving problems on the conservation and wise use of African fishes and aquatic biodiversity.

It was also established through content analyses that the majority of projects in SAIAB are directed primarily towards answering conservation and management related problems.

Promoting sustainability patterns is one of the factors behind the Cape Action for People and the Environment Conservation Education Project in the Faculty of Education which focuses on biodiversity loss in one of South Africa's most significant biodiversity hotspots; and the educational quality research.

4.5.1.9 Implementing the university's Environmental Policy

This factor is said to have become important after the university established its Environmental Policy in 1998. The existence of the policy influenced staff and students to begin thinking of ways of implementing it as shown by initiatives in the Environmental Science Department, the Estates Division, the Faculty of Education among others. This is said to be coupled by the belief in environmental responsibility by the Rhodes community.

<i>... we believe in being environmentally responsible and I think at the end of the day that what's driving us (P4, pers. comm., 20 November 2007).</i>
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4.5.2 Approaches used in mainstreaming sustainability issues at Rhodes University

Evidence from the data shows differences in ways in which dimensions of sustainable development issues are integrated in departmental or research unit activities. In only a few departments/units was there evidence of all the three main dimensions (i.e. the ecological, social and economic dimensions) in the department/unit's functions and operations. In most of them, only one or two dimensions were integrated showing strong and weak concepts of sustainability. The ecological dimension was the most popular while the economic aspect was the least popular (Table 4.1).

Table 4.11 Aspects of sustainable development integrated in departmental activities

Department	Major sustainable development aspects
Accounts	Economic
Management	Economic
Anthropology	Social
History	Social
Biochemistry	Ecological
Chemistry	Ecological
Environmental Science	Ecological, social, and economic
Geography	Ecological, social, and economic
Ichthyology	Ecological
Education	Ecological, social, and economic
Law	Social and ecological
Pharmacy	Social and ecological
EBRU	Ecological, social and economic
IWR	Ecological and social
SAIAB	Ecological and social
ISER	Social, economic and ecological

The aspects outlined in Table 4.11 represent the major dimension(s) of sustainable development dealt with by each department. While the other dimensions not indicated in each case may also be addressed, it is to a lesser extent.

In terms of approaches to sustainability, these are closely related to the aspects of sustainable development that are mainstreamed in a department or unit. The Environmental Science Department for example, which has the three pillars of sustainability integrated in its core activities, has an integrated or holistic approach to sustainable development issues.

Sustainable futures is the ... conscious trade off between social, environmental, ecological, it's what we teach and that's why we are here. So we don't have a particular economic focus, we don't have a particular social focus, we don't have a particular ecological focus, we put these issues together (P23, pers. comm., 13 February 2008).

Its curriculum has an interdisciplinary perspective with all their courses addressing all the major dimensions of sustainable development, that is, social, economic and ecological issues. Environmental Science is open to all faculties and hence, even though most students are from the sciences faculty, the department draws students from humanities, commerce and law. Students from any of the faculties were also said to have the choice to major in Environmental Science from their second year and the department is not particular about their background.

In most of the departments and units, reductionist approaches (when seen in relation to a strong mode of sustainability as described in chapter 2, section 2.3.3) are used where only one or two dimensions of sustainable development are mainstreamed. In the Anthropology Department, evidence from content analysis shows that the department places people at the centre of its activities and addresses other sustainability issues as and when they positively or negatively affect human well-being. The same can be said for the History Department and the ISER (while ecological issues are also addressed in ISER, it is not at the same scale as socio-economic issues, see Table 4.7). The following extract is from an interview with the director of the ISER.

I think for us the environmental question isn't just about birds, bees, trees and the quality of water or whatever. It's about people, it's first and foremost about people. We in fact even had a programme called People and Livelihoods as one of our research clusters. We don't use that label any more but a lot of the work we do is related to the livelihoods of people because that comes first. ... a lot of the ecology debates are about whether the environment comes before people, but we say we can't do the one without the other if you want to defend the environment you have to defend the lives of people, you have to put the social justice issues first (P21, pers. comm., 24 January 2008).

Putting people's well-being first shows that the departments/units are addressing sustainability primarily from a social angle. Even though to a lesser extent, both departments also integrate other sustainability dimensions, they only do so as far as they affect and interact with human well-being.

Ecologically oriented departments promote the ecological welfare of the physical environment and then deal with only those social and economic issues which affect the ecological well-being of the environment. An example is the Ichthyology Department which is ecologically oriented but addresses socio-economic dimensions of sustainable development with a view to promoting the integrity of fish and fish environments. EBRU, IWR and SAIAB operate on more or less similar premises where their main focus is ecological sustainability and then bring in the human dimension in terms of effective management and harvesting of the ecological resources of concern. The sustainability dimension of major concern in IWR can be inferred from the following statement from an interview with the director of the institute.

... the institute is an interdisciplinary group which focuses on hydrology, ecology and environmental water quality (P8, pers. comm., 29 November 2007).

It was also mentioned in an interview with the SAIAB director that the main aim of the institute was sustainability of the environment and biodiversity.

Within the sustainability paradigm one accepts, for example in fisheries and fishing activities that some of the research will have an economic benefit, but that is not our motive around this. ... the institute is primarily focussed around non-economic issues, non-direct economic issues, in other words we are not into research whose primary aim is for economic benefits. The primary aim is sustainability of the environment and sustainability of biodiversity (P22, pers. comm., 04 February 2008).

It was later established through the same interview that interlinkages between these ecological issues and social issues were considered important in finding solutions to sustainability challenges.

... if we just focus on people and not the environment you would find that, because it's an unholistic approach, that something would not work. When you see people as part of the system and not separate from the system, is when you start getting the solutions, ... healthy people are dependent on a healthy environment, and a healthy environment is dependent on healthy population and communities, ... where the people side is in bad shape, for example overcrowding, bad health system and so forth, you have got to work on those issues as a priority if you want to sustain the environment. You can't expect people under those circumstances to respect the environment. However, if you start ... saying healthy people depend upon a healthy environment and you link them in an ecological way, you start to get the right solutions to the problem. ... you must see people as part of the environment and all as part of the solution (P22, pers. comm., 04 February 2008).

Accounting and Management are the only two departments from the study sample with a focus on economic issues. Sustainability issues integrated in the Accounting Department are those issues which affect the financial well-being of companies. In Management, the nature of community engagement work was said to be focussed on profitability and equality in terms of wealth. Both departments therefore use an economic approach in addressing sustainable development issues.

The way departments/units at RU approach sustainable development issues is so varied and this seems to be due to differences in appreciation of the dimensions of sustainable development. Variations could also have resulted from differences in the nature of the disciplines in terms of accommodating such issues. The disciplines seem to be influencing the kind of issues to be addressed depending on whether their core focus is related to ecology, sociology or economics thus allowing for particular approaches in addressing sustainability issues. This situation does not indicate how best to approach issues of mainstreaming sustainability, or what

sustainable development issues are relevant and/or a priority in the university's context as it merely gives an indication of how various disciplines may approach sustainable development. This study therefore applies systems thinking as a conceptual framework to establish priority sustainable development challenges in the case of RU (see chapter 5), and proposes how the various disciplines could respond, drawing on insights gained from the diversity of responses as shown by this data.

4.5.3 Obstacles to mainstreaming activities

4.5.3.1 Resources

One of the obstacles to mainstreaming environmental and sustainability issues in departmental activities was said to be a shortage of resources (see Appendix 5, case records 8, 13, 15, 21, 22). Inadequate human resources were mentioned as the major reason why the Accounting Department was failing to focus on and integrate environmental and sustainability issues in their activities.

We are under resourced at the moment, we are under-staffed and we are standing just to keep the basics covered in the department; there is no way any of us are in a position to undertake additional work of this nature (P12, pers. comm., 5 December 2007).

In the Geography Department, shortage of human resources was also mentioned as one factor negatively affecting sustainability initiatives. The department was in need of a field worker (interpreter) to assist with community projects.

Shortage of financial resources was mentioned as a significant constraining factor in implementation of environmental and sustainability oriented developments at the university by the Estates Division.

I think that whilst there has been a willingness to explore environmental best practice and sustainability in our projects, the implementation has been a challenge, because there is a number of issues, financial implications in some of them (P4, pers. comm., 20 November 2007).

A good example of a sustainability initiative being affected by finances, mentioned during the interview, was the use of solar energy. This was said to be expensive in the short run and hence difficult to justify economically though benefits will accrue with time.

In the EBRU, the major problem was not given as financial problems per se but was said to be that of securing a consistent supply of funds.

I think that the real problem is probably securing a consistent supply of funds from funding agencies (P7, pers. comm., 26 November 2007).

Time limitations were mentioned as one of the major obstacles affecting the operations of the Environmental Committee as members of the committee have other demanding duties.

... a lot of them (staff members) are ... highly involved and busy with other things on campus because they got their normal on campus jobs. It ... leaves very little spare time for them (P5, pers. comm., 21 November 2007).

The newly employed Environmental Officer was also working on a part-time basis.

... it's a very part time and very temporary thing. It's one day a week and the post has just been reoffered to me for another 6 months until June next year for two days a week. So just bear that in mind that those are the time constraints (P5, pers. comm., 21 November 2007).

The other related challenge mentioned in SAIAB was the issue of capacity within projects in terms of human resources, skills, physical resources and financial resources to sustain and ensure continuity of the projects that they initiate in the community.

... we can't just go and deliver a good and then pull out, you actually have to sustain your effort at different levels over a long period of time (P22, pers. comm., 04 February 2008).

4.5.3.2 Conventional disciplinary structures

Some departments and faculties follow structured curricula which are mandated by specific governing bodies and, for that reason, there is no flexibility in their courses to mainstream sustainability issues. Examples are the Accounting Department which is mandated by the Institute of Chartered Accountants and the Faculty of Pharmacy which is mandated by the South African Pharmacy Council. In both cases, the curriculum requirements were also said to be very demanding thus leaving no capacity to integrate environmental and sustainability issues.

Accounting: *the curriculum that we follow in the department just doesn't have scope to fit anything more in because the Institute of Chartered Accountants, their curriculum requirements are in fact far too big, ... in fact they have a task team ... at the moment trying to address ways to reduce their requirements because they agree now, after much concern has been expressed by the universities, that the curriculum has become too demanding and students can't cope with it, so there isn't space to fit anything else in (P12, pers. comm., 5 December 2007).*

Pharmacy: *It's a very structured course, it's not like a BSc or a BA where you can select majors in Mathematics or Biochemistry, Microbiology, and Economics; you can't do this mix and matching like the other subjects can do. So it's very difficult to have a one year course on Environmental Science when we have four years to get through a very crowded curriculum (P24, pers. comm., 18 February 2008).*

The morphogenetic analysis (section 4.2) however showed that opportunities for cross-disciplinary co-operation do exist and have been successfully mobilised in the university, mostly for supporting newly emergent programmes.

4.5.3.3 Keeping the fundamentals of the subject in focus

While some departments were not necessarily mandated by governing bodies and were mainstreaming environmental and sustainability issues in teaching activities, they still had to prioritise the basic requirements of their subjects. As a result, they choose emerging sustainability issues of relevance to their subjects and integrate them as long as they do not dilute their disciplinary focus. Good examples from this study come from the Chemistry and History Departments.

Chemistry: *green chemistry is an emerging area of interest, it is developing emphasis in terms of these contemporary (environmental and sustainability) issues and challenges so we kind of sponsor those as we are able to. We still have to teach the fundamentals of the subject (P25, pers. comm., 14 February 2008).*

History: *we are a History Department and in teaching History we try to cover many different dimensions of the human experience. If we were to overemphasise say sustainability, the environment, at the expense of other themes I think that would be inappropriate. ... We have got to deal as far as we can with the total human experience rather than just focussing on one aspect (P15, pers. comm., 10 December 2007).*

4.5.3.4 Lack of enthusiasm among some staff members

Interviews with members of the Management Department and Faculty of Pharmacy revealed a level of reluctance among staff members. The interviews established that environmental and sustainability issues were considered not to be part of what they were expected to do.

Management: *we don't sort of pay specific attention ... we don't regard that we should specifically emphasise sustainability projects ... those are the things which are ingrained in*

students which will come from all the courses that they do. ... that would probably be something from Environmental Science or something like that, certainly we don't emphasise it (P18, pers. comm., 13 December 2007).

Pharmacy: *We can't focus on something that is purely, ... it's not part of what we have to do (P24, pers. comm., 18 February 2008).*

4.5.3.5 Lack of awareness of sustainability issues

Low integration of sustainability issues in the Faculty of Law was also suspected to be a result of lack of awareness of environmental and sustainability issues among staff members.

We probably are not in our own daily lives as aware of sustainability issues as we should be (P9, pers. comm., 29 November 2007).

The same sentiment was mentioned in the Management Department where this study was said to be the first to mention mainstreaming of environmental and sustainability issues.

We are not sustainably aware, not in that way, ... I am, as a financial manager not sustainably aware except in terms of, as I say, increasing gross domestic product, generating wealth, wealth creation for the community ... I do to a large extent emphasise wealth creation and how to create wealth but not really, you know, in terms of the flora and fauna; the so called physical environment (P18, pers. comm., 13 December 2007).

This was in spite of the existence of an innovative environmental and sustainability programme in the Faculty of Commerce (the Masters in Business Administration in the Investec Business School, see section 4.2) indicating potentially poor communication on sustainability initiatives across the Faculty

In SAIAB, this problem was mentioned in relation to execution of projects in the community. Sustainability as a concept was said to be a difficult concept especially in the African continent.

Inadequate information about sustainability issues can also be inferred from the results of Part A of the USAT where some of the sustainability initiatives seem not to have been considered in rating indicators. An example is the Department of Accounting in which indicators under the curriculum cluster were rated 0, yet from content analysis it was established that there was some sustainability content (a course on Ethics). This may also relate to the conception of sustainable development

that was used in scoring indicators. During the interview in the Faculty of Law, there was an emphasis on the ecological dimension of sustainability. As a result only research in Environmental Law was considered in responding to the interview yet the 2007 Rhodes University Research Report outlines other sustainability related research outputs in the areas of social justice, homelessness and racial discrimination among others (see Appendix 5, case record 11). The Faculty of Pharmacy's rating of research and service indicators also seems to have left out the credit service learning programme which has a focus on sustainable development related issues.

4.5.3.6 Lack of institutional commitment

It was also established through interviews that some problems pointed towards a lack of institutional commitment to promote environmental and sustainability projects. In the Environmental Science Department, the university was said to have failed to respond to a suggestion to implement a simple water saving mechanism.

We did ask, two years ago, for the toilets in the building to be; for the water from the wash-basins to be linked to the toilet, it's a quick job, it wouldn't take long but it still hasn't been done. The water used to wash your hands will then be used to clean the toilet (P23, pers. comm., 13 February 2008).

In the Department of Geography, the interview revealed that the university did not respond when they requested the creation of a position for a field worker to assist with their community projects which are mostly in the environmental and sustainability area.

We had a person working as a research assistant, who was a field worker, field interpreter, who had worked on a number of our community type research projects and I wanted to get him a position within the university so that he could be someone we could call on and have a guaranteed salary and I was told the HR (human resources) would look at this and they never actually followed it up (P20, pers. comm., 22 January 2008).

While these issues were raised, the morphogenetic analysis in section 4.2 shows that the institution is prepared to support efforts towards sustainability, but that such support is carefully allocated after substantive review processes. Examples are the cases of the Environmental Science Department, the EESU and the Community Engagement Division which were all allocated additional staff and resources after reviews were commissioned and undertaken.

4.5.3.7 Acceptance of sustainability initiatives by targeted beneficiaries

This constraint was mentioned during an interview with the director of SAIAB where it was said that sustainability concepts could not be forced on people.

... you can't impose concepts of sustainability on people or on nations. It's got to be something that the people and nations themselves must wish and require, it must be a willing partnership, a free and open association. If it's a force it's temporary and it's short-term, it will never be sustainable (P22, pers. comm., 04 February 2008).

The morphogenetic analysis in section 4.2 shows that emergence of sustainability initiatives at institutional level takes time.

4.5.3.8 Problems of continuity of student initiatives

At RU there is a problem of the dying away of students' environmental societies. Societies tend to be short-lived and die down as the group that initiated them finish their studies and move on. This is because a following for such initiatives is built mostly around students in the same stream. This leads to a lack of continuity of projects initiated by such societies. This problem was attributed to a lack of leadership building in these societies. One way of addressing this was through ongoing Environmental Science Department support for the Environmental Councillor in the Student Representative Council. This creates a more substantive structural framework for student involvement.

4.5.4 Suggestions for improving mainstreaming at Rhodes University

During interviews a number of suggestions were made regarding ways of improving mainstreaming sustainability in RU functions and operations. Some of the suggestions were targeted at addressing the obstacles identified in section 4.4.3 while others represented original initiatives. Some suggestions were specific to departments while others were more general and at the level of the university. Following is an outline and discussion of these suggestions.

4.5.4.1 Additional resources

In the Accounting Department, the very low integration of sustainability initiatives was attributed to shortage of resources. As a result, provision of additional resources was suggested as a way of improving mainstreaming. While the Department of

Ichthyology has a high integration of sustainability issues and this was stressed during the interview, the only way of extending the sustainability activities was said to be increasing human resources in the department so as to extend the current sustainability projects. In the Faculty of Law, continuity in terms of Environmental Law staff was suggested as one way that could help ensure its continuous engagement with sustainable development issues. As shown in the morphogenetic analysis in section 4.2, allocation of additional resources significantly enhances possibilities for structural elaboration into sustainability initiatives.

4.5.4.2 Enhancing sustainability focus in core activities

In the Management Department there was a feeling that room could be created for take-up of sustainability issues through setting aside time for sustainable development tutorials.

They (sustainability issues) probably could be incorporated into the existing course, in other words if you have a module which has got 30 lectures, you might take it as a tutorial in say 5 lectures but certainly not specifically dedicated to sustainable development. It would just be part of the general lecture course (P18, pers. comm., 13 December 2007).

Another possible strategy to consider which is emerging from the morphogenetic analysis (section 4.2) is communication and/or collaborative work within the Faculty of Commerce as there is already a sustainability programme in the Investec Business School.

4.5.4.3 Addressing community needs

While in IWR further encouragement was said to be necessary in community engagement, an approach that addresses both sustainability issues and the immediate needs of the community was suggested. This may suggest the need for a re-definition of sustainability challenges.

... community engagement is probably the one that needs further encouragement ... I think it's quite difficult to get sustainable development onto communities' agendas when they have got so many other issues, I mean this is part of the problem within municipalities that they are so concerned at the moment with lack of capacity, service delivery and so on, but to get them to actually focus from the unsustainable development, it's difficult, it's not a concern of communities, their concerns are where their next meal is coming from or whether they have got a roof over their house, and to get them to focus on sustainable development is maybe quite difficult. ... Rhodes has to get into the community more and make people more aware of the involvement, but I think they have to do that in a way which is cognisant of the community's issues as well. Essentially poverty is a much bigger issue with the community.

They haven't got a sustainable lifestyle at the moment ... until they have got a sustainable lifestyle they are probably not actually going to worry ... much about sustainable development issues. What they are concerned about is where the next meal is coming from or where their next job is coming from. ... I think, you can look at an example of say rural Eastern Cape, the former Transkei, if you went there and tell everybody please try to stop cutting down trees from the environment because virtually the trees will sustain the growth until they are going to prevent soil erosion, they are going to say to you yah but what am I going to cook my next meal on (P8, pers. comm., 29 November 2007)?

The same sentiments were expressed in the Faculty of Pharmacy with a slightly different orientation however. The suggestion was that instead of changing the focus of what they teach they can make people more aware of some of the sustainability issues as they pertain to Pharmacy. While they would need help in defining issues, aspects like health promotion, human rights (e.g. the right to water) and sanitation are facets they could explore.

The other potential area of improvement was said to be choosing certain sustainability issues which are part of the postgraduate research area and making them part of the undergraduate curriculum. This could be done through identifying aspects, for example, specifically related to Pharmacy and Pharmaceutical Practice and seeing how they can be built in at lower levels.

4.5.4.4 Making it possible for students to major in Environmental Sciences

In the Chemistry Department it was mentioned that there is need for flexibility in planning the department's work so as to allow students to major in both Chemistry and Environmental Science. At the time of the study this was not possible due to timetable clashes.

4.5.4.5 Making sustainability more upfront in university activities

This suggestion was made in the Biochemistry Department with particular reference to a number of initiatives at the university. The first suggestion was the need to make sustainability more obvious in stated outcomes for courses and more explicit in terms of practical components. Though students have been working in that area already, they do not necessarily see it as sustainability.

I think sustainability is a huge part of what we do, it's just not upfront, and I actually think one of the major things we can do is to add text to that effect on how, when we list the outcomes of our courses, that we want our students to be aware of the need to develop sustainable practice (P16, pers. comm., 11 December 2007).

Encouraging more debate would also make students think about what they are doing and the consequences of their actions before they go ahead and do it.

4.5.4.6 Introducing sustainability into the university vision and mission statement

The need for introducing sustainability into the university vision and mission statement, to state that the development of the university will be in a way that recognises sustainable development; and that the university will endeavour to minimise its impacts on the environment, was also stressed during the interview with the Biochemistry head of department.

4.5.4.7 Creating environmental awareness

In terms of creating environmental awareness among staff members, one suggestion was that it was necessary to inform people to be involved through creating incentives. Heads of departments, people who are on teaching and learning committees in their departments and even students were said to be the appropriate persons to drive the process.

4.5.4.8 Competitions

It was also suggested that competitions could be used to promote sustainability among students. Examples of competitions suggested include:

- Coming up with ways in which RU can more efficiently utilise or save energy on campus,
- Rewarding the residence that uses the least amount electricity in a year, or the one that recycles its water or uses the least amount of water or the residence with the least number of leaking taps.

4.5.4.9 Improving individual sustainability practices - living by example

This suggestion was directed at individual student activities outside the classroom and was mentioned in Environmental Science. In terms of improving their practice, the feeling was that in teaching and research, everything they could do was being done and students did very well in class and in their researches and were able to

engage in sustainability debates. However, there was room for improvement in terms of encouraging students to critically look at practices in their own lives and at home.

It just pains me to see students who just sit around in our internal debates and debate sustainability, but they don't recycle their paper, they don't take their glass anywhere, so they don't internalise the things that their research project is all about or the course that they have just passed. They don't internalise that for their own purposes (P23, pers. comm., 13 February 2008).

It was suggested that people should live by example and use multiple strategies to create a more enabling environment around them.

4.5.4.10 Promoting responsible behaviour

Universities in general were encouraged to practice what they preach and to be exemplary. They were accused of tending to tell other people how to do things which they themselves are not good at. Thus faculties were encouraged to look at their sustainability practices and improve them, for example, issues of energy management as sometimes lights were left on all night or throughout the weekend.

In SAIAB it was suggested that sustainability had to be encouraged so that it becomes a way of thinking or the prevailing paradigm for success to be realised.

... sustainability is a paradigm, it's a way of thinking and doing, ... it got to become part of your existence. ... the paradigm of continuity, of sustainability of something must become embedded in your thinking at all times, only then will it be a success. ..., sustainability must be built in to everything you do from the beginning ..., and when it becomes second nature you can stop worrying, it will be sustainable (P22, pers. comm., 04 February 2008).

At the same time, it was said to be important for people to start looking at themselves critically without only pointing fingers.

There is need for much more self-reflection at the individual level, much more self-reflection on what they are doing and how they are doing it (P14 pers. comm., 07 December 2007)?

4.5.4.11 Strengthening the understanding of basic processes underlying sustainability

In the Geography Department one of the suggestions made was to strengthen the understanding of basic processes underlying the understanding of sustainable development issues rather than increasing the amount of teaching on sustainable

development. This was said to, for example, “give students a better understanding of the basic climate processes so that they can then interpret global warming; they can be more critical about it” (P16, pers. comm., 11 December 2007).

4.5.4.12 Collaboration between departments

Collaborations between departments was recommended during an interview in the Faculty of Law. For example, it was suggested that the Environmental Law person could collaborate with people involved in sustainability issues in other departments at the university e.g. Zoology, Biochemistry or Chemistry. Such a network was believed to be in a position to sustain what they are doing as a faculty.

At the moment our focus is primarily teaching one course in the LLB curriculum but, for it to become sustainable and to develop it into the next level, to get more masters students in etc., one would have to start developing interdisciplinary research network, to provide that node around which one can work (P9, pers. comm., 29 November 2007).

This was also suggested in EBRU where an Environmental Forum was recommended to promote take-up of sustainability issues.

... one of the best things we could do is to have an Environmental Forum on the university where the people who are involved in environmental studies meet regularly and the whole sustainable development topics and ... sustainable development in education and all that type of staff would automatically be a subject of ongoing debate within that community (P7, pers. comm., 26 November 2007).

A platform for such collaboration is already there at the university in the form of the Environmental Committee. The morphogenetic analysis in section 4.2 shows the value of such collaboration, but reveals that only a few departments are substantively engaged in cross-faculty collaborations with regard to sustainability initiatives in the university. What seems to be necessary therefore is inclusion in the committee of members from all the faculties and research units at the university instead of only those with explicit sustainability focus in their work.

The other suggestion was that of establishing a task team responsible for sustainability issues at RU and in this case, the skills for doing the work were said to be there at the university.

4.5.4.13 Implementation of the University's Environmental Policy

It was also mentioned in one of the interviews that there was need for fully implementing the university's Environmental Policy. The policy was said to be a good policy, but was not being fully implemented. The policy however emphasises mainstreaming of environmental rather than sustainability issues in research, curricular and other campus operations (Appendix 1) probably due to its emergence framework, as outlined in section 4.2.

4.5.4.14 Contributing to the global debate

One suggestion which was mentioned in the Faculty of Education is for the university to improve its sustainability through contributing to the global sustainability debate. The morphogenetic analysis in section 4.2 shows that this is happening but again appears to be limited to a few departments only and, at regional level, to the MESA Universities Partnership initiative only.

4.5.4.15 Improving sustainability in operations and other functions

One recommendation given by the Environmental Science Department was to encourage the university to adopt a policy of printing on both sides of the paper, and with two pages on each side in student laboratories where there is a considerable amount of printing. Rhodes University through the Information Technology Division uses approximately 4000 reams of paper a year.

In operations, several suggestions were made as follows:

1. Efficient power monitoring and power shedding. This was said to be a recommendation of students' surveys.
2. Use of motion sensors in buildings to switch off the power when there is no movement.
3. Encouraging research on alternative lighting systems.
4. Implementing Environmental Management Systems more effectively to effect, not only awareness but cost reduction.
5. Adopting green building design as a basis for Rhodes University design criteria rather than designing a building first and then seeing how

environmentally friendly it can be made - being upfront right from the design itself.

6. Being more proactive and entrenching the Environmental Policy in organisational goals and missions, from the physical campus planning point of view as well as from a strategic planning point of view; so as to take cognisance of the environment at the first level rather than somewhere in the process.
7. Rewarding departments by giving them an element of their funding based on their sustainability footprint, through considering the amount of energy they use, the waste they release, the amount of environmental research going on and Environmental Education programmes they offer.
8. Facilitating educational programmes to enhance information flow to people.
9. Committing resources to the establishment of a waste-water recycling project and the use of recycled water for irrigation purposes.
10. Committing resources to and converting university vehicles into bio-diesel, and to supporting the bio-diesel initiative in Grahamstown.

Suggestions were also made on how the university could implement sustainability during an interview in the Human Resources Division. Notable among the suggestions are the following:

- goal definition – defining what the university wants to achieve,
- objectives – what the university will do,
- capacity development and education – developing the ability of people,
- developing a supportive culture among people,
- infusion of sustainability into all aspects of business,
- developing skills in students, and
- mapping out the activities the university is going to be involved in.

The role of the Human Resources in all this was said to be in terms of how the university recruits, promotes and develops staff members, making sure that the issues get infused through the people side of the business. The Research Office will then be responsible for infusion into research programmes, etc. Also suggested was the need to start by 'selling' the idea to the top management and to have people who will be responsible for championing it. This proposition implies a more systematic

way of infusing sustainability in university operations (see chapter 6 where systems approaches to mainstreaming are discussed).

4.6 CONCLUSION

This chapter has presented an empirical description of sustainability practices and performance at RU. It also went beyond description to outline the processes and flows populating the actual level of reality, which are influencing sustainability initiatives at the institution. This was done through elaboration of approaches used in mainstreaming and factors enabling and constraining sustainability initiatives at the institution as well as through morphogenetic analysis. The chapter also outlined suggestions that were made during interviews for improving mainstreaming at the university, linking them to insights from the morphogenetic analysis in section 4.2. While more could have been said if the study had looked at all the departments/divisions/units (this was not possible due to resource limitations), this account provides a relatively complete picture of the nature of initiatives and the associated processes and flows as was confirmed by the theoretical saturation of data categories.

In the next chapter (chapter 5), the sustainability picture and the associated events are recontextualised within a different framework to enable deeper explanations. As mentioned in chapter 3, concepts of the systems thinking approach are employed in this process.

5 RECONTEXTUALISING SUSTAINABILITY INITIATIVES AT RU WITHIN A SYSTEMS THINKING FRAMEWORK

5.1 INTRODUCTION

This chapter discusses the results of the study described in chapter 4 through employing systems thinking models and concepts. The discussion in chapter 4 was centred on sustainability activities within the RU system without relating these to the environment. This chapter is aimed at analysing and describing the RU education system within the framework of systems thinking and makes use of systems models as lenses to broaden the understanding of sustainability initiatives at the university. These include the systems-environment model, the functions/structure model (Banathy, 1992), the nesting systems model and the model representing interrelationships between the operational dimensions of an education system (Sterling, 2004) (see chapter 3).

The purpose of this activity is to determine the relevance of RU's responses to sustainability within the context of its environment. While the main functions and operations of universities found to be instrumental in responding to sustainability issues were identified as teaching, research, community engagement and operations among others, of concern here is the relevance of sustainability initiatives in place at RU (see chapter 1, section 1.2 and chapter 2, section 2.3. for sustainability issues of relevance to Rhodes University's context). The chapter therefore draws significantly from chapter 4 besides the case records.

This recontextualisation gives a new frame of reference and thus allows for deeper insights into phenomena. It facilitated determining the extent to which sustainability initiatives at RU are responding to both contextual sustainability challenges in the Makana District in which it is situated and the contextual sustainability issues (discussed in chapter 2) of relevance to South Africa. It also enabled a deeper exploration of key sustainability themes associated with the roles of universities (research question 2, chapter 1). The mode of inference employed is abduction where both undercoded and overcoded abduction (Danermark et al., 2002) were engaged (explained in chapter 3, section 3.5.6.3). The chapter first builds a picture of the university system and its components in relation to its environment and then goes on to discuss the relevance of responses.

5.2 RU SYSTEM IN RELATION TO ITS ENVIRONMENT

The RU system in which the sustainability initiatives presented in chapter 4 are taking place is an open system which influences and is influenced by its environment as shown in section 4.2. This makes it necessary to seek for explanations of occurrences both from within and outside the system. Figure 5.1 is a model of the relationship between RU and its environment which is based on Banathy's (1992) systems-environment model and is compared to the nested systems model by Sterling (2004) (insert). Education is therefore presented as a subsystem of society, a relationship which Sterling (2004) argued that facilitates holism in the way higher education institutions respond to unsustainability (Chapter 2, section 2.5). Note that the functions of the systems defined in the model only relate to sustainable development.

The university (RU) is modelled as a nested open system which receives input in the form of contextual sustainability challenges and defined roles in sustainable development from its immediate environment. Through mainstreaming activities, that input is transformed into initiatives which are fed back to the systemic environment and at the same time, has potential to inform the mainstreaming practice at the institution. There is also communication between the systemic environment and the overall environment, which suggests a possibility for explaining what takes place within the RU systems to be located in the wider overall environment.

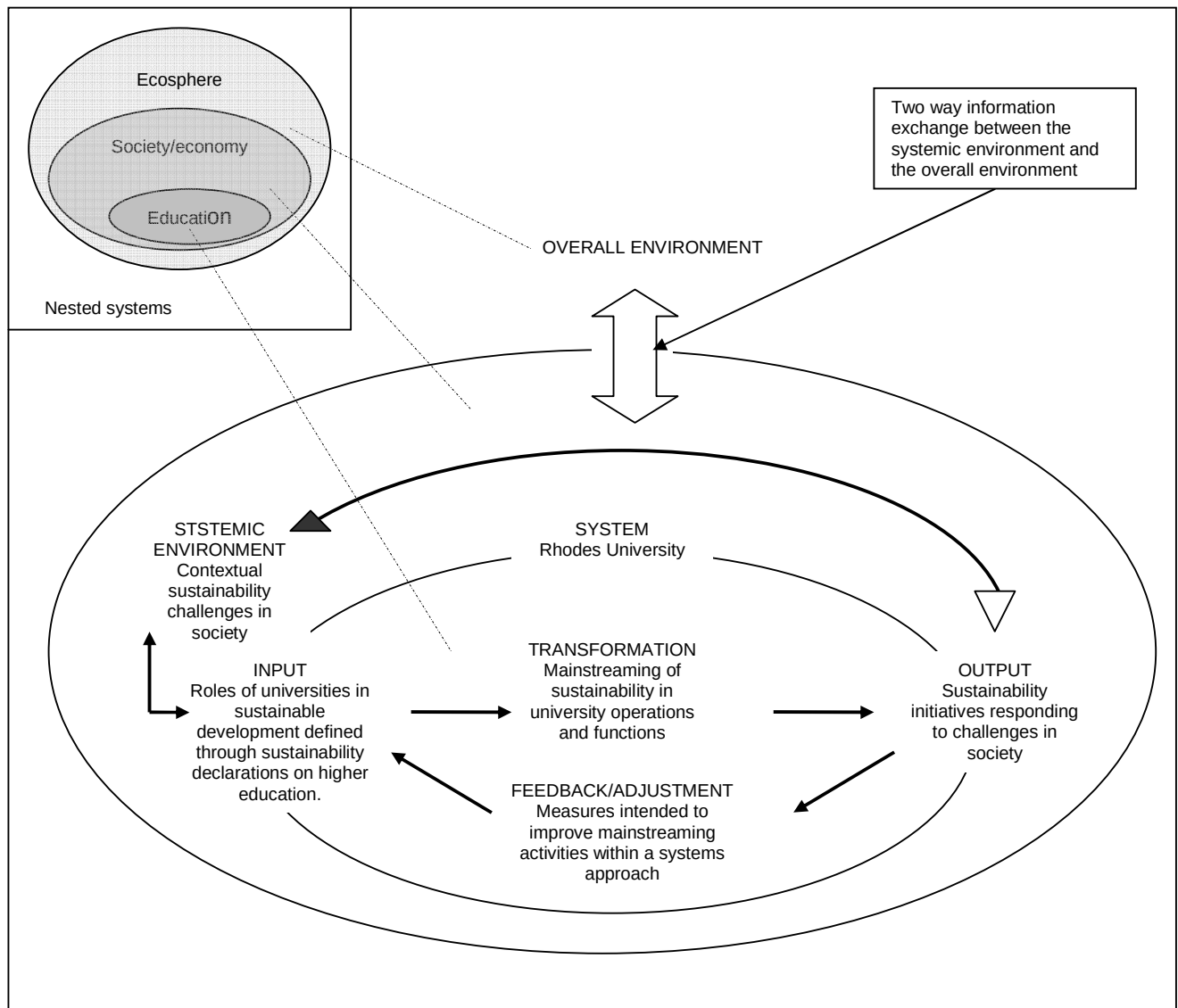


Figure 5.1 Rhodes University system in relation to its environment

5.2.1 Systemic environment

In terms of environmental expectations, needs and policies (Banathy, 1992, Walton, 2004), the systemic environment is characterised by, among other things, a variety of challenges threatening the sustainability of society. Sustainability challenges in the context of Makana District, in which the university is located, were summarised in chapters 1 and 2 (section 1.2 and 2.3.5.2 respectively). These are as follows:

- low incomes, unemployment and lack of skills,

- malnutrition and food security,
- access to basic services,
- HIV/AIDS and health,
- educational quality and access,
- sanitation,
- declining water quality,
- unsustainable exploitation of resources,
- increasing pollution, declining air quality with negative impacts on health, and
- land degradation.

These societal challenges represent issues in the systemic environment of the university, to which RU is expected to respond. In the context of Rhodes University, it is important to note that most of the identified problems relate to the formerly disadvantaged Grahamstown East and hence it is the primary focus of most of the university's sustainability initiatives (see chapter 4, section 4.3.3), although their sustainability contributions reach the wider society to include policy issues and provincial, national and international activities.

5.2.2 Input

The existence of and emergent, controversial and contested nature of sustainability challenges in society led to the emergence of global debates and deliberations on how to solve them. As discussed in chapter 2, universities were also identified as having a role to play in seeking solutions and their responsibilities were defined. These key themes/roles of universities shape the sustainability input which is communicated to the RU education system and is in the form of information/expectations or guidelines, policies and research. They are communicated to the system through breaks in the systemic boundary and through feedback loops involving reflexive engagements of staff and students in the university.

Some of the roles are generated through the university's own research initiatives, for example, involvement of the Department of Environmental Science in Resilience and Millennium Ecosystem Assessment (www.millenniumassessment.org) research which is developing the concept of sustainable development (see also chapter 2, section 2.3.4). The EESU is actively involved in the Decade of Education for

Sustainable Development activities which include developing ESD concepts and approaches including the MESA Universities Partnership (see Chapter 4, section 4.2). Research in the IWR is also shaping water policy and practices in the country (see Appendix 5, case record 14).

For the purpose of determining the relevance of RU's sustainability initiatives in the context of Makana District undercoded abduction (chapter 3, section 3.5.6.3) was employed. Sustainable development issues in Makana were matched to initiatives at RU to determine how the university was addressing them.

Resources (human, materials or financial) were identified as a necessary input into systems (Banathy, 1992; Walton, 2004). At RU some external funding agencies were said to specifically fund sustainability related research. There are funded and self funded research units like the EESU and the ISER, in which research programmes which take up a considerable amount of financial resources have a strong sustainability focus (Appendix 5, case record 10 and 16 respectively). Available human resources in those institutes are also dedicated to sustainability work. In recruiting staff however, expertise in sustainable development is not part of the criteria (Appendix 5, case record 18). Staff allocations at the university are made after critical review processes, where a critical need for staff has been identified and fully justified (e.g. the allocation of more than 10 full time professional staff members to the EESU, Community Engagement Division and the Department of Environmental Science, see chapter 4, section 4.2). At the same time, the university's Research Office does not necessarily use sustainable development as a criterion for allocating research funding except where it is a requirement of external funding agencies. It was anticipated that in future there was going to be more funding targeted at sustainability research as the Department of Science and Technology, which is the main funding agency, identified and is emphasising research in critical areas of national well-being which include sustainability issues (Appendix 5, case record 19).

5.2.3 Outputs

Outputs in this study are the direct responses or outcomes that RU is sending into its environment. Since the challenges are varied and multi-faceted, mention is made of each of the challenges followed by a discussion of how RU is addressing it, and a

subsequent discussion of the relevance of the outputs. The focus of the study is limited to RU thus making it difficult to confidently ascertain adequacy as this may require including the systemic environment as part of the study. Some of the information discussed in the sub-sections below was also mentioned in chapter 4 especially its section 4.3.3 but, as mentioned in the introduction (section 5.1), is now being interpreted within the framework of systems thinking.

5.2.3.1 Low incomes, unemployment and lack of skills

Among the problems being faced in Makana (chapter 1, section 1.2) are issues of low incomes, unemployment and lack of skills for the current job market, especially among the youth. A number of initiatives at the university address these problems. The Management Department offers a course which is directed at the development of managerial skills.

... we certainly do interact with the local community and the municipalities and we do give them management development courses ... they are more management development courses, how to become more skilled in how they do their job (P18, pers. comm., 13 December 2007).

In the History Department, though community engagement links were said to be weak according to the interview, part of the focus of the Egazini Project is centred upon issues of job creation and community tourism. The Department of Ichthyology addresses these issues through the promotion of aquaculture and through its rural fisheries project which is aimed at promoting sustainable livelihoods for rural communities. The department focuses on livelihood opportunities, for example, utilisation of dams for fishing by rural communities in the Eastern Cape Province. The Department of Environmental Science is involved in community initiatives that deal with skills transfer in product development, marketing and client relations in projects based on natural resources targeted at income generation. In 2006, it supported the establishment and running of a community food garden using waste water treated via algal ponds.

While the EBRU's primary focus is treatment of waste water, the unit has also worked on a project aimed at beneficiation of waste water in job creation or wealth creation in the community. The project is targeted at communities with no other means of production like land, capital or skills but which can use treated water for production. The system is already in use in Johannesburg (Gauteng Province).

With reference to skills development, while the initiatives by the above mentioned departments/units (Management, Ichthyology, History and Environmental Science etc) are relevant, the expertise at the university is not being fully utilised. There are other relevant areas of expertise which the study established are not being applied due to resource related problems, for example in the department of Accounting. At the same time, some of the interventions may not be fully employing the available capacity, or could be expanded, for example in the History Department where the intervention is relevant, but only a single individual is involved which may possibly limit scope. With relevance to EBRU's project aimed at beneficiation of waste water, application has not been widespread despite this being a very relevant initiative.

5.2.3.2 Malnutrition and food insecurity

The ISER works in partnership with local farmers (Masifunde project) and Umthathi, a local NGO, to develop food gardens in the community. The Department of Environmental Science is also involved in community vegetable gardens initiatives and in addition, donations, e.g. of food parcels in the past. Students address these issues through Oppidans and other societies and clubs where they are involved in fundraising efforts in collaboration with the Centre for Social Development. They collect and distribute food and clothing donations.

The ISER and Environmental Science food garden initiative is relevant in Grahamstown's context given the problem of malnutrition and food insecurity. Food gardens also help supplement the low incomes in these communities. The EESU and Eco-schools support teachers to use the gardens as learning resources and for supplementing food security in school feeding schemes. However, there is information which points to water supply problems in the community (the Galela Amanzi Project by students is meant to avert water problems in schools in the community, see Appendix 5, case record 23). While it was beyond the scope of this study to establish whether water supply issues were impacting negatively on the community gardens projects, this may be one factor that may affect the sustainability of the project. The fundraising and donations approaches being used in some cases only alleviate the problems in the short term. This is because they do not address the root of the problems of malnutrition and food insecurity but only the symptoms. Such approaches are not holistic as they do not trace the problem to its root causes and

hence simplify reality through isolating problems, which does not cater for the complexity of the world where, for example, social problems can be emergent from the biological world as society is embedded in nature (Huckle, 2004), or from other structural factors as explained by Archer (2003). This would mean that solutions to such problems could lie in the biological world, or in other dynamics of the social world (i.e. the structural dynamics of poverty), which calls for holistic approaches offered by both critical realism and systems thinking.

5.2.3.3 Access to basic services

Some initiatives directly address problems of access to basic services (e.g. water, electricity), social justice and quality of life. The ISER deals with such projects which include community involvement. The institute's municipal services project directly informs the municipality on service provision issues. The Institute is also involved in quality of life studies in which social justice issues are addressed (see Appendix 5, case record 16). Social justice issues are also a focus of community engagement in the Anthropology Department in which one of the staff members was in the past, involved in evaluating projects, including those focussed on social justice, social welfare, health and education, for the Impumelelo Innovations Awards (Appendix 5, case record 3). The Faculty of Law reaches out to the community through the Legal Aid Clinic which has branches in Grahamstown and Queenstown which, among other things provides free legal services to poor people (Appendix 5, case record 11). In terms of addressing water supply problems in the community, as explained in chapter 4, there is an initiative to supply water tanks or taps in schools in Grahamstown East.

In the case of initiatives in the ISER, the study did not explore how these have helped address social justice issues through informing the municipality as this would have meant bringing into the study other social systems involved in sustainable development. All these initiatives are however considered to be relevant as they are dealing with current problems that the society is grappling with.

The morphogenetic analysis in chapter 4 (section 4.2) revealed a longer term relationship between the university and the municipality which started with a formal partnership agreement between the university and the municipality in the late 90s. The partnership was then extended to support the establishment of the Makana

Environmental Forum, a partnership to manage the Botanical Gardens which has raised substantial poverty relief funds of above ZAR20 million. It supported the development of fundraising proposals and research for a Local Economic Development and Social Development Framework which has most recently led to partnerships on local economic development issues and the appointment of a Municipal Environmental and Sustainability Manager to improve sustainable development and service delivery targets in Makana District.

5.2.3.4 HIV and AIDS and health

Also evident are a variety of initiatives targeted at addressing the problem of HIV and AIDS. HIV and AIDS and other health issues are a focus of some community engagement initiatives at RU. ISER works in collaboration with the Faculty of Pharmacy in the community around issues of administration of HIV and AIDS medication. As mentioned earlier, the Faculty of Pharmacy has a strong credit-bearing service learning programme which is part of the Pharmacy Administration and Practice syllabus. Through this programme, the faculty works with poor and disadvantaged communities where students assist with health promotion. The Faculty of Education is also involved in supporting the improvement of health in Makana District through curriculum work with teachers.

Only a few departments at RU were established through the study to be involved in community initiatives in HIV and AIDS and health issues. There might therefore be room for uptake of such issues by other departments. The university has commissioned a study to survey all departments to understand both direct and indirect contributions to addressing HIV/AIDS and health issues but results of this study were not available at the time of writing of this thesis. The same may be possible in the case of health promotion. However, in the case of health promotion by the Faculty of Pharmacy through service learning, all students undertaking their first degrees have to be involved in their fourth year as it is a credit bearing service learning exercise. Thus improvement in this area could only be in terms of looking beyond the faculty or probably infusion in other activities.

5.2.3.5 Education quality and access

Also identified as one of the sustainability challenges in Grahamstown/Makana area is educational quality and access where most of the schools in Grahamstown East

suffer from a variety of challenges characteristic of former black schools (including high teacher to pupil ratios, the absence of a culture of learning, see chapter 1, section 1.2) and hence have very low success rates. The majority of students from these schools fail to obtain minimum qualifications required for entry at RU. There are two major initiatives at the university which are directly targeted at addressing this problem. One of them is the establishment of the Extended Studies Unit by the university which offers bridging courses to these students for a year, after which, if they pass, they can be admitted to the university. The second one is the Makana Schools Partnership among the university and seven high schools in Grahamstown East, the Department of Education (DoE) and a teacher's union; which is targeted at addressing the quality of teaching and learning in these schools. The university is aiming to assist schools in this partnership by using its expertise to capacitate educators, by providing resources, and by tutoring and motivation of learners by students from the university.

Both these initiatives are relevant but while the Extended Studies Unit has been operating and helping students over the years, the Makana Schools Partnership programme is still in its early stages which makes it difficult to assess its possible future impact. However, if it succeeds, it will be one of the most comprehensive community initiatives at the university as it is intended to encourage credit bearing service learning in all RU departments through the partnership with local schools.

Besides these initiatives, there are a number of education-oriented community initiatives at the university that involve both students and lecturers. Students, through a volunteer programme, are involved in education projects in which they help to tutor learners in schools in the community. An example is the Volunteer Association of Students as Teachers outreach project which began in 2006. In this project Rhodes University students from a variety of science disciplines, teach and provide revision support to learners from numerous previously disadvantaged high schools in grade 12 Biology.

The Geography Department is involved in a teacher support programme in which it coordinated a series of meetings with Geography and Natural Science educators in Makana to help improve the basic skills of students entering the university to study Geography. The Chemistry Department is also involved in capacity building of

teachers and supports the provision of educational materials. In the Faculty of Education, there was intervention to provide resources where the department developed and continuously supports a computer laboratory at a formerly disadvantaged primary school in Grahamstown. The EESU is involved in Eco-Schools and the Schools and Sustainability initiative.

Except for the Grahamstown schools partnership, most of these initiatives are not mandatory but are based on volunteerism. They are therefore not systematic in terms of application of RU disciplinary expertise. As a result not all subjects in Grahamstown schools are facilitated and supported at the moment.

5.2.3.6 Sanitation

In terms of sanitation in Grahamstown, some residential areas are still using the bucket system (see chapter 1, section 1.2). Other stakeholders are currently involved in remedying this situation, and in addition, RU has initiated several attempts to address this problem. The Department of Environmental Science, at a small scale, assisted with the provision of funds to build toilets among other things.

The EBRU developed low cost sewage treatment systems which are appropriate for small rural or peri-urban communities. Even though such systems have not yet been adopted by the Grahamstown municipality for use in townships where people still use the bucket sanitation system, the development of such systems directly respond to community needs. This is one example of how sustainability initiatives do not guarantee access to such facilities in society. For such initiatives to bear fruit there is need for their acceptance by responsible authorities and possibly collaboration between them and the university. This calls for a holistic approach through coordination of efforts between systems.

5.2.3.7 Tree planting and recreational needs

Some of the student initiatives through student societies including GRASS, an environmental society, address tree planting and recreational needs in Grahamstown. An example is the “Adopt a Tree” project explained in Chapter 4 (section 4.4.3). In 2008, Arbor Day celebrations were intended to take place in the community with plans to hold a planting campaign. Departments are also involved in such initiatives and in 2006, the Environmental Science Department donated

indigenous trees for the national Arbor week to local schools. The EESU also supports the Millennium Tree Planting project in Makana.

Even though the relevance of these initiatives is obvious in that they are directly responding to one of the identified community problems in Grahamstown, the university only helps when it can, hence there is a high chance of only partially addressing the problem. However, there are other community organisations which are actively involved and some of them collaborate with RU, for example, Umthathi.

5.2.3.8 Water quality and ecosystem health

The DEAT (2006) identified declining water quality and ecosystem health as one of the sustainability issues in South Africa. At Rhodes University the EBRU (Appendix 5, case record 13) is involved in water quality issues in the Witwatersrand area where one of their projects is focusing on multiple cycles of water use. The area is water scarce but is responsible for about 60% or 70% of industrial production in South Africa. In the same area is the Vaal river system, a minor river, which, according to the interview, is being polluted by sewage treatment works upstream and acid mine drainage which is decanting into the environment and finding its way into the river resulting in rising salinity. The unit has therefore developed a range of systems using algae and bacteria to remove salinity from such waste water. It developed the '*Rhodes Bio-sure Process*' a high profile process specifically for treating mine water and, at the same time, to reduce the salinity pollution load going into the Vaal river system. The establishment of the project is already under way and it is expected to be implemented worldwide. The process is inexpensive and environmentally friendly and is said to be the most cost-effective solution on the market to treat sulphate-rich water. The algae ponding system (discussed in section 5.2.4.5) for effluent treatment by the same unit also contributes to improving water quality with the advantage of being a sustainable solution to effluent treatment.

The Department of Ichthyology's (Appendix 5, case record 9) work on aquaculture with provincial departments of agriculture has a focus on ecosystem health where it is promoting sustainable management of aquatic ecosystems. The IWR has done water quality research for Makana Municipality and has a training programme for municipal officials which also contributed to the water aspects of the LEAP process (Lotz-Sisitka, pers. comm., December 2008).

These initiatives show that the university is reaching out far and wide to address problems of national and regional relevance. In the case of the EBRU, there is a possibility of implementation of their initiative at a global level. Acceptance and implementation of these initiatives in itself reflect upon the relevance of the projects in responding to sustainability challenges.

5.2.3.9 Unsustainable exploitation of resources

Unsustainable exploitation of resources is another contextual sustainability challenge in South Africa as identified by the DEAT (2006). This is being addressed by the Environmental Science Department (Appendix 5, case record 7) through their community work which is in the form of applied research mostly by students. The department had a research programme which looked at commercialisation of natural resources in the rural areas and spanned three and a half years. Such research endeavors involve the community in the process and the results are fed back to society to inform their practices.

The IWR (Appendix 5, case record 14) has a focus on promoting sustainable use of water resources with its objective being to contribute to the knowledge of sustainable water resources management and to promote the understanding and wise use of natural water resources in southern Africa. The institute's community projects contribute to sustainable exploitation of water resources.

Projects in the SAIAB (Appendix 5, case record 15) also contribute towards sustainable utilisation of resources particularly fish resources. The projects are mostly at a regional level and are focussed on training and empowerment of people for sustainable management and exploitation of aquatic resources.

5.2.3.10 Land degradation and use

Community engagement work which has the potential to address land degradation issues in future is taking place in the Department of Environmental Science (Appendix 5, case record 7) in which they are developing local institutions for ecosystem management. The department is also developing a management plan for and initiating the establishment of a conservancy.

5.2.3.11 Overall assessment of initiatives

The contextual sustainable development challenges being addressed by RU as discussed in this section are more or less the same issues of particular concern to the African context that were defined through the Ubuntu and Kasane Declarations. Through addressing issues of concern in its community, RU is therefore also responding to new thematic areas or roles of universities outside those synthesised by Wright (2002; 2004). Examples of such issues are access and equity in education, socio-economic development challenges, teacher education among others (Ubuntu Declaration, 2002; UNEP, 2006).

While universities are expected to reach out to the communities in which they are located through community service in order for them to be relevant in society, university responses mostly go as far as the availability of expertise to tackle the issues of societal concern. Universities may therefore not be in a position to respond to all of the societal challenges. In the case of sustainable development problems, these are multi-faceted and their responses do not only lie in university initiatives as in the case of tree planting and sewage systems in this study.

There is need for universities to partner and collaborate with other stakeholders for holistic responses. When operating within the framework of systems thinking, such relationships are the basis of success as piecemeal approaches will only address some dimensions and there might be a chance of missing related challenges. Even if the university does have the capacity to address some these challenges, coordinating efforts with other concerned organisations may help in enhancing the quality of responses. (An example at the university is the University-Municipality Partnership, see chapter 4, section 4.2.)

Rhodes University has however made an effort to support community initiatives within a systems thinking framework. As an effort to assist with these issues, it was involved in the LEAP process (discussed in chapter 1, section 1.2) which, in a holistic manner, identified most of the sustainability challenges in Makana and developed a Sustainable Development Framework for Makana. At the same time, the EESU assisted with the establishment of the Makana Environmental Forum (see chapter 4, section 4.2) which provides a university community space for deliberating these issues.

Owing to the fact that RU is an educational institution whose expertise is overwhelmingly in the education and research area, most of its responses are therefore through education and research or are education/training-related initiatives. However, education and research may not be the only solutions to sustainability issues. As discussed in chapter 2, earlier views sought answers to sustainable development through technology, and at one point it was believed that development was the answer, however later education was identified as having a key role to play. It is however important to engage multi-dimensional approaches as sustainable development issues have proven to be elusive and emergent (see chapter 2, section 2.3.3), hence the need for longer term partnerships.

The study established that some of the sustainability challenges identified in the community in which RU is situated were not being addressed by the university; at least through the departments/units investigated. These include waste management and storm water drainage issues. While there is a chance that other departments/units not included in the study may be addressing these issues, this may also point towards lack of expertise in those areas.

The relationship between the university and the community has shown that to an extent, the university is situated within its broader environment in terms of responsiveness to societal sustainability crises. The university is arguably in transition from treating ESD as an add-on to the existing structures to a more whole state where there is a mutual relationship between education and society characterised by positive feedback loops; where education helps to guide social systems and where agents respond to their context in shaping social structures (Archer, 1995; Banathy, 1996 and Sterling, 2003; see chapter 2, section 2.5).

5.2.4 Self-regulation

Sensitivity to relevant environmental change (Banathy, 1992) at RU has so far been through adaptation as shown in chapter 4, section 4.2. Good examples include the establishment of the Chair of Environmental Education, RU Environmental Policy, Environmental Science Department and the Masters in Business Administration in Environmental Management Programme as a way of ensuring the university is responsive to the increasing environmental and sustainability challenges in society.

The way departments like History and Geography are mainstreaming sustainability can also be explained using the concept of adaptation as they are reacting to and aligning what they do with current trends.

A closer look at the history of emergence of sustainability issues at RU shows that the university has continually been aligning itself to emerging sustainability issues. The university is also likely to continue improving in terms of mainstreaming sustainability and responding to contextual sustainability challenges. This position can be supported by citing the university's Community Engagement Policy and its vision and mission statement which show commitment to addressing local sustainability related challenges and the socio-economic ills of the past respectively (see chapter 1, section 1.4). This argument is also based upon looking into the future where there is a possibility of research re-orientation to address critical issues defined by the Department of Science and Technology (Appendix 5, case record 19). Other future plans discussed in chapter 4 (section 4.4.1) include the establishment of a cross-faculty Masters programme focusing on integrated social development and the possibility of introducing a compulsory course in citizenship and ethics for first years both of which would include sustainability-related issues (Appendix 5, case record 17).

5.2.5 Feedback

This study did not investigate how the output has informed further system adjustments within RU as this would have meant studying other systems outside the university to understand how the outputs have helped in addressing sustainability challenges. The continuous re-orientation of activities (chapter 4, section 4.2) at the university may be due to a reflexive deliberative process on the initiatives hence continuous system re-organisation with time. The review processes seem to be significant here.

5.3 RU RESPONSES IN RELATION TO THE KEY ROLES DEFINED BY SUSTAINABILITY DECLARATIONS ON HIGHER EDUCATION

This section draws from the functions/structure model (Banathy, 1992), the supra-system model (Walton, 2004) and the model representing the operational dimensions of an education system (Sterling, 2004) as lenses to establish the parallels between

the key roles of universities in sustainability as adapted from Wright (2002; 2004) and the sustainability initiatives that are in place at the university; and the nature of sustainable development related interactions between component parts of the RU system. It draws upon the concept of function as explained in chapter 3 (section 3.2.6.2) where the aspects of this function are the identified key university roles in sustainability. This is done through outlining the themes or roles of universities and discussing the initiatives that are in place at RU in relation to each of the roles. The section then establishes the mutuality (assonance) of interrelationships among components of the RU system included in this study. In this case, the study relies on the concept of structure (see chapter 3, section 3.2.6.2) which helps define relational arrangements between components. In this section, there is also significant reliance on data presented earlier (in both chapter 4 and 5) and to an extent, data in case records. Note that only the themes defined by Wright (2002; 2004) are discussed in this section since those defined through other declarations in the African context (the Kasane and Ubuntu Declarations) have already been discussed in section 5.2.3.

5.3.1 Functions

As stated earlier, the concept of functions is used to explain what the university has to do in order to fulfil its goals (Banathy, 1992). In the context of this study, the concept informed a review of what the university is doing and the nature of the activities in relation to each of the defined roles of universities (chapter 2, section 2.3.7).

5.3.1.1 Ecological literacy

Ecological literacy is one of the frequent themes in sustainability declarations on higher education (chapter 2, section 2.3.7). In this respect, universities are expected to develop the capacity of university staff to teach and practice sustainable development and to enhance the understanding of environmental and sustainability issues among staff, students and the public at large (Wright, 2002). While there is no clear criteria as to how universities should fulfil this role, the CRE-Copernicus Charter talks about incorporating environmental perspectives in university work and setting up Environmental Education programmes (ibid.). The MESA Universities Partnership argues for mainstreaming of sustainability in the curricula (UNEP, 2008). The response of the university to this theme was addressed through looking at the

inclusion and examination of sustainable development topics in the curricula in the selected teaching departments at the university which form part of the study sample.

As shown in chapter 4 (section 4.4.1, Table 4.2), most of the departments at RU mainstreamed at least some environmental and sustainability content in some of their courses. In some departments environmental and sustainability issues form an integral component of at least some of their courses, for example Environmental Science, Geography and the Department of Ichthyology. In others, like Accounts and the Faculty of Law, sustainability content was very low. Departments also examined the sustainability topics which are taught in class. The university also has Environmental Education programmes offered by the EESU under the Education Faculty. Besides teaching Environmental Education programmes, the unit is also involved in educating the community through community engagement and through partnerships with other stakeholders (e.g. Makana Regional Centre of Expertise, MESA Universities Partnership).

Other approaches suggested to have potential to influence behaviour change among students include educators becoming role models in promoting particular lifestyles, experiential learning and systemic learning (Martin, Dawe and Jucker, 2006). They argue that role modelling is an element of effective teaching in some disciplines where learning would be reciprocal between educators and learners and encompasses role play and other forms of interaction. They also argue that experiential learning has the potential to influence ecological literacy as students get hands-on experience of sustainable development issues through exposure to complex and messy realities and get involved in seeking solutions. The authors also argued for systemic learning where they say education should move from reductionist approaches to transdisciplinary and interdisciplinary teaching and to approaches which develop critical thinking among students for them to be able to critically engage with knowledge (Martin et al., 2006).

At RU there were no specific Environmental Education programmes for staff members which could potentially develop their expertise, hence making them more effective in sustainable development issues. They were, however, exposed to environmental awareness campaigns run by the Environmental Committee (Appendix 5, case record 21). Role modelling was only evident in the Geography Department through play acting which was centred upon sustainable development

issues (Appendix 5, case record 8). Experiential learning was a practice of only the Faculty of Pharmacy through service learning (Appendix 5, case record 12). In terms of teaching approach however, all teaching departments involved in the study promote critical thinking skills among students.

With regards to courses with sustainability content on offer in departments and faculties at the university, not all students are exposed to them as they are in most cases not mandatory (e.g. Environmental Law in the Faculty of Law). At the same time, inclusion of these topics in courses does not guarantee that ecological literacy is being promoted as there are issues of whether learners are internalising what they are taught. This was raised in the Environmental Science Department where students were not in a position to apply what they are taught in class to make it part of their everyday lives even though they pass their studies (see section entitled 'Room for improving', Appendix 5, case record 7).

5.3.1.2 Public outreach

The theme of public outreach has to do with universities situating themselves in the societies in which they reside. The basic idea propounded by this theme is that universities should go beyond the education of students to develop an understanding of sustainable development in the communities in which they reside (Wright, 2002). Evidence show that the university is mainstreaming sustainability in its community engagement through public outreach where many departments/units use their expertise in developing an understanding of sustainability issues among the general public. This is mainly done through offering courses aimed at skills development, service learning (Faculty of Pharmacy) and addressing issues of educational quality in formerly disadvantaged schools in Grahamstown among others. Examples of public outreach in sustainable development at the university are as follows:

- skills transfer in projects based on natural resources targeted at income generation by Environmental Science Department (see section 5.2.3.1),
- supporting the use of vegetable gardens as learning resources by the EESU (see section 5.2.3.2),
- the ISER's Municipal Services Project which directly inform municipality in service provision issues (see section 5.2.3.3), and
- the Makana Schools Partnership Project (see section 5.2.3.4).

University performance in this function is however being affected by a shortage of human resources in departments like Accounting. The department's skills and expertise relevant to sustainable development are therefore not being utilised.

5.3.1.3 Moral obligation

Universities have also been tasked with the application of their knowledge in solving the complex problems of society (Wright, 2004). There are a variety of initiatives at Rhodes University which address such societal problems (these have been elaborated in section 5.2.3). Examples are as follows:

- the development and establishment of mine water treatment processes targeted at reducing the salinity pollution load going into the Vaal river system and promotion of multiple cycles of water use to cater for water scarcity by the EBRU,
- aquaculture promotion by the Department of Ichthyology to create sustainable livelihoods in the face of a multiplicity of socio-economic challenges,
- sustainable low cost sewage treatment by the EBRU,
- beneficiation of waste water and job creation by the EBRU,
- development of food gardens,
- fundraising and donations, and
- free legal services to poor people by the Legal Aid Clinic.

What is particularly notable about these initiatives is that most of them address complex problems which are of importance in the immediate context of the university. The mine water treatment project has been implemented at national level with the possibility of it being taken up at an international level (Appendix 5, case record 13). This shows the scale of importance of the project.

5.3.1.4 Sustainable physical operations

According to Wright (2002), having sustainable physical operations is one of the themes that sustainability declarations mention as a role of universities, though it was alleged not to be of primary importance. The expectation regarding the theme is that universities should have sustainable physical operations through establishing

ecological policies and practices aimed at conservation of resources, recycling, waste reduction, etc. (ibid.). While sustainable physical operations are not a major focus at RU, there are several practices in place which show that it is increasingly becoming important (Appendix 5, case record 22). Notable efforts include solid waste recycling, water conservation and landscaping. Electricity consumption, pest management and fossil fuel consumption were some of the areas given attention by the university. The university has not yet adopted sustainable building design but was increasingly considering sustainability issues in new buildings scheduled to be constructed, for example, in terms of effluent, rain water harvesting and solar power, even though some of the options are expensive in the short term.

Most activities related to this function are still in their infancy. There is a long way to go before the university can be said to have sustainable physical operations. There is however room for improvement given institutional commitment especially through capitalising on the initiatives already in place. Evidence to support this view can be inferred from the historical emergence of sustainability at the university (chapter 4, section 4.2).

5.3.1.5 Developing interdisciplinary curricula

This theme was mentioned by the Talloires Declaration and encourages universities to develop curricula for an environmentally sustainable future (Wright, 2002). As a way of responding to the international growth in environmental issues and a demand for suitably qualified environmental professionals owing to increasing awareness of environmental and sustainable development issues at RU, the Department of Environmental Science was established as a cross-departmental programme in 1998. It grew to a full department by 2002. The department draws students from a variety of backgrounds and students from all faculties at RU can opt to major in Environmental Science (timetables allowing).

The Environmental Science curriculum is also interdisciplinary and as reported in Appendix 5 (case record 7) ecological, social and economic sustainability issues are addressed. A variety of other departments have also re-oriented their programmes so that besides the core content of their courses, they have a sustainable development focus. A good example is History (see chapter 4, section 4.4.1, Table 4.5). While not all departments have interdisciplinary curricula, interdisciplinarity at the university is

also promoted through the requirement that general degree students major in two programmes. Such students are therefore always exposed to more than one discipline. However, this may have little impact in facilitating exposure to sustainability disciplines as a student may choose to major in courses which do not have any sustainable development content.

No students from the Faculty of Pharmacy had ever opted to do a course in Environmental Science. On following this up with the Faculty of Pharmacy, the reason was not because Environmental Science was considered to be outside the scope of Pharmacy as a discipline but because there was no flexibility in terms of allowing students to do Environmental Science (Appendix 5, case record 12). With regard to the Chemistry Department it was also mentioned that Chemistry students could not major in both Environmental Science and Chemistry due to timetable restrictions even though the necessity of both subjects was expressed (Appendix 5, case record 6). In addition, other agential factors may come into play where students may choose not to do the course even though it is open to everyone. At the same time, structural factors including capacity may also limit the number of students that the department can accommodate per intake. The overall conclusion regarding this theme is therefore that the establishment of interdisciplinary curricula at an institution does not automatically translate into exposure of students to such curricula. There might be need to go a step further in encouraging students' involvement.

5.3.1.6 Sustainability research

Sustainability research was identified as one of the key roles of universities where they are expected to encourage research that contributes to local, regional and global sustainability. At RU, as was explained in chapter 4 (section 4.4.2), there are a variety of research initiatives targeted at addressing sustainable development issues. The initiatives are at different scales with some focussing on local issues like trade in medicinal plants (Anthropology Department) and some on regional issues, for example SAIAB in which research initiatives on aquatic biodiversity spanned a number of countries in Southern Africa. There is also research in issues of global relevance like medicinal chemistry in the Chemistry Department.

The university however does not have a clearly defined research policy in which sustainability issues are reflected. At the same time, there aren't any other internal

university initiatives which encourage research on sustainable development issues. Reverting to Wright's (2004) argument that encouraging sustainable research could be difficult due to issues of academic freedom (chapter 2, section 2.3.7), it might be a challenge for the university to be prescriptive. However, some of the research funding the university receives is intended for projects in sustainable development and that is one of the factors that influences sustainability research especially in the EBRU, the IWR and the ISER. At the same time, the scale of research in sustainable development issues at the university shows that many staff members are already grappling with it at various levels. There are therefore budding initiatives which have the potential of growing with time, especially if the said funding from the Department of Science and Technology increases in the future.

5.3.1.7 Partnerships with government, non-governmental organisations and industry

In terms of partnerships, universities are encouraged to collaborate with other organisations concerned with sustainable development issues in trying to find solutions to sustainability challenges (Wright, 2002; 2004). The RU supra-system (after Walton, 2004) has weak sustainability links. This is because most partnerships at RU are not specifically targeted at sustainable development except for the Makana RCE, the partnership between different departments and units in the university and Makana Municipality, and to an extent the schools partnership programme. Some of the partnerships also have a reductionist focus where only one or two dimensions of sustainable development are addressed. At the same time, the partnerships are mostly at departmental rather than institutional level with the exception of the schools partnership programme and the university – municipality partnership.

Looking at the historical emergence of sustainability at the university, RU is increasingly partnering with other organisations and agencies in sustainable development. There is therefore a good foundation in this regard which can be expanded and extended to include departments/divisions/units which are not currently active in partnerships in sustainable development.

5.3.1.8 Inter-university cooperation

Intra- and inter-university cooperation was also identified through sustainability declarations as an approach that can be utilised for addressing sustainable

development issues by way of sharing information. As already mentioned (chapter 4, section 4.4.5) there is evidence of collaborations within RU and between RU departments and other universities, even though most of these collaborations were not specifically developed for addressing sustainable development issues. The other characteristic of the partnerships at RU is that a number of them are at an individual level and are not even departmental initiatives. While some are at departmental level, institutional commitment to them is not quite apparent. Only the MESA Universities Partnership between RU and other African universities was established to have been primarily developed to tackle sustainability issues and as such, has sustainable development issues as its primary concern.

5.3.1.9 Overall assessment of functions

The university has initiatives in place which attempt to address all the themes identified by sustainability declarations in higher education. As mentioned previously, the university is a signatory to the Talloires Declaration (chapter 1, section 1.4), the signing of which led to a gaining of momentum in the emergence of a multiplicity of responses (discussed in chapter 4, section 4.2). The Talloires Declaration is the only declaration which identifies all the themes as relevant to universities (see chapter 2, section 2.3.7, Table 2.1).

It is important to note that, though defined at a global level and specifically in the context of the developed world, these themes are evident through projects initiated to address problems which are relevant to the context of the university's immediate environment. However, the themes, as discussed in chapter 2 (section 2.3.7) have not directly specified some of the topical sustainability challenges of particular concern in an African context in which this study is taking place. These include issues, as identified by the Ubuntu and Kasane Declarations, of access and equity in education, equitable socio-economic development, teacher education, use of information and communication technology, inequalities in knowledge and indigenous knowledge systems. To enhance their relevance, the themes identified by Wright (2002; 2004) may need to be contextualised and extended depending on the context in which universities operate. Rhodes University seems to have managed to do this considering that it has a strong focus on context (section 5.2.3) and has other initiatives outside those related to the defined roles of universities as identified by Wright (2002; 2004).

Additional responsibilities of universities defined by the Ubuntu and Kasane Declarations serve to show that it may be necessary to continuously review sustainability themes with time as new relevant information is generated so as to keep them up to date with emerging sustainability challenges and new roles of universities; and the complex dynamics of the global ESD context. This may facilitate infusion of new ideas from later declarations and initiatives, examples of which are the Ahmedabad Declaration (2007), MESA Universities Partnership (UNEP, 2008) and the Regional Centres of Expertise concept (2004) (see chapter 2, section 2.3.7). The roles of universities defined in the African context also show the importance of redefining immediate sustainable development challenges in local contexts and hence targets for sustainability initiatives by local universities.

5.3.2 System structure: Inter-relationships between Rhodes University systemic components

Among the characteristic features of systems is the fact that they are made up of components (sub-systems) which exist in interrelationship with each other. As Banathy (1992) explained, the structure of the system results from patterned relationships and connections resulting from interactions as the system attends to its functions. In the case of this study, the systems structure is only defined with specific reference to sustainability initiatives (Chapter 3, section 3.2.6.3).

Figure 5.2 portrays the relationships between RU divisions and offices which were the focus of this study. The figure is an adaptation of Sterling's (2004) model of operational dimensions of an educational system. Connections indicate some form of interaction, direct or indirect influences (positive, neutral or negative) between divisions and offices.

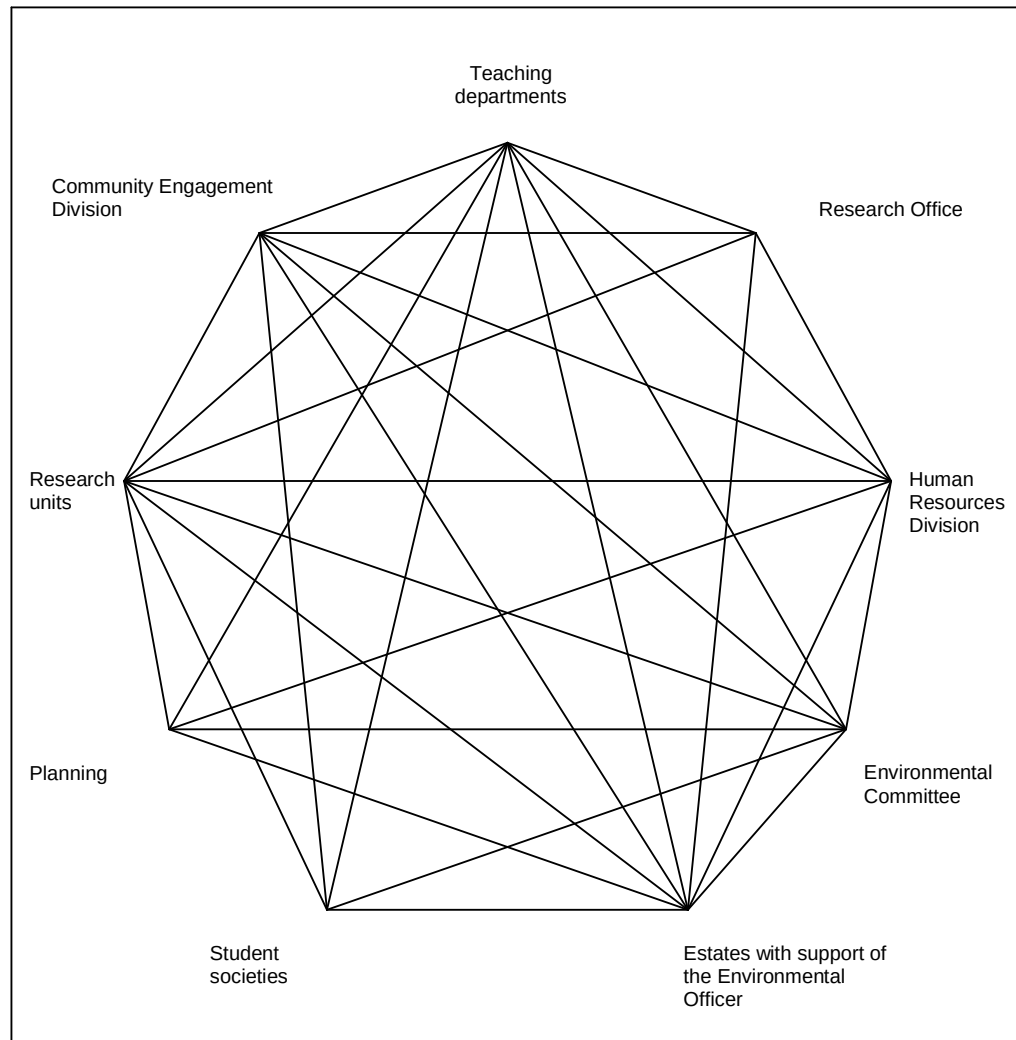


Figure 5.2 Interrelationships between components of the Rhodes University system

The estates division, for example, is shown in the diagram to be influencing and/or influenced by all the other components of the system. A good example of such an interrelationship is the recycling activities on campus which are spearheaded and facilitated by the Estates Division and have been taken up at university level, thus are affecting all aspects of campus life. Teaching departments were also established to have interactions with most other divisions on campus as follows:

- Community Engagement Division – they collaborate in community engagement initiatives,

- Research units – some units are affiliated to teaching departments and/or collaborate in research and teaching activities,
- Student societies – lobbying for and supporting student societies, student representatives in these societies are also groomed through teaching departments,
- Estates Division – besides influencing sustainability operations like recycling, students are also involved in researching environmental and sustainability aspects of the operations division, members from the operations division sometimes offer lectures in teaching departments,
- Environmental Committee – some of the representatives are lecturers in teaching departments and, at the same time, they influence departmental sustainability activities in view of the deliberations of the committee,
- Human Resources Division – responsible for staffing in teaching departments hence its decisions indirectly influence availability of human resources in sustainability initiatives, and
- Research Office – responsible for some of the research funding in these departments which is sometimes used for sustainability projects.

The Research Office is influenced by the Estates Division (recycling) and the Human Resources Division. However it directly influences research initiatives in teaching departments and research units through allocation of research funds. Where this funding is intended for sustainable development research, the result is positive. The fact that it does not have a policy which encourages sustainability research however may be negatively affecting the taking up of these issues in departments and units. While this was not directly mentioned in these departments and units, it is possible that if there was a policy promoting such research, more could have been happening on the ground.

The Community Engagement Division coordinates community engagement initiatives at the university and works in collaboration with teaching departments, research units and students in some of the projects. It is also influenced by the Estates Division in recycling activities and the Human Resources division in terms of staffing. Interaction with the Environmental Committee is through the committee's environmental awareness initiatives.

The Environmental Committee is responsible for campus wide environmental awareness in the form of campaigns, lectures, or video shows and therefore interacts with the whole university community. At the same time there are other links which include reporting of information by members who are based in different faculties and divisions, for example, Education and Science Faculties, Student Representative Council, Estates Division among others, and through Environmental Policy which governs environmental practices of the whole institution.

The Human Resources Division, besides being influenced by sustainability initiatives in various other sections of the university like the Environmental Committee (environmental awareness), and the Estates Division (recycling), influences all other sectors through staffing. The Planning Office interacts with teaching departments and research units in the development of new programmes which seem to be of late, increasingly in the area of sustainable development (chapter 4, section 4.2). The Human Resources Division is responsible for its staffing; it is influenced by the Environmental Committee through environmental awareness raising initiatives and by the Estates Division through recycling initiatives.

Research units interact with most of the identified RU components in the following areas:

- Community Engagement Division – the Community Engagement Office (working with the Centre for Social Development) is responsible for coordinating community engagement initiatives in the units and sometimes they do collaborative work with the units,
- Teaching departments – some research units operate within or are affiliated to teaching departments and at the same time their staff collaborate in teaching and research,
- Research Office – the Research Office is responsible for funding which is sometimes allocated for sustainability research in these units,
- Student societies – members of research units support teaching departments in teaching students and help in grooming them,
- Environmental Committee – interaction is through environmental awareness raising which in some cases involves talks from members of the units, and
- Estates Division – interaction is through paper recycling.

The diagram shows a complex network of interactions in sustainable development initiatives at the university. The component parts of the university are therefore in interrelationship with each other which defines the structure of the system. The diagram serves to give a picture of the nature of interrelationships among RU sub-systems. It therefore did not elaborate on the existing contradictions which will be discussed in section 6.3.2 under systemic issues. The morphogenetic aspects of some of these relations were discussed in chapter 4 (section 4.2).

5.4 CONCLUSION

This chapter recontextualised the sustainability initiatives at RU within the context of its environment. It has demonstrated that there are initiatives responding to most of the sustainability challenges in the university's systemic environment. At the same time, it demonstrated the presence of initiatives which address all the themes defined by sustainability declarations in higher education and established the contextualised nature of these initiatives, and indicated that these themes are open to continued revision and emergence as understandings of the global context of ESD in higher education develop. It also managed to establish the complex links that exist at RU in sustainability initiatives. Chapter 6 discusses how to strengthen the emerging system structure in mainstreaming sustainability at RU in response to contextual sustainable development challenges which in themselves are also changing.

6 CAUSAL FACTORS, SYSTEMIC ISSUES AND STRATEGIES FOR A SYSTEMS APPROACH

6.1 INTRODUCTION

This chapter employs retroduction to establish causal factors behind sustainability initiatives at RU and the constraining systemic issues. The chapter responds to research questions aimed at establishing causal factors behind mainstreaming activities and constraining systemic issues which need to be addressed in developing a systems approach (chapter 1, section 1.6.1). The main strategy employed is counterfactual thinking (see chapter 3, section 3.5.6.4) (Danermark et al., 2002). The discussion is from both an historical and a contextual perspective and hence draws on both chapters 1 and 2, as well as chapter 3 which provides the theoretical lenses, and chapters 4 and 5 in which the data was presented. The chapter then goes on to discuss how a systems thinking framework can be employed in mainstreaming sustainability in universities.

6.2 CAUSAL FACTORS WHICH INFLUENCED THE MAINSTREAMING OF SUSTAINABILITY AT RHODES UNIVERSITY

This section discusses causal factors which enabled mainstreaming at the university. The discussion of these underlying mechanisms draws from history and context as mentioned earlier, and also from the university's internal situation.

6.2.1 Unsustainable patterns in society

Environmental concerns, issues of poverty and deprivation (Dresner 2002, UNEP, 2006) (see chapter 2, section 2.3.1) are said to have been behind the conception of sustainable development. The critical environmental challenges forming the original focus of sustainable development include global warming, atmospheric pollution and ozone depletion. Sustainable development problems are emergent and are characterised by risk and uncertainty (UNEP, 2006). These challenges are multi-dimensional and have an effect on all spheres of life on earth, and, according to Munier (2005), they are critical challenges in society as they affect the chances of survival of humans. In southern Africa sustainable development problems are aggravated by the vulnerability to climate change, high incidence of poverty, unstable economies, food insecurity, poor governance and a variety of other challenges (see

chapter 2 section 2.3.9.2). In the SADC region, environment and development were thus identified as priority areas of intervention (Lotz-Sisitka et al., 2006b).

While there are a variety of other causal factors that influenced RU to integrate sustainability in its activities, the chief mechanism behind mainstreaming is most likely the existence of unsustainable patterns in society. This factor was also explicitly identified through an interview in the History Department.

Well I think there is a strong feeling among most staff members umm, that the environment, deterioration of the environment, global warming umm, are maybe the most pressing issues facing the world today. So given this concern we take these issues into our courses (P15, pers. comm., 10 December 2007).

6.2.2 International policies and declarations

Existence of environmental and sustainable development challenges in society as discussed above (section 6.2.1) influenced the search for solutions through global sustainability movements. Early environmental writings including *Silent Spring* (1962) by Rachel Carson and *Our Common Future* (1987) by the WCED added further impetus to find solutions hence an increase in international conferences and declarations on sustainable development. The fact that sustainable development proved to be elusive (Leal Filho, 2002) and is contested, controversial, emergent (UNEP, 2006) (see chapter 2, section 2.3.3) contributed to the call for education to play a role in finding solutions through international conferences including the Rio Earth Summit (1992) and the WSSD (2002) (see chapter 2, section 2.3.6.2).

Various declarations on sustainability in higher education (Wright 2002; 2004) have also stressed the need for universities among other higher education institutions, to mobilise their operations and functions in addressing sustainable development challenges. As was mentioned in chapter 2, Rhodes University signed the Talloires Declaration and, in recognition of the requirements of the declaration, formed an Environmental Policy which stresses the need to mainstream environmental issues in operations and functions. At the same time, members of the university are increasingly involved in hosting regional and international meetings on sustainable development (chapter 4, section 4.2). As indicated in interviews (in Environmental Science, Geography, EBRU etc.), it is growth in such international debates, their

recommendations (including Millennium Development Goals) and the awareness that is created among participants that influenced initiation and growth of environmental and sustainability oriented programmes and activities at the institution. The United Nations Decade of Education for ESD for example, provided the impetus for the MESA Universities Partnership and thus ultimately this research.

6.2.3 The need to redress past social inequalities

As discussed in chapter 1, apartheid policies in South Africa affected all spheres of life including education. Institutions of higher learning during apartheid rule were assigned roles which made them instruments in reproducing the social order of the day (Badat, 2007a). Also mentioned in chapter 1 is the fact that RU, which operated for some time as a white institution, conformed to and did not challenge such policies and was therefore arguably accommodative of them as alleged by Maylam (2005). These past inequalities are still evident in South Africa and at Rhodes University.

Part of what defines the relevance of higher education lies in its role in the search for solutions to societal challenges inclusive of democracy, human rights and the environment (UNESCO, 1995). Former white institutions (including Rhodes University) in South Africa during apartheid were detached from prevailing social problems and conditions of especially the black community. The role of higher education however changed with independence and there is a drive to make it relevant through responding to local and national developmental challenges. This drive for redress is probably one of the mechanisms that influenced the university to engage in socio-economic development and environmentally oriented programmes including research and outreach. This is evident in the formation of community engagement structures after 1994 (see chapter 4, section 4.2). The target for RU's outreach is mostly the poor black communities and includes concern for quality, relevant education and research to contribute more widely to societal transformation.

6.2.4 South African policy on higher education

During apartheid rule in South Africa, significantly fewer blacks compared to whites attended higher education institutions both in absolute figures and proportionally. The 1968 UNESCO figures show that South Africa ranked second after America with regard to the number of white university students per 100 000 inhabitants. It had 30 000 in the segregated historically white universities alone and only 3 000 total African

students in all historically black institutions put together (South Africa - Higher Education, n.d.). Estimate figures put the African population at 70% and the white at 16% of the total with the remaining proportion comprising of coloured and Indian races (Subotzky, 2003). Former black institutions including universities and schools were disadvantaged in terms of resources and the poor quality of education offered (see chapter 1, section 1.2).

Following independence, South African policy on higher education thus identified key transformation issues in higher education. Specified in the Education White Paper 3 of 1997 are transformation issues which include the following:

- broadening the diversity of learners (in terms of race, class and gender),
- accommodating various backgrounds of students among other issues, and
- meeting issues of equity (equity of access), redress and development (Department of Education (DoE), 1997).

(Note that these are only a sample of the key transformation issues which were particularly selected for their relevance to this study.)

The same Education White Paper also defined community development and extension services as a function and integral component of higher education. Through community service, universities are encouraged to promote social responsibility and awareness among their students and to demonstrate their social responsibility and commitment to the common good by making available expertise and infrastructure for community service programmes (DoE, 1997).

This may also have influenced the university to engage in initiatives which facilitate university entry for students from previously disadvantaged schools who struggle to obtain the RU minimum entry requirements due to poorly resourced schools, the history of disadvantages which have led to an absence of a culture of learning, poor quality teacher education and teacher absenteeism, among other things (chapter 1, section 1.2). Examples of such initiatives include the establishment of the Extended Studies Unit and the formation of Makana Schools Partnership. The former capacitates school leavers to enter university by offering a one year bridging programme while the latter aims to provide resources and skills to seven formerly disadvantaged high schools in Grahamstown East.

6.2.5 Availability of expertise in sustainable development at the university

Mainstreaming of sustainable development at the university could not have been possible without the necessary skills and expertise. While there was no evidence of internal initiatives to train staff in sustainable development at the university, some staff members already had such skills to meaningfully engage in those issues. The university however offers support to employees to pursue training/studies in sustainability issues as expressed in the following quote, which broadens their expertise in sustainable development:

There is a Joint Research Commission Fund which allows staff to attend conferences. The university has a policy of discount for fees for staff members to study at the institution. In the Faculty of Education, for example, two members of staff are currently doing PhDs in Environmental Education/ESD, with time allocated for this by the department and support and mentoring as well as research cost support. A number of staff members have also attended the Environmental Management Masters in Business Administration modules. All our staff members (EESU) have done the Gold Fields course (Lotz-Sisitka, pers. comm., December 2008).

The high level of engagement with sustainability issues in the EESU in the Faculty of Education (see appendix 5, case record 10) can be explained in terms of staff expertise. Staff expertise therefore is probably one of the important causal factors behind some of the sustainability initiatives at RU, especially mainstreaming of these in teaching, research, community engagement and operations. This was also evident in the morphogenetic analysis in chapter 4 (section 4.2) which indicated that increased staff allocations facilitated influence of the Environmental Science, Masters in Business Administration and community engagement programmes at the university.

Presently the running of sustainable development related programmes (e.g. in the Environmental Science Department) are responsible for further developing expertise at the university. For example, the current Student Representative Council's Environmental Councillor is a student in the Department of Environmental Science. Through implementing sustainability projects, organising and being involved in sustainability awareness programmes and supporting students in sustainability related initiatives, he is applying expertise partly acquired at the university. Students graduating from environmental and sustainability related programmes at undergraduate levels also have the potential to pursue sustainable development

related research at post graduate level thus further extending and expanding sustainability initiatives at the institute.

The availability of expertise in sustainable development at the university has been instrumental in the historical emergence of sustainability initiatives as discussed in chapter 4 (see section 4.2, Table 4.1). The pooling of such expertise through collaborative work between the EESU, the Faculty of Commerce and the Environmental Science Department made it possible to establish the Environmental Management Masters in Business Administration programme. The EESU also collaborates with the Environmental Science Department in offering a Community Based Natural Resources Management course every year (Lotz-Sisitka, pers. comm., December 2008). Existence of environmental and sustainability expertise at the university was instrumental in the successful hosting of the International Training Programme workshop related to the MESA Universities Partnership by the EESU in 2008. Besides the EESU, the expertise was also provided by the following divisions at the university:

- Environmental Committee,
- Humanities Faculty,
- Environmental Science Department,
- Academic Development,
- Commerce Faculty, and
- students.

(Lotz-Sisitka, 2008).

6.2.6 Collaboration with other organisations

The other factor that might have been instrumental in implementation of some sustainability programmes at the university is partnering with organisations from outside the university which have employees with the requisite skills and expertise. An example from the study is the Environmental Science Department which is supported by the Coastal Environmental Services in its Honours degree in running the Environmental Impact Assessment course. Besides skills provision, collaborations with funding organisations have also facilitated sustainability research, for example, in the IWR. The operations division is also benefiting from such

collaboration in its bio-diesel initiative in which a local business produces this fuel for the university.

6.2.7 Availability of funding and relevant equipment

While the university does not allocate research funds targeted at sustainable development initiatives, among the funding organisations which support the university are some which specifically fund research on sustainable development topics. This enabled some departments and research units to be highly involved in sustainable development oriented research. Examples from the study are the ISER, EBRU, IWR and the EESU. The university also has technical equipment necessary for sustainability projects, for example, in the Biochemistry Department, which is one factor which made it possible to pursue sustainable development research and teaching activities in such departments.

6.2.8 Institutional support

With regard to student initiatives, the successful initiation and running of sustainability projects could partly be attributed to institutional support from the university. The student volunteer programmes which also address sustainable development related issues get institutional support through the Centre for Social Development in which the coordinating posts (Community Engagement Division) are funded by the university. The establishment of a Student Representative Council Environmental Portfolio has also been supported by the university through the Environmental Science Department. The portfolio receives support for its environmental and sustainable development projects from the institution in the form of funding through the Student Representative Council. The institution supports students who choose to do research on sustainable development topics through the provision of funding, other resources and supervision.

Institutional support is a powerful causal factor which, when fully mobilised can enhance sustainability at the university as shown in chapter 4 (section 4.2). However, there were instances in which it was not actualised even though potential for its positive contribution was there. An example is the case of linking water from wash basins to toilet tanks in the Department of Environmental Science which was not supported by the university.

6.2.9 Economics

In the Estates Division, the interview revealed the first trigger for sustainability practices at the university to be economics even though with time pure sustainability factors became more and more important. The university used to have a power management system in which, if the peak consumption of energy over the saving maximum is reached early in the year, for the remaining months the university would have to pay 75% of that maximum even if consumption fell below this. There was therefore power shedding at the institution as a means of keeping within the saving maximum. This 'economic' practice was, however, also contributing to sustainability.

Some of the current practices at the university also have an economic advantage thus making economics a possible causal factor. An example is the bio-diesel initiative which, besides positively contributing to sustainability, has an economic advantage to the university as there are no costs hence considerable savings. The same goes for the water saving initiative by the Estates Division whereby they have periods during which they do not water lawn and other plants on campus.

6.2.10 Structural and agential factors

Both structure and agency have also influenced mainstreaming of sustainability at RU. Agency in both staff members and students is another important causal factor that has enabled sustainable development initiatives. As discussed in chapter 3 (section 3.3.6), agency is the capability of doing things or of actively changing the course of events by causal intervention (Giddens as cited in Weik, 2006). However, Carter and New (2004) argue that the choice of agents is limited by structure. According to Archer (1995) social structures pre-exist agents, are relatively enduring and possess powers of enablement and constraint. Personal interest was identified as a factor behind integration of sustainability issues in some departments, for example, in the Faculty of Law (chapter 4, section 4.4.1). Agency is also quite evident in the case of students' researches on sustainable development related topics and sustainable development oriented community outreach projects. As discussed in chapter 4 (section 4.2), agency was instrumental in the emergence of sustainability initiatives and continual alignment of institutional activities with new sustainability knowledge.

Agency at RU is however limited by structural factors in the form of rules and resources. This is evident in the Accounting Department and the Faculty of Pharmacy in which regulations governing their course content limit the ability of staff members to mainstream sustainability topics. At the same time, resources, especially financial, limit the amount of sustainability projects that students can do. In the Accounting Department, human resources shortages were reportedly the reason why the department was not pursuing any community engagement initiatives through which it would have contributed to sustainable development. Structural enablement is evident through various institutional support mechanisms as discussed in section 6.2.8. There is therefore evidence of cycles of changes in action and interaction and structural elaboration as experts within the university continuously align their activities with new sustainability challenges (see chapter 4, section 4.2) and this seem to be continuing into the future. This shows the emergence of a systems wide approach to sustainability (see also chapter 5, figure 5.2) which is still in process at the university.

6.3 A SUMMARY OF SYSTEMIC ISSUES

This section outlines some of the systemic issues arising from the data which could further develop the systems approach to mainstreaming sustainability at the university. These are at different scales ranging from university to department/division levels. They include issues of goal definition, holism and complexity to mention a few.

6.3.1 Fragmentation and contradictions

Sustainable development is perceived differently by departments at RU. Some consider it to be important in their operations and are enthusiastic about it and thus they are influenced by global sustainability agendas. Other departments have not embraced it and argue that it is not part of what they have to do and therefore are not committing to it. As a result, sustainable development has not been and is not being consistently mainstreamed among departments. Potential however exists for different divisions of the RU system to explore sustainable development and further develop a systems approach in mainstreaming sustainability.

There are also differences in awareness of sustainability issues. While some departments were conversant and knowledgeable about sustainable development issues, in some it was admitted that members were not that aware of them. This could be another explanation for the different levels of interest and commitment that currently exist.

Most departments at RU seem to place emphasis on some form of sustainability which is influenced by their disciplines (see chapter 4, section 4.5.2). They mainstream only those aspects of sustainability which form the focus of their disciplines, and in some cases, other sustainability aspects which interact and influence their disciplinary focus. (This was explained in chapter 4 where, for example, Anthropology, which is focused on human well-being, mainstreams only those sustainability issues which affect human well-being). This has therefore resulted in differences in sustainability foci in different departments.

Contradictions in perceptions about and awareness of sustainable development demonstrate the controversial and contested nature of the concept (UNEP, 2006) as discussed earlier (chapter 2, section 2.3.3). In the case of RU, there are contradictions even at a local scale which might call for a negotiated meaning of the term. At the same time, contradictions in the way departments are responding to sustainable development challenges confirm a lack of consensus on what needs to be done (UNESCO, 2006) to address unsustainability patterns in society albeit at a local scale.

6.3.2 Diversity in aspects of sustainability mainstreamed

Emphasis on only some aspects of sustainability and not the whole range show diversity in sustainability issues of priority. If such a prioritisation of issues is not done carefully it may result in reductionism. Reductionist approaches were said to be a characteristic of the United Kingdom school system in which learning approaches in support of systems thinking had to be developed in some subjects with other courses aiming at bridging arts and sciences (Martin et al., 2006). In China, independent development of disciplines (science and social science) is reportedly one of the barriers to systematic and scientific ESD training of students (Shi, 2006).

However, since Rhodes University is an emerging system in terms of sustainability, there is room for taking advantage of such rich diversity in further developing the system. Wright (2004) in discussing the roles of universities (chapter 2, section 2.3.7), argues that ecological literacy in students is not the result of a mandatory course in environmental studies, but can result through seeing connections between the subjects studied and the environment. What may be important to do therefore is to contextualise disciplines within the environment so as to facilitate understanding of relationships between the environment, sustainability issues and each subject.

According to Wals (2007), diversity and contradictions can provide learning opportunities in ESD and social learning for sustainability owing to the complex nature of sustainable development challenges. Diversity can therefore be a necessary condition in the development of a system as it allows for depth and engaged interactions. Such interactions may result in system elaboration and re-organisation, events which may not have taken place if the system was in equilibrium. However, opportunities for such interactions need to either exist or be created.

Folke (2006) argues for resilience in complex adaptive systems (see chapter 2, section 2.3.4). Almost in accordance with Wals (2007), Folke (2006, p. 253) argues that “in a resilient social-ecological system, disturbance has the potential to create opportunity for doing new things, for innovation and for development”. Folke (2006) explained this using the concept of complex adaptive systems which explains the emergence of patterns of interaction from disorder through rules that guide change. According to Levin (cited in Folke 2006, p. 257) the essential elements of complex adaptive systems are:

... sustained diversity and individuality of components; localized interactions among those components; an autonomous process that selects from among those components, based on the local interactions, a subset for replication or enhancement.

In terms of sustainability initiatives, Rhodes University is arguably developing into a complex adaptive system basing on the history of the development of sustainability issues. There is diversity in dimensions of sustainability issues addressed, there is autonomy in departments/divisions involved in sustainability issues and there is

individuality of components which are, however, interrelated through complex networked linkages, as explained in chapters 4 and 5.

6.3.3 Interrelationships between system components

Collaborative work between departments/divisions/units involved in sustainable development at the university needs to be strengthened. Partnerships need to be encouraged as they improve the quality of solutions (Whitfield, 2003); in systems thinking they help bring about harmony between components of a system through negotiated and complementary roles. While maintaining individuality and autonomy, there is a need to coordinate the roles of component parts of a system so as to facilitate local interaction and enhance outcomes. To use an example, synchronisation of the ISER and Environmental Sciences community gardens project, the Galela Amanzi student outreach initiative and the waste water beneficiation project by the EBRU could result in a holistic approach: simultaneous introduction of these facilities in any one area would lead to success of all three interventions. This is unlikely to happen if there is no coordination in their introduction. Community gardens may be failing in one area due to water shortages although structures which could rescue them are there but may not have been introduced to those situations. In some of the university initiatives like the Makana Research Group, synergy is being created and this can inform other operational dimensions of the university if sustained. At the same time, recognition of the importance of sustainability in structures like the Research Office, Planning Division and the Human Resources Division which are all important in the smooth running of other divisions of the university, may influence adoption and expansion of sustainability.

6.3.4 Inexplicit goal of mainstreaming

Commitment to sustainable development at Rhodes University is not that obvious. The institution does not have an explicit sustainability policy even though it has an Environmental Policy and other policies with sustainability dimensions embedded within them, for example, the Community Engagement Policy and the HIV/AIDS Policy. There is room for improving the Environmental Policy especially with regard to defining the overall university understanding of and commitment to sustainability. This is in view of the contextual nature of sustainable development issues which require localised, temporal and contextualised definitions. At RU commitment is

reflected through the signing of the Talloires Declaration and the consequent establishment of the Environmental Policy. The Environmental Policy also needs to be strengthened as it stresses environmental issues and not the broad range of sustainable development issues. While the Community Engagement Policy and the HIV/AIDS Policy do address these issues to some extent, there seem to be no synergies in the implementation of these policies, except some links between environmental initiatives and community engagement initiatives.

6.3.5 Resources

According to Banathy (1992) the other type of input that systems require in order to function properly is in the form of resources, be they human, monetary or any other form. At RU, besides funds from agencies which emphasise sustainability projects, the study did not establish any other resources that the university had committed to sustainable development initiatives, except for those which go to salaries of staff involved in these initiatives. The issue of funds was raised in several departments as an obstacle to mainstreaming of sustainability.

6.3.6 Constraints and rules

Systems operate under certain rules or constraints which limit the freedom that they have in providing solutions to problems (Banathy, 1992). At RU these were identified in the Accounting Department and Faculties of Pharmacy and Law in which curricula are mandated by governing bodies and hence they are restricted in terms of mainstreaming sustainability.

6.3.7 Relevance and responsiveness to the environment

While the university is expected to respond to the key themes defined through sustainability declarations on higher education, there is also a need to establish the relevance of these in relation to the systemic environment. The role of the university should closely relate to its context or setting. An example is the MESA Universities Partnership which specifically addresses issues relevant to the context of participating universities in the broader African environment and development contexts, as shown in chapter 2 (section 2.3.5). Rhodes University is doing this to some extent, but this can still be expanded and enhanced.

6.4 A SYSTEMS APPROACH TO MAINSTREAMING

This section makes use of systems models and insights gained through the RU case to propose a systems approach to mainstreaming sustainability in response to contextual sustainable development issues. It uses systems concepts and models to discuss how universities can mainstream sustainability within the systems thinking framework. The suggested approaches entail mainstreaming of sustainability within the broader functional goals of universities but with a contextual focus.

6.4.1 Systems environment model

Environment: The university system has to be situated in its environment including the immediate environment and the overall environment in terms of being responsive to sustainability challenges. From the environment are political, social, ecological and economic needs that influence education in terms of policy, resources and other educational requirements. It is from the environment that systems get their students whom they educate before releasing them back into the environment (Banathy, 1992). Of importance within the framework of systems thinking and ESD is for universities to develop these students' ecological and sustainability literacy and systems thinking among other things, before releasing them into the environment.

Banathy (1992, p. 37) argued that education systems have to explore issues in their environment as this helps to “understand the educational implications of emerging societal changes and transformations that represent emerging societal expectations and requirements that Educational Activity Systems have to satisfy”. These changes in society are the ones which shape the purpose of education. In the case of this study, the sustainability assessment showed integration of both contextual and global sustainability challenges in the curriculum and research. However, in describing and analysing RU sustainability initiatives within the framework of systems thinking, only contextual sustainability challenges (Grahamstown and Makana District) were considered so as to emphasise the importance of context in sustainability issues. Besides this, the sustainability themes defined by sustainability declarations were contextualised at the university.

This study suggests the exploration by universities, of relevant sustainability challenges in both the systemic and the overall environment. Hopkins and McKeown

in their paper *Excerpts from Guidelines and Recommendations for Reorienting Teacher Education to Address Sustainability* (2006) talk about Education Faculties making decisions about the themes to emphasise in their programmes and practices to ensure that they fit the socio-economic and environmental context of their communities, regions and nations. Activities like research, community engagement, partnerships with other stakeholders and conferences can be instrumental in this exploration. It is important that a holistic approach be employed in exploration of these sustainability needs to determine how they interconnect and interrelate, in order to be able to define them comprehensively.

Inputs: In the light of the preceding description of environment, sustainable development inputs to the university are in the form of both contextual and global sustainable development challenges. These could be shaped by existing local, national, regional or global sustainability trends, or by regional and international meetings and research, for example Millennium Development Goals and sustainability policies.

Universities have to make an effort to create the conditions necessary for them to be in a position to engage in sustainability initiatives. Banathy (1992) suggested resources that the system requires in order for it to perform its designated duties as one form of inputs to the system. Universities should therefore source relevant resources for sustainability initiatives. Drawing from the RU example, there were problems of human resources and funding although there was allocation of resources over the past ten years which led to significant outcomes. Examples of additional inputs which universities may need in mainstreaming sustainability may therefore be as follows:

- staff with expertise and skills in sustainable development,
- research equipment for sustainability projects, and
- funding for sustainable development programmes, research, student and service activities and estates management.

These are only examples and can vary depending on the needs of the university in question. The list may also include other supplies like buildings and utilities if they are not already in place.

Relationships: According to Banathy (1992), education systems interact with other systems which include other educational institutions, business, industry, government, social agencies, etc. and at the same time, there are interactions which take place at the level of the components of the system. Interactions between systems at the same level or components of the same system are in pursuit of a common or shared goal. Within the broad education goals forming the basis of interactions at Rhodes University, there is need to create room for sustainable development issues where some of the interactions could be dedicated to sustainable development. In terms of system components, this can be in the form of a sustainable development forum with representatives from all the components of the university who can thus inform and spearhead sustainability initiatives in their respective divisions. At RU the Environmental Committee is one kind of a forum in which sustainable development related issues are included, but its major focus is on environmental issues rather than sustainable development. At the same time there is no comprehensive representation from all the departments/divisions/units at the university. The other suggestion is to develop partnerships at university level between the university and other universities or stakeholders who are dedicated to sustainable development issues. As discussed in chapter 2 (section 2.3.7), partnerships have the potential to improve both the quality and scale of responses while facilitating interdisciplinarity (Hemmati and Whitfield, 2003; Hopkins and McKeown, 2002).

Openness: The degree of interaction between the system and its environment defines its openness. Education systems were said to be open but are not completely open systems as their inputs are regulated and their outputs are specified (Banathy, 1992). The complex nature of current societal challenges (ibid.) thus leads to an increasing complexity of the input and the expected output. This seems to imply that universities have to be increasingly open in terms of communication of sustainable development challenges with the environment. This is being suggested owing to the fact that sustainable development challenges, besides being complex themselves, are emergent and evolving and, for effective sustainability strategies, universities have to keep up with emerging issues.

Self-regulation: Universities should be in a position to adjust themselves through adaptation or co-evolution (Banathy, 1992) so as to remain attuned to changes in the

environment. Adaptation involves correcting for errors to align the systems to changes in the environment while co-evolution would mean re-conceptualisation of the system in the light of substantial changes in society (ibid.). This seems to suggest that, while sustainability challenges are emergent, responses by universities have to be emergent too. Literature recommends co-evolution of education systems with adaptation being arguably inadequate (Sterling, 2003; 2004). This may be suggesting morphogenesis of systems (Archer, 1995) through sequences and cycles of structural elaboration and change (Ritzer and Goodman, 2004) which results in constant alignment of university activities to emerging challenges. The difficulty would be to evaluate and differentiate between adaptation and co-evolution in the context of morphogenesis.

Self-regulation is said to take place through either **negative feedback** (correcting for errors) or **positive feedback** (transformation) (Banathy, 1992) where performance of the system against expected outcomes is determined and analysed and results are used to inform activities within the system. Within the context of RU, the historical emergence of sustainable development initiatives (chapter 4, section 4.2) illustrated how the university has been self-regulating itself through deliberative processes, interactions and in response to new information and policy imperatives.

6.4.2 The functions/structure model

The functions/structure model is employed here in an attempt to define what universities should be doing in relation to sustainable development challenges. The study draws on the concepts of image, purpose, functions, components and structure (Banathy, 1992).

Image: Banathy (1992) put forward two aspects that the concept of image can clarify. The first one is: what is the system about? This draws from the expectations or the needs of the systemic environment and the expectations of people within the system in determining the image of the system. In the case of mainstreaming sustainability in universities, image should facilitate defining what the university should be doing in addressing sustainability challenges. This might entail articulation of the goal of mainstreaming sustainability among other university functions.

The second aspect that the concept of image can clarify is: what system type is it? The system can be rigidly controlled, deterministic or purposive (Banathy, 1992). RU has characteristics of both deterministic and purposive systems. Aspects of deterministic systems are evident in departments like Accounting and the Faculty of Pharmacy in which the curricula are mandated by governing bodies. Lecturers in these departments therefore do not have the freedom to alter the content of courses. In outreach activities, the university operates more like a purposive system. Drawing from the RU example, what may be important is for universities to clarify to what extent they are in a position to define and select their purpose, goals, methods, tools etc. in relation to mainstreaming of sustainable development in their operations and to specify the differences in this freedom among departments. This will give a picture of the responsiveness of the system to its environment. There might be a need for deliberate effort to improve the openness of the university to its environment.

Banathy (1992) identified people within the system as another source of image definition through determining the guiding principles, strategies and preferences. In the context of this study, this may entail actors within the system (for example, university professors, lecturers etc.) coming up with their sustainability values, principles and determining sustainability strategies to engage in. At Rhodes University, this pattern is reflected in the history of sustainability initiatives which shows that agency in both students and lecturers was influential in the implementation of some of the sustainability initiatives.

Purpose: the definition of purpose comes after image and further clarifies the image of the system. Drawing from several dimensions proposed by Banathy (1992) as generic and specific purposes of education systems, the following are suggested for addressing sustainable development:

- acquisition of information and knowledge,
- acquisition of resources, and
- articulation of responsibility by the system and its members.

Specific sustainable development purposes need to focus on the role of the system with regard to components including the larger society, systemic environment and

the community. Table 6.1 outlines suggested systemic components and services in pursuing sustainable development in universities.

Table 6.1 Suggested sustainable development purposes

Component	Suggested services
Larger society	Establishing global networks in sustainable development Engaging in debates on sustainable development within such networks Mainstreaming sustainability issues in relevant activities
Systemic environment and community	Mainstreaming sustainability challenges in the community in relevant functions and operations Educating the community about sustainability Providing expertise and resources to address sustainable development where possible Promoting ecological literacy among learners who will be going back into the community
Other systems	Networking and collaboration in finding solutions to sustainable development Providing and seeking relevant support in addressing sustainable development Educating or training other systems' members or having own system members trained by other peer systems
Learners	Facilitating their exposure to sustainability issues, e.g. through the curriculum. This can be through developing a compulsory module on sustainable development. Developing certain critical skills important in sustainable development, e.g. critical thinking skills, integrated problem solving skills (Roorda, 2001) Engaging them in sustainability debates.
Stakeholders (in sustainable development)	Being accountable in terms of set sustainability goals and priorities, quality of sustainability policies and programmes

Table 6.1 provides examples, drawing on insights gained in the context of this study in line with the defined key roles of universities (Wright, 2002; 2004). More services can be identified depending on the context of study. Issues of when and how the services will be offered and the constraints the system should consider (Walton, 2004) will also have to be elaborated. At RU these could include resources, disciplinary structures, lack of awareness of sustainability issues etc. as has been identified in chapter 4 (section 4.4.3).

The university will also need to specify how it wants to see itself as a system. Banathy (1992, p 82) used examples, two of which are:

- “be a societal institution that has a collective global vision of society as a whole and which makes purposeful contribution to human betterment.”
- “provide programmes, arrangements and resources through which individuals and social groups in the community can attain their fullest potential, enrich their inner quality of life and the quality of their environment and learn to direct their own lives and the lives of the systems in which they belong”.

While university purpose pertains to the overall role of the institution, there should be mainstreaming of its proposed role in sustainable development. This might mean the integration of sustainability explicitly in the university's vision and mission statement.

Functions: A system's functions relate very closely its purpose. Functions are specifications of what has to be done so as to fulfil the purpose (Banathy, 1992). While the key roles of universities in sustainable development were adapted from declarations on sustainability in higher education (Wright, 2002; 2004), there were no clearly defined functions in relation to some of the roles. The following is an outline of some of the functions of a system defined by Banathy (1992, p. 86) (in bold), and a suggestion of what these may entail in the context of sustainable development in universities.

- **Continuous interaction with the environment:** this may translate into continuous exploration of sustainability challenges which will feed into the system (e.g. Environmental Science participation in Millennium Ecosystem Assessment research that shaped changes in their curricula, EESU participation in the United Nations Decade of Education for Sustainable Development and resultant changes in the unit).
- **Continuously defining the purpose of the system:** this may entail the continuous re-definition of purpose in relation to the emergence of new sustainable development challenges (e.g. the emergence of the Makana Research Group to enhance university-municipality partnership needs).
- **Defining relevant systems to network with in the environment and identify opportunities for learning and human development:** this could involve establishing other relevant systems which have a stake in sustainable development for purposes of networking, sharing resources and other relevant opportunities (partnership building, for example, the university-municipality partnership at Rhodes).
- **Maintaining inter-linkages with the identified systems:** this may be through collaborative research, forums or use of their resources and vice versa, on a continuous basis (for example, the Makana Environmental Forum).

- **Maintaining, guiding and managing the functions:** as promotion of sustainable development is not the sole purpose of universities and because it is still relatively new, there may be a need to establish a task team to be responsible for monitoring and management of sustainability functions (for example, extension of the mandate of the Environmental Committee at Rhodes University).

Components: this stage is meant to select the component parts of a system that will be employed in executing the functions based on their ability and potential (Banathy, 1992). Drawing from examples in this study, components and their functions are proposed in Table 6.2.

Table 6.2 Systemic components and their functions

Components	Functions
Teaching departments or a specific sustainable development department	Developing sustainable development curricula Teaching sustainable development modules Research on sustainable development Initiation of sustainable development related community engagement initiatives
Research Institutions	Research on sustainable development Initiation of sustainable development related community engagement initiatives
Research Office	Mainstreaming sustainable development in research policy Seeking funding for sustainability projects
Human Resources Division	Employing staff competent in sustainable development for the teaching of sustainability modules. Staff development in the area of sustainable development
Estates Division	Re-orienting the Environmental Policy for it to be more upfront in sustainability issues Sustainable management of campus environments

Again, these are only a few suggested examples and do not represent the scale of university components which can be mobilised, and the nature, extent and relevance of the activities they can be involved in.

Banathy (1992) points out the need for self-assessment especially in terms of the usefulness of the structure/functions model for the intended purpose. This is important in mainstreaming sustainability in universities as challenges keep changing possibly suggesting the need for reviewing the relevance of the functions that components of a system may perform in response.

6.4.3 The motion picture model

According to Banathy (1992), human and educational systems are not static, they engage in processes which relate to their purpose. The motion picture model thus reveals the life of the system. It helps to define activities that take place between the inputs to a system and the outputs. The main concepts of this model are input processing; transformation; output processing; and feedback, adjustment and change.

Input processing: This requires communication between a system and its environment so as to facilitate the flow of input from the environment. The system should, in this case, decode and establish the relevance of messages so that only the pertinent information enters its boundary (Banathy, 1992). Only the selected input should be allowed to enter the transformation process. In the case of RU and sustainable development in general, the inputs to be assessed include sustainability needs and requirements which have to be screened so as to guard against irrelevant requirements. In terms of resources, input processing may entail determining that only relevant equipment in terms of sustainability projects is sourced, or, that people hired for sustainability programmes/projects have the relevant skills and experience. While at RU the study did not explore input processing, sustainable development issues addressed were dependent on the expertise at the university and resources available, including the history of emerging practices at the university in which review committees seemed to perform a significant function.

Transformation: Transformation entails systemic operations in which components get engaged in and use resources to accomplish a purpose. While Banathy (1992) used an example of the transformation of the learner, in the context of this study there are a multiplicity of targets besides the learner as outlined below:

- developing ecological literacy among students and the university community,
- sustainable building design and construction,
- sustainable landscaping,
- developing sustainable transportation systems,
- purchasing organic and local food, and
- researching sustainable development topics etc.

Transformation facilitation and management which ensure the continuity of the process and the smooth running of the system (e.g. by resourcing the system) (Banathy, 1992) can be the responsibility of a sustainable development task team in universities.

Output processing: This entails the identification and assessment of outputs and dispatching them into the environment and requires facilitation and management (Banathy, 1992). In sustainable development at universities, this can be the assessment of the relevance of solutions to sustainability problems prior to the solutions being implemented and the adoption of more coordinated approaches (for example, the deliberation of environmental and sustainability initiatives by the Environmental Committee at RU before recommending them for consideration by senate, which also deliberate on them before they can be implemented).

Feedback: Feedback from the output process determines if the system requires adjustments. To explain this in relation to sustainable development initiatives in a university context, the relevance of solutions (outputs) will determine whether there is need for changing anything in the operations of the system so as to improve quality of outputs.

6.4.4 Summary of the systems approach

Systems models drawn from in the discussion have been utilised as examples which served to demonstrate the usefulness of systems approaches in sustainable development in higher education. According to Banathy (1992, p. 17), “the systems view helps us to understand the true nature of education as a complex, open, and dynamic human activity system that operates in ever-changing multiple environments and interacts with a variety of societal systems”. In light of the above argument and in relation to sustainable development, building a systems view of universities which recognise their nestedness in their environments facilitates a deeper understanding of the nature and gravity of their roles, the operations and functions necessary to perform those roles, the relevant components and issues of how and when they should be executing them. Underlabouring the systems approach with critical realism (as discussed in chapter 1, section 1.7) facilitates an understanding the fallible nature of knowledge on sustainable development and enables going beyond human experiences to identify causal factors behind current sustainability initiatives and to

seek explanation in history which provides a social change vantage point for systems thinking.

What I think is a very important issue in sustainability in higher education is the fact that systems lenses, specifically the functions/structure model, guide systems in defining the tasks to be performed so as to accomplish their goals. This is one area which is still fuzzy because, even though sustainability declarations defined the roles of universities in addressing sustainable development, it is not clear how these roles are to be met. The problem with the model is that it could become structural functionalist through placing people in certain positions so as to fulfil the roles of those positions (Ritzer and Goodman, 2004); yet sustainable development challenges require critical and engaged change oriented responses in society for which professionals would need a degree of academic freedom. This should therefore be guarded against in employing the model. Wals (2007) and Folke's (2006) concepts of diversity and resilience in complex adaptive systems may be providing insights which might help to resolve this dilemma.

Involvement of actors within the system in defining the image of the system is another important aspect which can facilitate mainstreaming of sustainability in universities. It implies the involvement of the university community in determination of sustainability strategies and guiding principles. This facilitates a feeling of ownership among employees and therefore the possibility of eliminating resistance to change. This should also entail recognition of individuality, agency and autonomy which brings in the advantage of diversity and creates room for deliberations and reflective processes, resulting in improvement of the quality of responses. An example at RU is the historical emergence and morphogenesis of sustainable development initiatives (chapter 4, section 4.2).

Generally, use of the above models, complemented by critical realist tools for analysing causality and morphogenesis, can facilitate the development of systems approaches in mainstreaming sustainability in universities. The models and the critical realist tools help in developing a holistic approach in terms of identifying sustainable development challenges and in the way universities generate and accomplish their responses and can be useful reflexive tools for universities currently

'on a path/paths' towards mainstreaming sustainability into their operations and functions.

6.5 CONCLUSION

Drawing on critical realist ontology, this chapter established the causal factors that influenced mainstreaming of sustainable development at RU and the systemic challenges that are currently affecting mainstreaming activities. Some of the causal factors are rooted in the history and context of higher education in South Africa while others relate to the global context and to the internal environment. Systemic challenges were mostly embedded in the structure of the system. Through discussing the way systems models can be mobilised by universities in addressing sustainable development challenges, the study has demonstrated the potential of improving mainstreaming activities through drawing from systems thinking approaches complemented by critical realism. The next chapter provides a summary of the findings, reflections on the theories and tools used, recommendations and a conclusion.

7 SUMMARY, REFLECTIONS, RECOMMENDATIONS AND CONCLUSION

7.1 OVERVIEW

The purpose of this study was to investigate how universities can improve mainstreaming of sustainable development issues in their operations and functions in responding to sustainability challenges through use of systems thinking approaches. The research adopted a case study approach and is situated in the impoverished Eastern Cape Province in which societies are still grappling to recover from the ills of the colonial and apartheid period. The university is therefore faced by a double challenge of adhering to the higher education transformation policy and, at the same time responding to local, national and global sustainability agendas by re-orienting its functions and operations so as to address sustainable development challenges, which, as argued in chapter 2, are both contextual and universal (chapter 2, section 2.3.3).

The study context has shown that sustainable development issues are multi-pronged and do not have simple solutions, hence the call for learning institutions to play a role through education and other activities. The study is situated within the MESA Universities Partnership and is meant to inform the sustainability practices of African member universities through expanding and extending the techniques, approaches and insights that can be employed in mainstreaming sustainability in African universities.

The main research question the study is responding to is:

- How can universities mainstream sustainability in their functions and operations in response to contextual sustainability challenges in a changing environment using a systems approach?

The study drew on critical realism and systems theories which provided the ontological and epistemological perspectives respectively (See chapter 3, section 3.2 and 3.3).

This chapter summarises the findings of the study in relation to the objectives. It discusses my own reflections of the research process including the theoretical framework and the USAT. Limitations of the study and recommendations are also discussed before the conclusion.

7.2 SUMMARY OF FINDINGS

This section summarises the findings of the study. It provides a bird's-eye view of key results in relation to the research questions and the overall objective.

Emergence of sustainability initiatives at Rhodes University

Sustainability initiatives at Rhodes University were established to have emerged following the 1990 Talloires Declaration and they parallel the emerging international institutional developments in the early 1990s. The history of emergence of these issues shows that the university has been continuously realigning its operations to emerging sustainable development challenges. The emergence of sustainability initiatives created opportunities which have been and are still being taken advantage of in the continuous re-orientation of university operations to address emerging sustainability challenges. A systems wide response is emerging through ongoing morphogenesis and structural elaboration.

Sustainable development initiatives and the extent to which RU has mainstreamed sustainability issues

The study established that the university has mainstreamed sustainability in most of its functions and operations across various divisions including teaching, research, community engagement, physical operations and students' activities and can be described as an emerging system in sustainable development. Mainstreaming activities include incorporation of sustainability topics in the curriculum and research, community engagement involvements targeting sustainable development issues (initiatives which sometimes include students), other practices like water and energy saving, use of organic fertilizers, sustainable landscaping, recycling, establishment of specific programmes, chairs and other facilities for sustainability initiatives. What is not consistent is the level to which this mainstreaming has taken place owing to the fact commitment to sustainability is not very apparent and there are departments and staff members who feel that they are not obligated to be involved in sustainability

activities. At the same time, initiatives which facilitate developing awareness and capacity among staff members are not obligatory.

The other characteristic of sustainability initiatives at the university is that some of the university-wide initiatives like the Makana Schools Partnership and Makana Research Group have not yet been adopted widely, but are in the process of being promoted in teaching departments and research initiatives. In some teaching departments, integration of sustainability is still low or partial, and only certain dimensions or a few aspects of sustainability are mainstreamed. Some of the high scores obtained from the USAT assessment relate to levels of integration of sustainability issues without considering whether all the dimensions and aspects of sustainable development are mainstreamed.

Approaches to mainstreaming, enabling and constraining factors

Only a few departments/units at RU use a holistic approach in addressing sustainable development where the three overall dimensions of the concept are mainstreamed. These include Environmental Science, Geography and Education. Other units/departments at the university were found to be addressing only one or two aspects of sustainable development with their subjects restricting mainstreaming to discipline related dimensions. Generally departments in humanities were people centred and addressed social sustainability issues; those in economics were economic centred and hence focussed on economic issues, while those in sciences were in most cases mainstreaming ecological issues. This diversity of approaches and of issues addressed presents the university with a learning opportunity in the face of complex challenges like sustainable development which have no simple or straightforward answers.

A variety of factors that are influencing mainstreaming activities both positively and negatively were identified through interviews. Those that enabled mainstreaming include the international sustainability discourse, personal interest of staff, availability of technology, market demand, among others. Members of staff at RU identified resources, disciplinary restrictions, and in some instances, lack of awareness and interest, as obstacles to mainstreaming of sustainable development issues.

Relevance of sustainability initiatives to context and key roles of universities

Sustainability initiatives at the university were found to be relevant to contextual sustainability challenges (which are more or less similar to thematic areas of relevance to the African context defined by the Kasane and Ubuntu Declarations). This indicates system communication and responsiveness to the environment. Initiatives at the university were related to at least most of the contextual challenges identified by the study through literature and the majority of them were interventionist.

In most cases however, the initiatives were established to be at a small scale partly due to the fact that they are emerging from the context of individuals/departments (rather than from the whole institution) or depending on availability of expertise and resources. While some are departmental initiatives, a number are at the level of a single staff member. However, there is an emergence of more coordinated approaches exemplified by the Makana Schools Partnership and the appointment of the Community Engagement Director which is likely to improve such coordination.

With regard to the key themes associated with the roles of universities (Wright 2002; 2004), Rhodes University has initiatives in place which relate to each of these. While some of the responses are arguably relevant, the extent to which the university is responding to each of the themes differs. Themes like research, ecological literacy and community engagement are closely related to the functions of universities and that might be the reason why most initiatives at RU work through them. Distribution of initiatives within departments/units is also varied maybe due to variations in disciplinary foci and availability of expertise. While the university has some policies which are sustainability-related, for example its Environmental Policy, HIV/AIDS Policy and Community Engagement Policy, an analysis of the synergy among these policies has not been done, thus there is no coordination in their implementation.

Causal factors

A number of causal factors were identified by the study to have influenced mainstreaming of sustainability. Some are embedded in the history and context of the university while others relate to structure and agency. What was more striking in relation to structure and agency is the fact that while there was agency in staff members which led to some mainstreaming activities, and which could still be tapped into to extend and expand such initiatives, these initiatives were structurally

regulated. Carter and New (2004, p. 6) argue that people choose what they do but make their choices from “a structurally and culturally generated range of options – which they do not choose”. Using Archer’s (1995) morphogenetic approach facilitated understanding and explaining the emergence of sustainability initiatives at the university through cycles of structural/cultural conditioning, social/socio-cultural interaction and structural/cultural elaboration (see section 4.2). There were instances where agents had a negative influence through deciding not to adopt sustainability. At the same time, other projects were also made possible through structural factors, for example, financial support and staff allocations.

Systemic issues

The major systemic issues that the study identified as requiring attention so as to improve mainstreaming include complexity where there are variations in sustainability issues mainstreamed and a diversity of approaches that are used which point towards complex adaptive systems thinking. The study also identified the absence of an apparent pronouncement at institutional level of commitment to sustainability through goals, policy, or guidelines. Also reported in many departments/units was lack of support in the form of resources for sustainability initiatives. Other issues relate to governing rules which do not leave room for adoption of sustainability initiatives and the need for enhanced system responsiveness to the environment in view of the emergent nature of sustainability challenges.

A systems approach to mainstreaming

The study established the possibility of improving sustainability practices through extending the emergent systems thinking approach to mainstreaming sustainability in universities. This was done through discussing the usefulness of systems models and concepts in university sustainable development initiatives, drawing examples and lessons from the Rhodes University case. These include the systems/environment model, the functions/structure model and the motion picture model (Banathy, 1992), complex adaptive systems thinking (Folke, 2006) and critical realist insights into causality, fallibility and emergence/morphogenesis.

Building a systems view of education by way of employing systems models in ESD can help universities to reflect on and review their roles in response to sustainability challenges. It facilitates understanding of the complex nature of these institutions and

that of their environments, and how they can be mobilised to respond to changes in the environment.

7.3 REFLECTIONS ON THE RESEARCH PROCESS

7.3.1 Theoretical framework

Aspects of critical realism provided me with a useful framework that the study relied on both for theoretical and analytical purposes. Its theory of ontological depth and causality facilitated a deeper understanding of the causal factors that are influencing the sustainability initiatives that staff members at RU are involved in, thus unearthing a reality beyond what we see and experience. It facilitated understanding sustainable development issues in context. The morphogenetic approach provided for an understanding of the emergence/morphogenesis of sustainability issues at RU and social change processes by foregrounding the importance of an historical perspective on the development of systems approaches to mainstreaming which is also important when dealing with contextual issues like sustainable development challenges. Critical realist insights into fallibility enabled an understanding of the fallibility of knowledge in the context of ever-changing and contextual sustainable development issues.

The **empirical** level of reality informed the sustainability assessment which culminated in building a picture of the extent to which the university has integrated sustainability issues in its functions and operations. Data from content analyses facilitated establishing sustainability topics pursued through the curriculum and research activities.

The **actual** level of reality facilitated establishing the sustainability related processes taking place on the ground. This was in form of the nature of sustainability initiatives; enabling and constraining factors; the approaches being employed; and processes believed to have the potential to positively contribute to mainstreaming. This was done through content analyses and interviews. An inductive mode of inference was employed at both the actual and the empirical levels.

The **real** level of reality probed the causal mechanisms behind the actualised and experienced reality. Some of the causal factors were discovered to be embedded in

the history and context of the university. A retroductive mode of inference was utilised which facilitated going beyond the empirical and actual levels to explain mechanisms populating the real level of reality, both those influencing the emergence of a systems approach to mainstreaming sustainability at RU, and those that can help to improve sustainability initiatives at the institution and extend the systemic nature of mainstreaming of sustainability.

The **morphogenesis and structure and agency perspective** was employed in tracing the history of emergence of sustainability initiatives at Rhodes University. It facilitated understanding the historically located social interactions behind emerging networked relations between component parts of the RU system, and how these interactions resulted in the reorganisation/elaboration of the system through the emergence of new initiatives. These interactions and resultant structural elaborations have been shown to be taking place in sequences of cycles explained through the morphogenetic cycle. This facilitated understanding that with regard to sustainability, the university is an emerging system and is likely to continue realigning itself with emerging sustainability challenges as it has been doing since the establishment of the Murray and Roberts Chair of Environmental Education in 1990, which coincided with preparations for the Rio Earth Summit (1992) and the University Leaders for a Sustainable Future initiative to involve university leaders in sustainability related issues and the Talloires meeting (1990) which the Rhodes University Vice Chancellor attended.

Systems thinking provided the study with a conceptual framework, and some of its models and concepts were employed in analysing data. Following induction (empirical and actual levels of reality), data was then recontextualised within a systems thinking approach to facilitate understanding within a different context. Systems thinking enabled seeing interrelationships among the component parts of the RU system hence enabling identification of the historical emergence of sustainability initiatives and systemic dissonances. At the same time, the relationship between the whole RU system and its environment helped in determination of the extent and the contextual nature of the university's responses to sustainability challenges and the key themes associated with the roles of universities in sustainable development.

The main goal of the study was to determine how university functions and operations can systematically address contextual sustainability challenges in a changing environment. Through making cross-references to the case of RU, systems thinking models were also employed to explore this goal.

The fact that systems thinking emphasises holism had to be critically considered in delineating the system of concern in the study without falling into the trap of reductionism. As discussed in chapter 3 (section 3.3.4), a system is difficult to define as it can be a cell, a human being or an organisation etc. The study thus considered the general characteristics of a system (see introductory paragraph to section 3.2) and selected three levels including the systemic environment (supra-system), the system of concern (primary system) and its sub-systems (system components). However, because the sub-system level in the case of universities is populated by departments, operational units and divisions upon which the USAT tool was based, this obscured the role of agency in the operations and emergence of the system. Individual agency and the history of structure/agency relations turned out to be another important analysis level when considering issues that emerged from the data, hence the inclusion of morphogenetic analysis. Since the study also drew on critical realism, a deeper explanation of the current status of the mainstreaming process at RU in relation to history, systems thinking and emergence could be obtained. This demonstrates the importance of employing more than a single theoretical framework.

7.3.2 The USAT

From my experience of working with the USAT, I found it to be quick and easy to use. It has the advantage of being unit-based which, for example in the teaching departments, gives one an option to assess only a sample of departments and not the whole university. Data generated can be easily presented in clear and simple to read graphical representations in which identification of strong and weak areas in departments/units is easy. The results give a good outline of the current state of mainstreaming activities at the university. However, as demonstrated in the case records, USAT data needs to be extended with document analysis and interviews, and careful verification to ensure validity and a more comprehensive picture as, on its own, the tool is not an adequately reliable reflection of sustainability in a particular unitary context.

While results of the USAT give a good outline of the amount of sustainability work going on within each of the departments, they do not give an indication of performance of the departments against the totality of environmental and sustainability issues. The scores basically reflect the commitment given to sustainability issues in courses without considering whether or not all the dimensions of sustainable development are included. This has resulted in some departments obtaining high scores even though they only address one or two dimensions of sustainable development, which required distinction between strong and weak concepts of sustainability and differentiation between reductionist and non-reductionist approaches. It was also necessary to interpret this within the context of disciplinary diversity which characterises the *raison d'être* of universities and education systems, due to existent knowledge structures in society.

The USAT also leaves out other important aspects which determine university sustainability, for example, institutional vision and mission statements, environmental/sustainability and other related policies, committees and cross-faculty collaboration. To address this, minutes of cross-faculty initiatives and university wide reports needed to be consulted and analysed for cross-faculty links and co-operation.

Some of the indicators were not well understood by respondents as they had to be explained before responses were given. At the same time, data generated from some of the indicators, for example, with regard to curriculum and research were not explicit in specifying the sustainability topics of concern. The tool does not have the ability to go beyond the empirical level of reality to unravel the processes and causal mechanisms beyond experienced reality.

More or less similar experiences were reported by members of the MESA network in various contexts. Those which are a bit different from the above-mentioned include that Part C of the tool was difficult for students to comprehend. Others who used the tool reported that some of the issues it captures are not of immediate concern or not applicable (initiatives not yet in place) in their contexts. Curriculum and research indicators were said to be too vague to yield accurate responses. This is probably due to the fact that the tool does not specify the “relevant” sustainability issues it

talks about. Also reported is the fact that understanding of the tool was difficult because of minimal sustainable development knowledge in some contexts (MESA International Training Programme Reports, 2008).

These weaknesses of the USAT were addressed in the study through triangulation with other data collection methods as mentioned earlier. Content analyses of selected documents and historical data facilitated establishing sustainability topics departments had mainstreamed in their courses, community engagement and research. Data analysed to establish constraining and enabling factors; and approaches being used in mainstreaming sustainability were collected through interviews. Both the data from interviews and content analyses were probed to determine causal mechanisms influencing sustainability at RU. The historical emergence and morphogenesis of sustainability at the institution in response to sustainability issues was also determined following content analyses of documents. In cases where USAT indicators are found to be irrelevant to contextual issues, the tool offers in-built flexibility where users can add indicators relevant to their contexts.

To specify and clarify relevant sustainable development aspects, in the context of Rhodes University, the original USAT (Appendix 2, no.1) was modified to include a description of the meaning of sustainability and to give examples of initiatives that universities moving towards sustainable development are engaging with on each part of the tool (see Appendix 2, no.2). At the same time, the fact that all the assessments were done in my presence facilitated addressing arising questions thereby eliminating misunderstandings of indicators.

7.3.3 Contribution to new knowledge

One of the contributions of the study to new knowledge is related to the theories that were utilised. The study has demonstrated the possibility of employing critical realism as an underlabourer to systems thinking approaches in ESD related research in universities focussing on mainstreaming of sustainability in relation to contextual sustainable development issues.

This study contributes to exploring the usefulness of systems thinking methodology in considering mainstreaming of sustainability in higher education adding to Sterling's (2003) work. The study also suggest ways of employing systems thinking and critical

realist analysis to inform mainstreaming of sustainability in response to contextual sustainable development issues in universities. While case studies are not generalisable to whole populations, according to the realist concept of generality, theoretical propositions summarising the causal mechanisms can be generalised to other contexts (see chapter 3, section 3.5.2). These suggestions can be employed elsewhere in the context of universities who have an interest in mainstreaming sustainability in response to contextual sustainable development challenges. The study recognises the contextuality of such processes and therefore argues that systems approaches need to be historicised in relation to contextual factors and in relation to causality, if an adequate (if fallible) account of the emergence of systems approaches is to result.

The other contribution to new knowledge made through the study is the development of an assessment tool (USAT) which has already been tested and found to be useful in other universities in Africa (MESA International Training Programme Reports, 2008). Other universities using the USAT have also reported the need for additional data collection and analysis work, but have noted the USAT's usefulness to 'get started' with sustainability assessments in universities within a systems framework (ibid.). While there are a number of other sustainability tools that have been and are being developed throughout the world (see chapter 2, section 2.4), the USAT is innovative due to the fact that it is unit-based which means it can be used at the level of a single department while still allowing for building the whole picture of the university from these departments/units. This differs from most sustainability assessment tools which operate at the level of the whole university. As shown in this study, the USAT is partially useful in establishing an accurate assessment of sustainability in universities and hence is best complemented by historical institutional links data which can be obtained from documents and interviews, and analysed within morphogenetic and systems frameworks. Thus, the collected data provides for accuracy at a micro-level which is often lost in more generalised assessments.

7.3.4 Limitations

Not all departments/units/divisions at the university were included in the study. This was meant to contain the scale of the inquiry owing to time limitations (see chapter 2, section 3.5.3). Even though reported sustainability initiatives are not comprehensive,

they turned out to be a representative sample of activities on the ground as they enabled me to adequately respond to the research questions reflecting theoretical saturation. The scope of the study did not include a consideration of feedback from implementation of sustainability outputs. This was again to limit the scope of the study by staying within the boundary of the system of concern (see chapter 5, section 5.2.5).

7.4 RECOMMENDATIONS

Implied in the main research question is the objective of developing recommendations which are meant to improve mainstreaming activities within universities through adopting a systems approach in response to contextual sustainable development challenges. Drawing on the research findings, some suggestions can be made to inform future sustainability practices in universities. The following is an outline of these recommendations.

7.4.1 Making the goal of mainstreaming more explicit

Infusion of sustainable development terminology in the vision and mission statements: Introducing sustainable development terminology in the university's vision and mission statement may assist in making the university's commitment to sustainability more explicit, which might influence behaviour within RU. The goal of sustainability is there in the statements but is not explicit enough and, owing to misunderstandings of what sustainability entails (which was also evident at the university), it might be difficult for some members of the institution to recognise it.

Environmental Policy: The RU Environmental Policy only stresses excellence in environmental studies and practices without much reference to sustainable development. Even the sub-objectives of the policy only made reference to environmental rather than sustainability initiatives. There might therefore be a need to re-orient the policy so that the sustainability objective becomes more explicit and upfront for the sustainable development discourse to find resonance within the institution. This may facilitate recognition of the institution's commitment by members of the university community hence promotion of mainstreaming activities in their work. At the same time, there is a need to create synergies among the Environmental

Policy and other RU policies at the university which have a sustainability dimension, for example, the Community Engagement Policy and the HIV/AIDS Policy.

Defining the university's understanding of sustainability: Given the fact that sustainability challenges are contextual, there is need for the university to define a negotiated understanding of sustainable development and to map out the sustainability challenges of relevance in its context. This could be done in conjunction with facilitating a better understanding of sustainability among staff, which, besides capacitating them to mainstream sustainability, may also deal with other contradictions and dissonances through complementary work.

7.4.2 Adoption of a systems/holistic approach in mainstreaming sustainability

The study recommends that universities adopt a systems thinking framework in mainstreaming sustainability characterised by the following:

Systems-wide approach: Rhodes University has been shown to be an emerging system in sustainability. However, there is still need to strengthen mainstreaming of sustainability in departments and divisions which are not emphasising it in their operations and function. This is especially important in management divisions which influence the operation of other sections of the university, examples being Human Resources and Research Offices. This would potentially result in positive interrelationships between the divisions of the university thus improving the functioning of the system in addressing sustainability. Teaching departments like Management and Accounting which have low integration of sustainability also need to have their sustainability focus strengthened across their functions.

Strengthening interrelationships in sustainable development: While the study appreciates the structural factors which led to diverse and discipline centred approaches in mainstreaming in some departments, there is need for the university to put in place mechanisms to promote networks and hence dialogue in sustainable development between departments. In this case, diversity and contradictions can be taken advantage of as learning opportunities (Wals, 2007). The emergence of patterns of interaction from an apparent disorder through rules that guide change

(Folke, 2006) can facilitate the development of the institution into a complex adaptive system in sustainable development.

Involvement of all students: Not all students at the university are exposed to sustainability-related courses due to various factors including that some of the modules were optional, their departments did not offer such courses and they could not opt to do such modules in other departments for a variety of reasons. If plans for implementing a mandatory module with sustainability content for first years is successful, this might enable the exposure of all undergraduate students to the fundamentals of sustainable development. Foregrounding the basics of sustainable development can create an understanding of 'the fundamentals' of the subject, which in themselves have been shown to be contested and emergent. However, Wright (2004) argued for interdisciplinarity which is discussed below.

Holistic approach to sustainable development through developing interdisciplinary curricula: Sustainable development issues are multi-dimensional and interconnected and this should be recognised in mainstreaming activities. Currently at Rhodes University, students from one department can opt to do courses in other departments which promotes multidisciplinary. There is still need to promote interdisciplinarity in departments whose disciplines focus on a single dimension of sustainable development so as to recognise the holistic nature of sustainable development. This would facilitate developing an understanding among students of the connections and interlinkages between individual subjects and the environment which promotes the development of ecological [and sustainability] literacy among students (Wright, 2004). Also important is exposure of students, through their chosen disciplines/subjects, to concepts which facilitate developing students' systems thinking, for example, systems thinking and its application, holistic thinking, complex adaptive systems, resilience thinking among others. There is also a need to develop an understanding of the fallibility of knowledge on sustainable development (chapter 2, section 2.3.5.3) and the contextualised nature of sustainable development challenges.

Whole university community: The study discovered that not all the staff members at the university had a comprehensive understanding of what sustainable development is about and what it entails, and most significantly its significance to

themselves and their work. There is therefore a need for developing faculty capacity in sustainable development more comprehensively. Sustainability awareness and understanding can be promoted through training sessions for all members of the university community through, for example, the Centre for Higher Education Research, Teaching and Learning (the former Academic Development Centre), or through cross-disciplinary links.

7.4.3 Enabling the system

Banathy (1992) talks about developing enabling systems in systems design of Education Activity Systems. The central aspects of this argument relate to the capability and capacity of the systems to deliver required functions thus attaining their purposes. With regard to the findings of this study, these enablers could be in the form of setting up a sustainability task-force to spearhead sustainability work at the university and setting aside resources specifically for sustainability initiatives.

Sustainability task-force: Forming a task-force responsible for coordinating sustainable development initiatives may help improve work in sustainable development. Rhodes University already has structures which are currently engaged in sustainability issues at the university, for example, the Environmental Committee. The sustainability task-force can therefore be formed within such a committee where there are already people with a high level of understanding and appreciation of sustainable development. The major role of the task-force would be to facilitate campus-wide mainstreaming of sustainability, awareness and training and coordination of such activities. It could also be useful to have representatives across all the faculties and divisions at the institution so that coordination of activities will be at lower levels and therefore less complex. The task force could also be the one responsible for screening sustainability input from the environment and assessing the relevance of the output. Setting up a task-force in ESD entails introducing another university sub-system thus increasing complexity. However, Banathy (1996) argued that the only solution to complexity is complexity; hence it will be a necessary self-reorganisation process. In the case of Rhodes University, the emergence of sustainability issues was already shown to have been based on cycles of complexity and self-reorganisation as explained earlier using the morphogenetic approach.

Resources: Committing more resources to sustainable development initiatives is the other way of ensuring the capacity of the system in ESD. These can be in the form of funds for starting sustainability practices, programmes, research and/or community engagement initiatives. At the same time, these can be in the form of additional human resources intended for advancing sustainable development. As shown by the history of sustainable development at Rhodes University, initial resources committed to sustainability led to positive impacts through cycles of emergence of new initiatives.

Rewards: Rewarding the sustainability efforts of individuals and departments is an indication of institutional recognition of efforts and may therefore help in promoting sustainable behaviour. Rewards have already been considered in sustainability work in other contexts (see Martin, Dawe and Jucker, 2006).

7.4.4 Coordination of efforts

The study also recommends coordination of efforts between universities, the community and other stakeholders. This is in view of the multi-faceted nature of sustainable development problems which imply that solutions are not vested in universities alone. Besides, responsibility for unsustainable patterns lies with all humanity and hence the solutions too. Coordination attempts are already emerging at the university in the form of the university-municipality partnership agreement, the Makana Research Group and the Community Engagement Division. Similar attempts may need to be introduced in other sustainability efforts at the university.

7.5 FUTURE RESEARCH

Future research could target beneficiaries of sustainability initiatives specifically to build a comprehensive understanding of their sustainability needs and requirements, and the scale of the challenges they face. This facilitates comprehensive input processing by the university and a more systematic adoption of initiatives in relation to available expertise. This study relied only on available literature but in view of the fact that sustainable development challenges are temporal and emergent, there is a possibility of missing newly emerging issues as has been indicated in section 7.3.4.

An important area of future research which this study opens up is going beyond the university into the community to understand the contribution of university initiatives in addressing contextual sustainability challenges. This would facilitate understanding how adequately the challenges are being addressed and the relevance of the responses from the point of view of the beneficiaries. This would strengthen communication between the university and its environment and, through feedback mechanisms, possibly lead to system adjustment in terms of refocusing and hence improving the quality of sustainability initiatives at the university.

While this study is not an intervention study, possible future research in light of the findings could use the recommendations of the study to intervene through informing sustainability practices at RU and then auditing the resultant changes against the baseline data collected in this study. This would help to test and verify the contribution of the systems thinking approach in sustainability in higher education.

Future research could also be targeted at establishing how sustainability initiatives facilitate building and enhancing resilience in communities. This is important as it recognises the fact that sustainable development is not a goal or an end state. As shown in this study, sustainable development and ESD in universities requires an emergent approach to systems thinking in response to changes in sustainable development issues and changes in structure–agency relations. The full implications of a critical realist morphogenetic orientation to complex adaptive systems thinking within a depth ontology could therefore also form the focus of further research.

7.6 CONCLUSION

This chapter provided a summary of the key findings in relation to the research questions. It has also highlighted my reflections on the research especially in relation to the theoretical frameworks before discussing the contribution of the study to new knowledge and its limitations. The chapter then made recommendations for improving sustainability initiatives within a systems framework and suggested possible future research opportunities.

I believe that the study managed to respond to the main research goal it set out to address. The overall conclusion of the study is that through use of systems models and concepts underpinned by critical realist ontology and an understanding of

morphogenetic change processes, university functions and operations can be mobilised in mainstreaming sustainability as a way of responding to contextual sustainable development challenges. This is however only possible where there is commitment from the university community and where enabling inputs like financial and human resources are available to facilitate the process. It is also important for the university to re-orient its written statements, to work in collaboration with other stakeholders, and to recognise and appreciate that such an approach is historically emergent and ever-changing.

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APPENDIX 1: ENVIRONMENTAL POLICY

RHODES UNIVERSITY

ENVIRONMENTAL POLICY

1. Policy Particulars

Date of Approval:

Date of Approval by Senate: 1998

Date of Approval by Council: 1998

Commencement Date: February 1998

Revision History:

Review Date:

Policy Level: All University structures, staff and students

Responsibility [Person/Division/Committee accountable for]: Mark Hazell

- **Implementation & Monitoring:**
- **Review & Revision:**

Reporting Structure:

2. Policy Statement

Policy Declaration

In establishing this policy for Rhodes University, the University recognizes that its use of resources has an impact on the environment (socio-economic and physical). As a University that strives to meet internationally acceptable standards, Rhodes University should play a leading role within the Eastern Cape and South Africa in respect of environmental issues.

2.2 GOAL

The University will actively pursue a policy of environmental best practice in order to assist in creating an environmentally sustainable future.

2.3 AIMS

1. To include and improve the environmental components of curricula.
2. To provide opportunities for students to study campus and local environmental issues.
3. To conduct a campus environmental audit.
4. To implement an environmentally responsible purchasing and campus stores policy.
5. To reduce campus waste.
6. To improve hazardous waste identification and management on campus.
7. To maximise campus energy efficiency.
8. To encourage the planning of indigenous flora on campus.
9. To optimise and control the use of water on campus.

2.4 OBJECTIVES

2.4.1. Educational

Curricula

Rhodes University intends to enhance (increase and improve) the environmental content of curricula offered in all faculties at Rhodes University by:

1. Improving awareness amongst teaching staff around the environmental content of courses.
2. The inclusion of environmental issues in curricula where appropriate.
3. Promoting the environmental orientation of Rhodes for marketing and fund-raising purposes by producing suitable publicity.

Research

The University will commit itself to encouraging environmental research by:

1. Encouraging students and staff to conduct environmental research on campus and in local areas (communities). Environmental audits could highlight possible environmental research issues.
2. Ensuring that research carried out at Rhodes is ethically and environmentally sound.
4. To establish a set of guidelines for research that could have a possible impact on the environment.

2.4.2. Resource Use

Waste

The University will aim to improve its management of both general and hazardous waste produced on campus by:

1. Minimising (reducing and /or recycling) wherever possible its solid and liquid waste streams at all discharge points on campus.
2. Using recycled products wherever feasible.
3. Adopting a purchasing policy sensitive to environmental concerns.

4. Identifying and minimising hazardous wastes on campus.
5. Ensuring satisfactory disposal of wastes (hazardous and general) that cannot be re-used or recycled.
6. Conducting a regular waste audit to assess improvement of waste management strategies on campus and to communicate these results to relevant parties.

Energy

The University will aim to maximise campus energy efficiency by:

1. Minimising and monitoring the total energy consumption.
2. Implementing wherever possible to best available energy technology for all new buildings and in existing structures where possible.

Water

The University will aim to manage its water resources efficiently:

1. Minimising and monitoring the total water consumption.
2. Ensuring that water systems on campus are not wasteful.
3. Encouraging the planting of indigenous flora to reduce water usage.

2.4.3. Partnerships and Communication

Community Involvement

Through the implementation of the Rhodes University Environmental Policy it is important that partnerships are encouraged and formed between those directly associated with and affected by the actions of the University. This will be achieved by:

1. Approving and facilitating interactions and communications of the University's environmental actions between the University and members of the communities which surround its campuses and with which its staff interacts.
2. Reporting annually on how environmental practices in the community have been addressed by the University.

Student Involvement

The University will encourage students to play an important role in the implementation, maintenance and assessment of the environmental policy by:

1. Increasing the ways in which students can participate in the policy implementation i.e. through research.
2. Ensuring policy implementation is fed back to the students via relevant media.
3. Reporting annually on how students have been involved in implementing the policy and assessing environmental issues on campus.

Management Involvement

The University management will:

1. Incorporate the environmental responsibility into its mission statement.

2. Continue to uphold the University's responsibilities as a signatory of the Talloires Declaration.
3. Ensure the implementation and monitoring of the environmental policy.
4. Ensure that the University community is aware of the policy and to communicate the results of the monitoring process.
5. Maintain an environment which is conducive to good scholarship and provides good working conditions.

**2.5 The Talloires Declaration:
University Presidents for a Sustainable Future
Tufts University European Centre,
Talloires, France
October 4-7, 1990**

2.5.1. Background

Twenty-two Presidents, Rectors and Vice-Chancellors of Universities from all over the world convened at the Tufts European Centre in Talloires, France, from 4 to 7 October 1990, to discuss the role of universities and in particular, the role of university presidents in environmental management and sustainable development.

Assisted by internationally respected environmental leaders, the presidents explored the state of the natural environment, the impact of human population growth and economic activity on the environment and strategies for the future.

The presidents discussed the role of education, research, policy formation and information exchange in managing human impact on the environment. Since the majority of the presidents were from developing countries, concerns about resource depletion, poverty and the need for substantial assistance from developed countries received equal attention with local, regional and global pollution problems.

The Conference was organised and hosted by Tufts University President, Jean Mayer and sponsored by grants from the Rockefeller Foundation, the US Environmental Protection Agency and the John D and Catherine T MacArthur Foundation. After a keynote address by Maurice Strong, secretary general of the United Nations Conference on Environment and Development (to be held in Brazil in June 1992), the presidents developed a series of recommendations which are summarised in this report. The Conference ended with a declaration of actions to be taken by the participants.

The presidents believe this conference is an important first step in engaging the considerable resources of universities to work toward an environmentally sustainable future. They pledge mutual support as they take actions at their own universities to implement the recommendations. They hope their deliberations will encourage other university leaders to initiate programs to prepare their graduates for the challenges of the twenty first century. They invite their colleagues to sign the declaration and join them in these efforts.

2.5.2. The Text of the Talloires Declaration

We, the Presidents, Rectors and Vice-Chancellors of universities from all regions of the world are deeply concerned about the unprecedented scale and speed of environmental pollution and degradation, and the depletion of natural resources. Local, regional and global air pollution; accumulation and distribution of toxic waste; destruction and depletion of forests, soil and water; depletion of the ozone layer and emission of "green house" gases threaten the survival of humans and thousands of other living species, the integrity of the earth and its biodiversity, the security of nations, and the heritage of future generations. These environmental changes are caused by inequitable and unsustainable production and consumption patterns that aggravate poverty in many regions of the world.

We believe that urgent actions are needed to address these fundamental problems and reverse the trends. Stabilization of human population, adoption of environmentally sound industrial and agricultural technologies, reforestation and ecological restoration are crucial elements in creating an equitable and sustainable future for all humankind in harmony with nature. Universities have a major role in the education, research, policy formation and information exchange necessary to make these goals possible.

The university heads must provide the leadership and support to mobilise internal and external resources so that their institutions respond to this urgent challenge. We, therefore, agree to take the following actions:

1. Use every opportunity to raise public, government, industry, foundation and university awareness by publicly addressing the urgent need to move toward an environmentally sustainable future.
2. Encourage all universities to engage in education, research, policy formation and information exchange on population, environment and development to move toward a sustainable future.
3. Establish programs to produce expertise in environmental management, sustainable economic development, population and related fields to ensure that all university graduates are environmentally literate and responsible citizens.
4. Create programs to develop the capability of university faculty to teach environmental literacy to all undergraduate, graduate and professional school students.
5. School deans and environmental practitioners to develop research, policy, information exchange programs and curricula for an environmentally sustainable future.
6. Establish partnerships with primary and secondary schools to help develop the capability of their faculty to teach about population, environment and sustainable development issues.
7. Work with the UN Conference on Environmental and Development, the UN Environment Programme and other national and international organizations to promote a worldwide university effort toward a sustainable future.
8. Establish a steering committee and a secretariat to continue this momentum and inform and support each other's efforts in carrying out this declaration.

Jean Mayer, President and conference Convener, Tufts University, USA / Pablo Arce, Vice-Chancellor, Universidad Autonomade Centro America, Costa Rica / L.Ayo Banjo, Vice-Chancellor, University of Ibadan, Nigeria / Boonrod Binson, Chancellor, Chulalongkorn University, Thailand / Constance W. Curris, President, University of Northern Iowa, USA / Robert W. Charlton, Vice-Chancellor and Principal University of Witwatersrand, Republic of South Africa Michele Gendreau-Massalous, Recteur de l'Academie de Paris, France / Adamu, Nayaya Mohammed, Vice-Chancellor, Ahmadu Bello University, Nigeria / Augusto Frederico Muller, President Fundacao Universidade Federal de Mato Grosso, Brazil/Mario Ojeda Gomez, President, Colegio de Mexico, Mexico / Calvin H. Plimpton, President and Emeritus, American University of Beirut, Lebanon / Wesley Posvar, President, University of Pittsburgh, USA / T Navaneeth Rao, Vice-Chancellor, Osmania University, India / Pavel D Sarkisov, Rector, D I Mendeleev Institute of Chemical Technology USSR / Stewart Saunders, Vice-Chancellor and Principal University of Cape Town, Republic of South Africa / Akilagpa Sawyer, Vice Chancellor, University of Ghana, Ghana / Carlos Vogt, president, Universidade Estadual de Brazil / David Ward, Vice Chancellor, Canipinas, USA / Xide Xie, President Emeritus, Fundan University, People's Republic of China.

The list of the Talloires signatories is to be found at:

<http://www.ulsf.org/about/tallosig.html>

APPENDIX 2: UNIT-BASED SUSTAINABILITY ASSESSMENT TOOL

1. ORIGINAL USAT FOR MESA UNIVERSITIES

Unit-based Sustainability Assessment Tool

draft
draft

A resource book to complement the UNEP
Mainstreaming Environment and Sustainability in
African Universities Programme

*Developed for use and refinement in the Swedish/Africa International Training
Programme 'Education for Sustainable Development in Higher Education' in Africa*



**Muchaiteyi Togo
& Heila Lotz-Sisitka**

Rhodes University Environmental Education and Sustainability Unit

Unit-based Sustainability Assessment Tool for Universities

**Help contribute to the development of this
Unit-based Sustainability Assessment Tool for use
in African Universities ...**

This sustainability assessment tool has been developed for use in the Swedish/ Africa International Training Programme (ITP) on 'Education for Sustainable Development in Higher Education', and complements the UNEP Mainstreaming Environment and Sustainability into African Universities (MESA) *'Education for Sustainable Development Innovations Programmes for Universities in Africa'* materials (available on www.unep.org/training/mesa/toolkit.asp). It is part of the broader UNEP MESA initiative which aims to resource African Universities to mainstream environment and sustainability into African Universities.

It is currently being tested at Rhodes University, and is being released here in DRAFT form. Participants in the ESD in Higher Education ITP programme are encouraged to use it to help identify their change projects, and to comment critically on its use-value in African University environments. Further suggestions on how to improve the Sustainability Assessment Tool booklet are welcomed. Improvements to the SAT will be discussed prior to, and during the ITP process.

- January 2008 -



See www.unep.org/training/mesa/toolkit.asp for materials on
*'Education for Sustainable Development Innovations
Programmes for Universities in Africa'* for more
information and ideas on change projects for ESD
in Higher Education in Africa

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Unit-based Sustainability Assessment Tool for Universities



Introduction

This booklet begins with an outline of a tool designed to assess sustainability at universities. The tool, henceforth called the **Unit-based Sustainability Assessment Tool (USAT)**, is designed to assess the efforts of a university by focussing on the different functional units in a University (e.g. departments, research units, management units etc.) to integrate sustainability concerns into its core functions of teaching, research and community engagement/service and other university management operations. Using a unit-based assessment tool allows for 'building the picture' of the whole, *as well as* concentrating on specific units as required (e.g. concentrating on one department etc.). This framework allows for the integration of sustainability thinking across the different units of the University, and creates possibilities for sustainability issues to be managed within functional units, *as well as* through a broader systemic framework. The booklet explains the indicators, the assessment criteria and ways of representing results of a unit-based sustainability assessment using the USAT. It also suggests other data collection methods to complement the USAT in carrying out a sustainability assessment.

For more information on sustainable development and sustainability in Higher Education, see the '**Education for Sustainable Development Innovations Programmes for Universities in Africa**' materials (Module 1), available on www.unep.org/training/ mesa/toolkit.asp

NOTE:
The USAT is included at the end of this booklet, for direct use or adaptation



Background

Sustainability in Higher Education describes "*a positive movement towards environmental accountability and social and environmental responsibility*" (Nicolaidis, 2006, p. 415). According to Cobb, cited in University Leaders for a Sustainable Future (ULSF) (1999), there can be no sustainable communities and institutions without social justice. **Sustainability therefore comprises social and economic, as well as ecological dimensions.** Clugston and Calder (2000, p. 34) describe sustainable institutions as institutions that "help students understand the roots of environmental degradation and motivate them to seek environmentally sustainable practices while also teaching the roots of today's injustices in full integration with modelling justice and humanness". Genuine commitment should be evidenced in the critical dimensions of institutional life (for example, written statements of mission and purpose, academic programmes, energy and purchasing practices, outreach, faculty hiring and development, etc) (*ibid*).



For case studies on how Universities in Africa are approaching sustainability, see the '**Education for Sustainable Development Innovations Programmes for Universities in Africa**' materials (Module 1), available on www.unep.org/training/ mesa/toolkit.asp

Academic institutions vary in the way they approach sustainability. Some concentrate on minimising their ecological impact through emphasising operational practices which include waste reduction and/or recycling, carbon dioxide and air pollution reduction, energy and water conservation practices, sustainable landscaping etc (ULSF, 1999). Others emphasise sustainability in the curriculum and are responding by taking up the question of sustainability into their teaching, research and community service activities. In Africa, a concern for sustainability is often reflected in contributions to sustainable development and poverty alleviation at community and national levels. Universities that show commitments to sustainable development often feature topics like globalisation and sustainable development; environment and development; poverty reduction; appropriate technologies; land ethics, rural development and sustainable agriculture; urban ecology and social justice; population, women and development etc. in the curriculum. A concern for sustainability can also be taken up in faculty and student research and community service activities on topics such as natural resource management, renewable energy, sustainable campus management, ecological economics, indigenous knowledge and technologies, population and development, total environmental quality management, etc. (UNEP, 2006 www.unep.org/training/mesa/toolkit.asp)



Different Sustainability Assessment Tools

A variety of tools have been developed for use in assessing sustainability efforts in higher education (Shriberg, 2002; Shriberg, 2004; Lozano, 2006). Among them are the **Sustainability Assessment Questionnaire (SAQ)**, the **Auditing Instrument for Sustainability in Higher Education (AISHE)** and the tool for the **Graphical Assessment for Sustainability in Higher Education (GASU)**.

The Sustainability Assessment Questionnaire (SAQ)

http://www.ulsf.org/programs_saq.html

The SAQ offers its users a comprehensive definition of sustainability in higher education as well as providing a snapshot of institutions on the path to sustainability. It covers seven critical dimensions of higher education including:

It is often difficult to 'get started' with sustainability activities in Universities. Sustainability Assessment Tools can be very helpful to assess what progress is being made, and what still needs to be done.

These tools can help you identify a 'change project' in your institution!



Unit-based Sustainability Assessment Tool for Universities

- curriculum,
- research and scholarship,
- operations,
- faculty and staff development and rewards,
- outreach and service,
- student opportunities, and
- institutional mission, structure and planning. (ULSF, 1999)



The Auditing Instrument for Sustainability in Higher Education (AISHE)

<http://www.science.uva.nl/ecdo/dho21/publicaties/AISHE/AISEH-book1.5.pdf>

The AISHE was developed in recognition of the fact that, while various charters give direction on the way in which higher education can contribute to sustainable development, they do not offer guidelines on what exactly needs to be done. Hence there was need for a concrete list of criteria, operationalised through some auditing instrument. The AISHE was then developed to make it possible to decide by internal or external auditing, to which level the University (or a part of it) has succeeded in implementing sustainability. AISHE is also a tool that can foster participation in the auditing process. There are 20 criteria within five fields of attention:

- vision and policy,
- expertise,
- educational goals and methodology,
- education contents, and
- result assessment. (Roorda, 2001)

For information and an activity to explore how sustainability assessments work, see the 'Education for Sustainable Development Innovations Programmes for Universities in Africa' materials (Module 3), available on www.unep.org/training/ mesa/toolkit.asp

Graphical Assessment of Sustainability in Universities (GASU)

http://works.bepress.com/rodrigo_lozano/4/

The GASU was designed to facilitate the analysis, longitudinal comparison and benchmarking of universities' sustainability efforts and achievement. It makes use of indicators grouped under economic, environmental, social and educational dimensions and offers a condensed graphical overview of these indicators (Lozano, 2006).



Unit-based Sustainability Assessment Tool (USAT)



In considering these aforementioned tools in the context of the UNEP Mainstreaming Environment and Sustainability into African Universities' Programme, and its intention to integrate environment and sustainability initiatives into a wide range of different faculties and departments, administrative and research units, and given the way that Universities tend to be managed via department or unit heads (within a broader systemic management system), it was necessary to develop a tool that could easily be used at department or unit level. Such a tool would also need to give an insight into the 'whole' picture of sustainability in Universities. It would need to allow for flexibility in the use of the tool so that it could be used at department, faculty or Unit level to identify change projects, *or* to guide assessment of University wide change initiatives. The SAQ, AISHE and GASU were therefore reviewed and adapted, and were used as a basis for developing indicators for a **unit-based** sustainability assessment tool, with built-in flexibility to be used at departmental or unit level and/or across the entire institution.

The driving factor behind the development of the USAT is the need to assess the level to which universities are contributing in responding to the sustainability agenda through their core functions of teaching, research and community service. It is intended to determine to what level universities have integrated sustainability concerns in teaching, research and community service, *but also considers* organisational level and management unit contributions, *and* student initiatives (similar to SAQ, AISHE and GASU). Like these other three tools, it is an indicator-based tool. It is divided into three parts for ease of administration:

- **Part A** of the USAT pays particular attention to the core mission of universities and covers curriculum, teaching approach, research and community service activities, examinations/assessment and staff expertise. It is targeted at heads of teaching departments (HODs) to give their impression on the indicators.
- **Part B** deals with other university operations and the management of the University. The idea is to benchmark or get a snapshot of the institution's sustainability performance in the identified areas.
- **Part C** deals with student activities which may be linked to, or independent of the other parts.

Unit-based Sustainability Assessment Tool for Universities

A whole systems approach (Sterling, 2003; Sterling, 2004) argues that the whole institution is of concern, Archer (1995), in her theory of social change, argues that different strata (or units) may possess different emergent properties and powers thus influencing the whole in different ways. For example, one faculty or unit may have different structures, histories, cultures, priorities, resources, leadership styles, visions, philosophies (including understandings of sustainable development), actors etc. to another, and may therefore influence the whole system in a different way to another faculty, department or unit. To get an in-depth and more complex picture of the different emergent powers that may be co-existing in various relationships to one another in one broader system (the University and its community), this has made it necessary to design a tool that can be used to study teaching departments and other institutional units at a university separately as some may be performing much better than others due to different influences and emergent properties, resulting in a larger impact or influence on the whole institution. If these are not differentiated in the analysis, areas of success and areas of possible intervention may be overshadowed, and may remain poorly understood in the context of the whole.

The USAT therefore facilitates a quick identification of departments leading, and departments lagging in sustainability as well as detection of the areas (indicators) in which they are leading or lagging. It therefore simplifies more complex emergent properties, but helps to identify areas of change and success through a relatively rapid assessment technique. Though the USAT is designed to be used at departmental / institutional unit level, the results representing the performance of various departments can be averaged to get the overall performance of the institution. Not all the teaching departments or institutional units at a university need necessarily be included in the survey though it is important to have all faculties represented if the results are to represent overall university sustainability performance. However, individual departments / units can also assess their own sustainability performance using the tool and benchmark themselves over time or compare themselves against other departments. They can also use the USAT as a basis for a deeper analysis of causal factors and emergent properties that are influencing their performance. This can contribute to reflexive and adaptive change management towards sustainable development.

NOTE: This makes the USAT a flexible tool to be used at individual department or faculty level, or at institutional level, to identify potential change projects / areas for future development and growth.





Indicators: Part A of USAT

The first part of the USAT (Part A) is for use in **academic departments, or research and teaching units**. It makes use of twenty indicators grouped under five clusters. These are:

- **Indicator cluster 1:** Curriculum
- **Indicator cluster 2:** Teaching approach
- **Indicator cluster 3:** Research/ community service and scholarship activities
- **Indicator cluster 4:** Examination / assessment of sustainability topics
- **Indicator cluster 5:** Staff expertise and willingness to participate in sustainability teaching and research.

These have been coded for easier tabular/graphical representation of results. The curriculum cluster has 5 indicators (C1-C5), teaching approach has 5 (T6-T10), research/service and scholarship activities also has 5 (R11-R15). Examination of sustainability topics is composed of 2 (E16-E17) and staff expertise and willingness to participate has 3 (S18-S20).

Indicator cluster 1: Curriculum

Indicators under curriculum are meant to establish if the department offers courses which deal with sustainability concerns and the integration of sustainability topics in such courses. They also determine the degree to which local and global sustainability issues and challenges form part of the department's teaching programme and the extent to which the department enrolls students in courses that engage sustainability concerns.

The presence of courses that address sustainability issues guarantees further exploration to determine the level of integration of sustainability issues in the courses. However this does not elaborate on the dimension(s) of sustainability (environmental, economic or social sustainability). As a result, for that dimension to surface there is need to qualify the USAT with interview questions with heads of departments to that effect; or to complement it with documents as explained later. At the same



Use Part A of USAT to help identify potential change projects in academic departments and research units.

Compliment the use of the SAT assessment of curriculum with interviews and documents to get a more comprehensive picture.



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time, the documents may also serve to triangulate data on the extent to which sustainability topics are integrated in the courses. Establishing enrolment in courses with sustainability content helps give a picture of how far students get exposure to that information. This can as well be qualified by asking whether those courses are compulsory or not.

Universities, through their curricula, should promote ecological literacy by aiding the development of an environmentally and social justice literate populace to help in understanding the functions of world, human impacts on the biosphere and on other people, and translation of understanding to action (Wright, 2002; Wright, 2004). Having aspects of sustainable development in the curriculum may therefore contribute to social change, as learners are empowered to make better decisions and choices in life. Students can potentially become more environmentally literate if subjects studied show a link to the environment, and more socially conscious if social justice issues are foregrounded in curricula. If alternative approaches to economics that strengthen sustainable development are shared, students are more likely to be able to conceptualise alternative economic frameworks and systems that can strengthen sustainability practices and social justice.

Indicator cluster 2: Teaching approaches

This cluster of indicators determine how far the teaching approach contributes to the development of critical thinking skills, the capacity to make informed decisions, a sense of responsibility, respect for the opinions of others and integrated problem solving skills among students. Selection of these characteristics to inform indicators in the USAT was guided by the AISHE. According to Roorda (2001), these are characteristics that are essential for enabling people to engage in sustainability practices and actions.

While including sustainability issues in the curriculum is important to strengthen capacity for **social learning and change** among students, through giving them exposure to knowledge concerning past, current and future sustainability challenges, there is also a need to support them to develop skills and values that are necessary for living sustainably in a changing world, and to confront complexity, uncertainty, risk and change. Sustainable development issues are evolving and differ with geographical areas and socio-historical and cultural contexts. It is therefore necessary to complement sustainability curricula with a teaching approach which develops the above mentioned characteristics among students to enable them to adapt to evolving sustainable development issues and challenges and to live sustainably even in

See the '**Education for Sustainable Development Innovations Programmes for Universities in Africa**' materials (Module 2), available on www.unep.org/training/mesa/toolkit.asp for a review of **transformative learning** approaches in ESD.



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unfamiliar environments and in the face of complex issues and risks. Graduates must therefore be equipped to deal with conflicting norms and values and uncertain outcomes and futures (Corcoran and Wals, 2004).

Indicator cluster 3: Research, community service and scholarship activities

Indicators falling under this group determine the extent to which staff and students in the department are involved in research, community service activities and scholarship in the area of sustainability and the degree to which local and global sustainability issues and challenges form part of their research and community service activities. They are also meant to establish if there is collaboration between the department and other stakeholders in pursuit of solutions to sustainability problems. The last indicator in this set attempts to determine the extent to which aspects of sustainable development are used in the selection/execution of research and/or community service. All this gives an idea of how far sustainable development challenges are given visibility in research and community service activities in the concerned department.

Research and / or community service can complement the curriculum by equipping students with hands-on experience in solving real world problems. It can add a practical side to the theory that students learn in class. It can teach them to develop the skills necessary to solve real problems thus to make a positive contribution to societal well-being and therefore is invaluable in sustainable development. Service learning programmes in particular have been widely used in education for sustainable development in universities. Though local sustainability issues are especially important because they are challenges facing immediate society, it is necessary to be involved in global sustainability issues as environmental and sustainability issues know no boundaries. In addition, collaboration and cooperation is important as it leads to quality results due to a variety of expertise and backgrounds among participants. It facilitates coordination of efforts and sharing of information (Wright, 2002; Wright, 2004).

Indicator cluster 4: Examination / assessment of sustainability topics

The indicators under examination / assessment of sustainability topics attempt to establish how far sustainability issues are examined or assessed and how far they are considered in evaluating projects or traineeships. According to Roorda (2001), if a clearly visible examination or assessment of sustainable



For more information or ideas for research / service /service learning, assessment and examination related change projects, see Module 2 of the 'Education for Sustainable Development Innovations Programmes for Universities in Africa' materials, available on www.unep.org/training/ mesa/toolkit.asp



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development issues and topics is absent, students may get the impression that sustainability is a kind of secondary consideration. It is therefore important to examine and assess sustainability issues and activities to encourage students to consider them seriously within the institutional practices of the University.

Indicator cluster 5: Staff expertise and willingness to participate

The intention of indicators under this cluster is to determine staff expertise in the area of sustainability and to establish their willingness to carry out sustainability research and community service and teach sustainability topics. Expertise in the area of sustainability is essential in improving integration of sustainability issues in a department's activities. Without that expertise it becomes difficult to carry out sustainability research and to teach sustainability topics. At the same time, that expertise will be put to good use if complemented with a willingness to do that kind of research or teaching among staff. Sustainability issues are relatively 'new' in the context of longer term university traditions and curricular practice, and may therefore require staff development.



What opportunities for professional learning about sustainability issues are available in the department / unit / university?

Can this form the focus of a change project?

Who could assist with this?



Indicators: Part B of USAT

Operations and Management

The first part of the USAT by design targets teaching departments and hence emphasises the core functions of the university leaving out other management practises. The second part is dedicated to other university operations and management practices. The design of the USAT Part B was modelled on the operations section of the SAQ (ULSF, 1999). It covers practises outside teaching, research



Use Part B of USAT to help identify potential change projects in university operations and management practices University.

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and service and these include waste management practices, air pollution, energy, water conservation, landscaping, pest management, transportation programmes, purchasing, and gives an option to add any other sustainability operations not mentioned. These, among others, are, according to ULSF (1999) some of the operational practices emphasised by institutions moving towards sustainability internationally. Our interest is to adapt and use these in the context of African Universities, which might require some adjustments. The various practises (15 in total, more can be added) have been coded for easier representation in tables or graphs. The same assessment criteria as for the USAT Part A are used in Part B.

The operations section also requires the assessor to indicate prime project areas and to show where he/she does not have adequate information regarding the practice. Another column asks for reasons for the implementation of the practice. This is intended to find out if the practice was driven by the need to respond to sustainability concerns or by other factors despite the fact that it has sustainability implications. The purpose of the last column is basically to establish if the university is doing all it can regarding the practice or whether there is still room for improvement.

For more information or ideas on operational management and sustainability (and organisational change), see Module 3 of the 'Education for Sustainable Development Innovations Programmes for Universities in Africa' materials, available on www.unep.org/training/ mesa/toolkit.asp



Indicators: Part C of USAT

Another aspect to consider in university wide sustainability assessment is the way students are involved in the operational management in the University (e.g. are student groups involved in recycling, waste management or energy saving initiatives on campus?), and how students think about and participate in sustainability issues. Part C of USAT draws on the SAQ to design as set of indicators for student involvement in sustainability issues. Such initiatives can be linked to other activities (outlined in Part A and B of USAT), or they can be self-initiated, independent initiatives taken by students outside of the mainstream teaching, research and management activities of the university. For this reason it is necessary to consider student involvement within a separate indicator framework within the USAT.



Use Part C of USAT to help identify potential change projects related to student involvement in sustainability issues in the University.

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The indicators in the USAT Part C, include assessment of student involvement in voluntary activities related to sustainability, student orientation programmes and career counselling, student politics and governance for sustainability, collaboration of students and management on sustainability issues, and student involvement in sustainability practices in residences (amongst others). The USAT indicators therefore cover voluntary activity by students, as well as student support, student organisations and governance systems.

Interviews or student project analysis might be needed to gain more information on this aspect of the USAT.

Students are a powerful force for helping a University re-orient towards sustainability. Integrating sustainability questions into all aspects of university life contributes to a broad based approach to ESD in universities. See www.unep.org/training/mesa/toolkit.asp for some discussion and ideas for student involvement.



Rating Part A, B and C of USAT

The 20 indicators under USAT Part A are rated by the head of each teaching department / unit forming part of the study, using the given assessment criteria. For USAT Part B, the head of the department or management unit responsible for the practice should undertake the assessment. For USAT Part C, the Student Representative Council or a similar student leadership body can undertake the assessment. The rating is based on evidence indicating the presence of the identified indicators and practices. This results in ordered response levels (Uebersax, 2006) loosely based on the Likert scale. Explanation and translation of the scales into percentages was based on the GASU (Lozano, 2006). Respondents select the rate from 6 choices ranging from X to 4 where:

Work with your head of department / other heads of departments / units in the University to complete the USAT questionnaire. Decide on who to work with based on the kind of change project you think you can realistically develop and implement.

- **X** (don't know) indicates a lack of information concerning the practice but not necessarily an absence of such information.
- **0** (none) indicates the absence of information regarding the indicator in question; this is an equivalent of about 0% of such information.
- **1** (a little) indicates that the evidence show poor performance in the concerned indicator and this is about 25% of full information regarding the indicator.
- **2** (adequate) indicates that the evidence show regular performance, about 50% of full information required by the indicator.
- **3** (substantial) indicates that the evidence show good performance about 75% of full information.
- **4** (a great deal) indicates that the evidence show excellent performance more than 75% of full information.

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Understanding X: If you get a response rate of more than 40% of the total responses as X in the assessment, then you need to try to identify another, more knowledgeable main respondent. Individual X scores in the assessment can also be followed up with other respondents (the main respondent may be able to refer you to a relevant person). X issues can also be discussed in staff meetings or other collective forums where someone else might have insight into the question being raised. X is therefore an indicator that requires further probing until you are satisfied that it should rather be a 0 score or any other relevant score.

To establish whether X can be allocated, you need to have done preparatory research (document searches) to identify whether information *does* exist, but is not known. X may be changed to 0 if, after trying other respondents, document searches and interviews no information can be found. X is therefore a 'holding score' which requires further investigation and research before assigning a more definitive score.



Additional documents and interview data

To supplement information generated through using Part A of the USAT, it is necessary to collect a course outline and most recent past exam question paper for one course per department in which sustainable development issues are highly integrated. The documents will serve to triangulate and provide evidence of such work. A list of research topics and publications by students and staff members in the department for the previous year will moreover help in providing evidence of sustainability research. Both documents will elaborate on the nature of sustainability issues the department is involved in, whether ecological, social or economic sustainability issues. The USAT does not provide such information but it is essential in determining the relevance of the issues being addressed in relation to the context. Similarly, the university community engagement report or the university website can also be a valuable source of additional information.

To complement Part B of the USAT, collect relevant policies, strategic plans and other relevant documents from the specific unit / management sector to extend the insights gained from Part B of USAT. For example, there may be annual expenditure records that can help assess energy use on campus etc.

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To complement and extend Part C of the USAT, student interviews, the student newspaper, resident management committee minutes, or Student Representative Council documents might provide more information on student involvement in sustainability issues (amongst other sources).

Supplementing USAT questions with follow up preparatory and follow up document analysis and interviewing will provide you with a more in-depth assessment.



Interpreting the results

Results of Part A of the USAT can be presented in table form or graphically. A table can be generated, showing the performance of all the departments that were part of the study and their respective rates per indicator (Table 1).

Table 1. Departmental sustainability rating per indicator (hypothetical)

Indicator	Management	Accounting	Education	Biochem	History	Anthropology	Law	Total (28)	% rating	Average
C1	0	0	4	2	3	2	2	13	46.4	1.9
C2	1	0	3	4	3	2	1	14	50	2
C3	1	0	3	2	3	3	1	13	46.4	1.9
C4	1	0	2.5	4	3	3	1	14.5	51.8	2.1
C5	0	0	3	3	3	3	1	13	46.4	1.9
T6	2	4	4	4	4	3	3	24	85.7	3.4
T7	3	4	4	4	4	4	4	27	96.4	3.9
T8	3	3	4	3	4	3	4	24	85.7	3.4
T9	2	2	4	3	4	4	4	23	82.1	3.3
T10	2	4	4	4	4	3	3	24	85.7	3.4
R 11	0	0	3	4	2	2	1	12	42.9	1.7
R 12	0	0	3	4	2	3	1	13	46.4	1.9
R 13	0	0	4	3	2	2	1	12	42.9	1.7
R 14	1	0	3	3	1	1	0	9	32.1	1.3
R 15	0	0	2	3	2	1	1	9	32.1	1.3
E16	1	1	3	3	2	3	1	14	50	2
E17	0	1	2	2	1	1	0	7	25	1
S18	1	1	3	4	3	2	1	15	53.6	2.1
S19	1	1	3	4	3	2	1	15	53.6	2.1
S20	x	2	3	4	3	2	1	15	53.6	2.5
Total (80)	19	23	64.5	67	56	49	32			44.4
% rating	23.8	28.8	80.6	83.8	70	61.3	40			
Average	1	1.2	3.2	3.4	2.8	2.5	1.6			

Results presented this way allow a quick comparison of performance in the indicated areas among departments from one university. Total performance for each department is obtained by adding up the rates for each of the indicators. Dividing the total by

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20 (the total number of USAT indicators for Part A) gives the average performance of the department. Average university performance for each indicator can furthermore be obtained through totalising the performance of each and department in a single indicator and diving by the total number of departments which formed part of the study.

From the hypothetical situation presented above, a quick scan of the results would show that the Biochemistry department at the university in question is performing much better (average rate 3.4 (emboldened in table 1)) than the other departments. This helps as a quick pointer to departments that require strengthening in the area of sustainability provided the intention is to have all departments incorporating sustainable development concerns in their activities. At the same time, it is also shown that the university is stronger in indicator T7 with a rating of 3.9. This is also a quick pointer to the general areas (defined by the indicators) lagging behind (E17) and requiring attention to improve the university's overall performance.

The results can also be presented using radar diagrams. The radar diagram can represent the sustainability performance of each of the departments at a university. Figure 1 below represents the performance of the Anthropology department in the hypothetical situation represented by the data in Table 1.

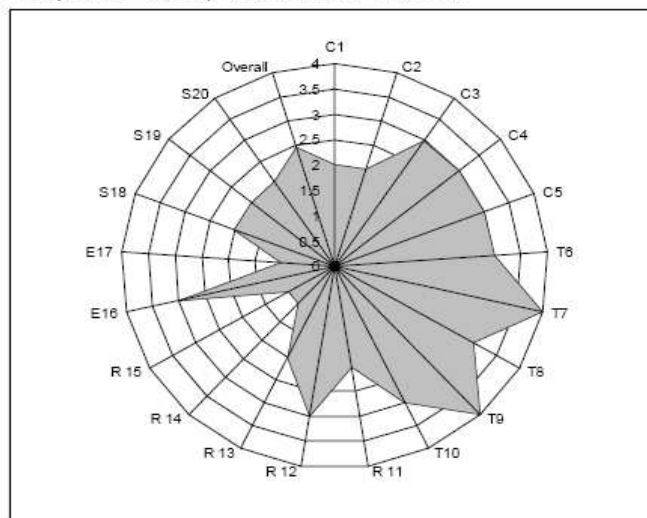


Figure 1. Sustainability Performance of the Anthropology Department

At the same time, average performance (Figure 2) of each department can be represented against other departments at the same university allowing comparisons across departments to be



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made. Total performance can also be represented in the same manner.

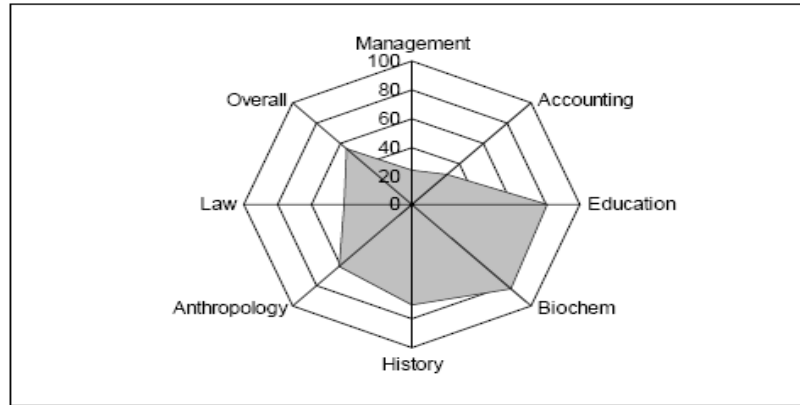


Figure 2. Average sustainability performance per department (%).

Thirdly, average (and the total) university performance per indicator can also be presented graphically (Figure 3). A graphical representation of the university's average performance allows comparisons to be made among several universities.

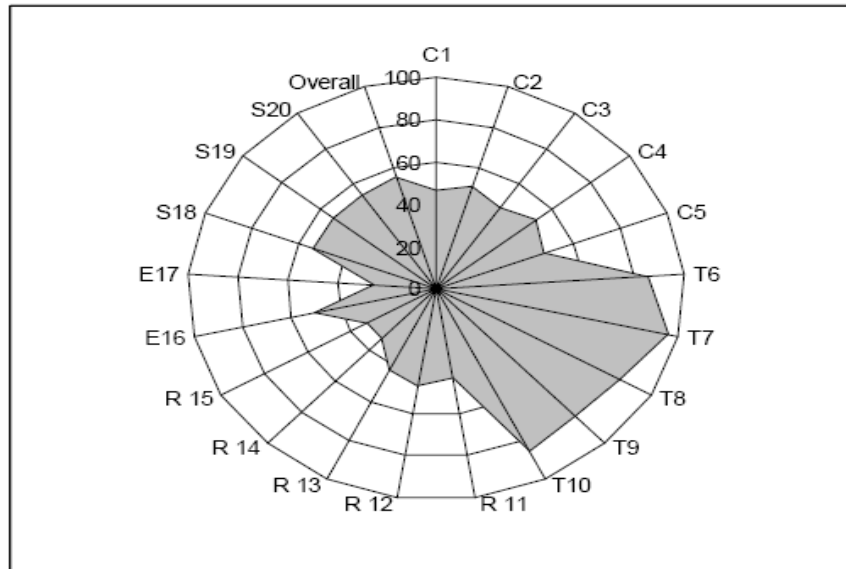


Figure 3. Average university sustainability performance per indicator (%).

Finally, figure 4 represents the overall performance of all the departments out of a maximum possible of 80 scores (4 possible scores per indicator multiplied by 20 indicators). The figure shows how each department is performing per indicator but it also allows

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comparisons to be made of overall performance among various departments.

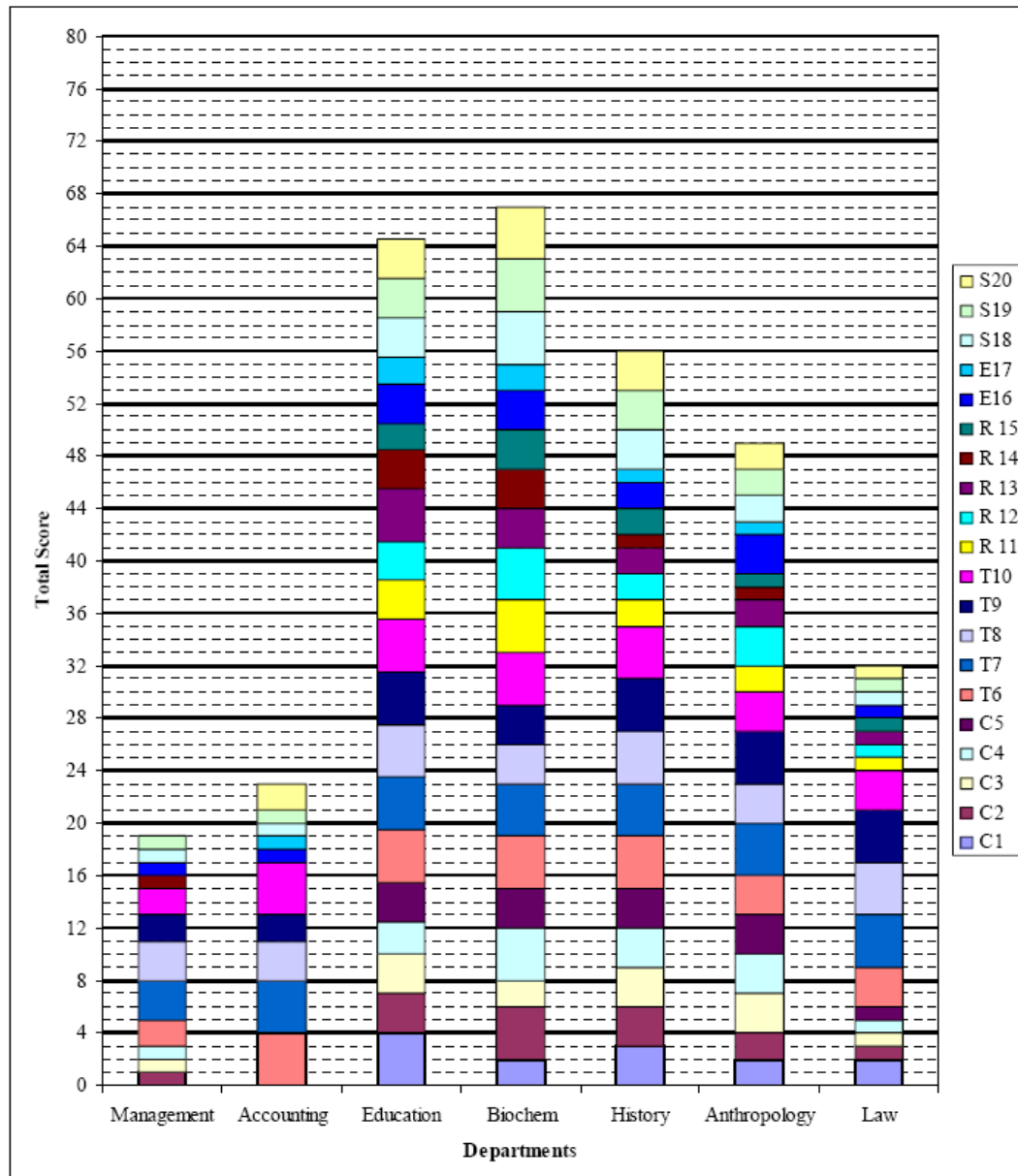


Figure 4. Overall departmental performance

Figure 5 represents the performance of the university in selected non-teaching practices identified in the second part of the USAT. This also enables easy identification of areas of high performance and those lagging behind. Comparison among different universities is also possible.

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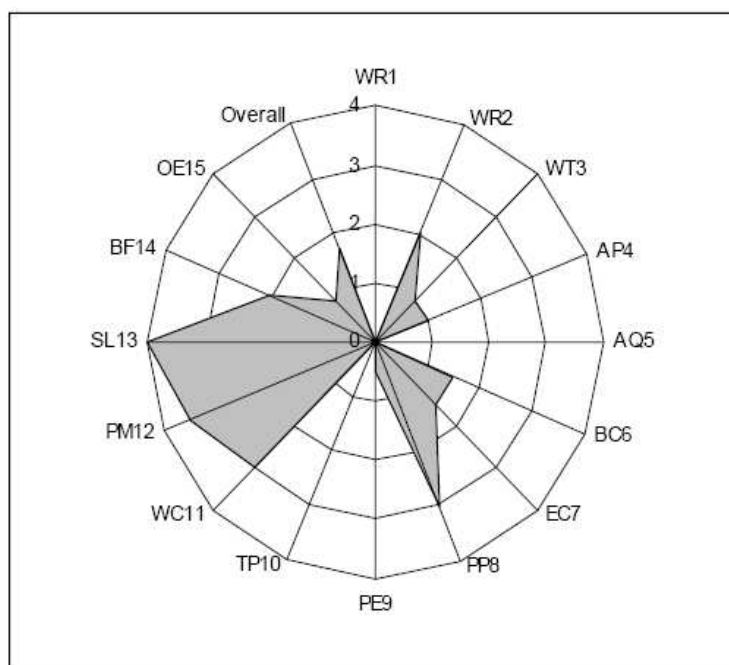


Figure 5. Sustainability performance of the university in various practices

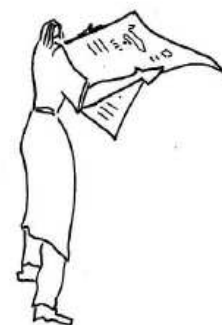
Similar representations can be made of the student data from Part C of the USAT.



Putting it all together

Putting together all the reports (from USAT Part A, B and C) into a University-wide report will provide useful insight into the entire institution's sustainability profile, and can help to identify change projects at university-wide level. Such a report could be tabled at senior management meetings or at Senate level, to argue for system-wide support for change towards sustainability. If carefully analysed and described (using complementary qualitative data) insight will also be gained into the differences and similarities in how sustainable development is being interpreted and practiced in the University. It can also bring out various relationships in sustainability practice (e.g. between departments and student activities, or between management and operational units and student activities), or identify where these don't exist.

See Module 3 of the *'Education for Sustainable Development Innovations Programmes for Universities in Africa'* materials for more insight into how to approach institutional change at a broader level. Available on www.unep.org/training/mesa/toolkit.asp



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Conclusion

According to Lozano (2006), of the three approaches that can be used to assess and report sustainability, that is, indicator-based assessments, accounts and narrative assessments, indicator-based assessments are better in terms of transparency, consistency and usefulness for decision-making. They are measurable and comparable, and give a 'quick picture' of what is taking place. The USAT presents an alternative way of doing a sustainability assessment that allow for unit-based assessments, especially in teaching departments. Its major strength is that it is flexible, and easy to use, while giving a picture of progress being made towards sustainability. Data from assessments using the USAT are easy to represent, understand and compare, and can easily be discussed at for example staff meetings.

The other advantage of USAT is that it allows for assessment of the institution in constituent parts and analyses these separately before building up the whole picture again, thus allowing for a capturing of the specific contribution and diversity of individual departments. As indicated, however, it needs to be triangulated with other data collection methods to verify results and to elaborate on the dimensions of sustainability which are not apparent from the indicators.

A more in-depth, qualitative analysis is also possible, using USAT as a starting point. Such an analysis might probe key influences such as:

- Available resources
- Structures and organisational means
- Qualifications, competence and interests of actors
- Length of time (history) of sustainability practices
- Philosophical assumptions influencing concepts of sustainable development etc.
- Demographics of student and staff involvement in sustainability issues etc.

For this USAT provides a starting point which can help to sample or identify departments, units or issues that require more in-depth study and analysis.

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PART A

Teaching, Research and Community Service

Assessment Criteria

Rating

X	=	Don't know	no information concerning the practice
0	=	None	there is total lack of evidence on the indicator
1	=	A little	evidence show poor performance
2	=	Adequate	evidence show regular performance
3	=	Substantial	evidence show good performance
4	=	A great deal	excellent performance

Code	Indicator	Score					
		x Don't know	0 None	1 A little	2 Adequate	3 Substantial	4 A great deal
	Curriculum						
C1	The extent to which the department offer courses that engage sustainability concerns						
C2	The level of integration of sustainability topics in courses referred to above						
C3	The degree to which local sustainability issues and challenges form part of the department's teaching programme						
C4	The degree to which global sustainability issues and challenges form part of the department's teaching programme						
C5	The extent to which the department enrol students in courses that engage sustainability concerns						
	Teaching approach How far the teaching approach contributes to development of the following characteristics among students:						
T6	The capacity to make informed decisions						
T7	Critical thinking skills						
T8	A sense of responsibility						
T9	Respect for the opinions of others						

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T 10	Integrated problem solving skills								
	Research/service and scholarship activities								
R11	The extent to which the department (staff and students) is involved in research/service and scholarship in the area of sustainability								
R12	The degree to which global sustainability issues and challenges form part of the department's research and service								
R13	The degree to which local sustainability issues and challenges form part of the department's research and service								
R14	The extent to which your department is collaborating with other institutions and stakeholders in pursuit of solutions to sustainability problems								
R15	The extent to which aspects of sustainable development are used in selection/execution of research/service								
	Examination (assessment) of sustainability topics								
E16	The extent to which sustainability aspects are assessed / examined during course								
E17	The extent to which sustainability aspects are considered in evaluating / assessing projects/traineeships								
	Staff expertise and willingness to participate								
S18	The level of expertise of staff members in the area of sustainability								
S19	The extent to which staff members are willing to carry out research and service activities on sustainability aspects/topics								
S20	The extent to which staff members are willing to teach sustainability topics								
	Other								

NOTE:

Reflect on the **USAT Part A** after using it.
 Can you suggest any changes that might be necessary?
 Have important things been left out?
 Please bring your suggestions to the **ESD in Higher Education International Training Programme** for discussion, and use them to inform decision making about your change project.



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PART B

Operations and Management

Assessment Criteria

X	=	Don't know	no information concerning the practice
0	=	None	there is total lack of evidence on the indicator
1	=	A little	evidence show poor performance
2	=	Adequate	evidence show regular performance
3	=	Substantial	evidence show good performance
4	=	A great deal	excellent performance
(Add a tick (✓) for key project areas and where more information is needed)			

Code	Practices	Rate	Key	Inadequate info	Reasons for implementing the practice	What can be done to improve the sustainability of the practice?
WR1	Waste reduction practices					
WR2	Recycling of solid waste (including paper, plastic, metal, etc.)					
WT3	Source reduction of toxic materials and radioactive waste					
AP4	CO ₂ and air pollution reduction practices (including alternative fuel use, renewable energy sources, emission control devices, etc.)					
AQ5	Indoor air quality standards and practices					
BC6	Building construction and renovation based on ecological design principles					
EC7	Energy conservation practices (in offices, laboratories, libraries, classrooms and dormitories)					

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PP8	Local or organic food purchasing program					
PE9	Purchasing from environmentally and socially responsible companies (including buying and using 100% post consumer chlorine free paper)					
TP10	Transportation program (including bicycle/ pedestrian friendly systems, car pools, bus pass programs, electric/natural gas campus vehicles)					
WC11	Water conservation practices (including efficient shower heads and irrigation systems)					
PM12	Integrated Pest Management practices (including reduction of pesticides to control weeds)					
SL13	Sustainable landscaping (emphasizing native plants, biodiversity, minimizing lawn, etc.)					
BF14	Use of bio-fuel					
OE15	Integration of operations into the educational and scholarly activities of the university					
	Others (please specify):					

NOTE:

Reflect on the USAT Part B after using it.
 Can you suggest any changes that might be necessary?
 Have important things been left out?
 Please bring your suggestions to the ESD in Higher Education
 International Training Programme for discussion, and use them
 to inform decision making about your change project.



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PART C

Student Involvement

Assessment Criteria

Rate activities and opportunities in the environmental and sustainability area.

X	=	Don't know	no information concerning the practice
0	=	None	there is total lack of evidence on the indicator
1	=	A little	evidence show poor performance
2	=	Adequate	evidence show regular performance
3	=	Substantial	evidence show good performance
4	=	A great deal	excellent performance

(Add a tick (✓) for key areas and where more information is needed; briefly outline key activities in the area of sustainability)

Code	Activities and opportunities	Rate	Key Area	Inadequate info	Outline of activities (what exactly is being done?)
ES1	Environmental societies or other Student Group(s) with an environmental or sustainability focus				
SC2	Student Environmental Center				
EH3	Sustainability practices in residences or dormitories by students (e.g. recycling)				
OP4	Orientation program(s) on sustainability for students				
SA5	Student environmental and sustainability awareness programmes				
CC6	Career counselling focused on work opportunities related to environment and sustainability				

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VS6	Voluntary community service by students related to sustainability issues and concerns				
SI7	Involvement of student groups across campus in sustainability initiatives				
SR8	SRC involvement in environmental and sustainability initiatives				
SM9	Student collaboration with management in the area of environmental and sustainability				
ESI9	Environmental and sustainability activities initiated by students themselves (independent of departments, lecturers, management etc.)				
SW10	Students' willingness to take responsibility in the environmental and sustainability area				

NOTE:

Reflect on the USAT Part C after using it.

Can you suggest any changes that might be necessary?

Have important things been left out?

Please bring your suggestions to the ESD in Higher Education

International Training Programme for discussion, and use

them to inform decision making about your change project.



2. MODIFIED USAT USED AT RHODES UNIVERSITY

Part A: Teaching, Research and Community Service

Department: _____

Institutions/departments committed to sustainability often prominently feature certain topics in their course offerings, e.g. globalization and sustainable development; environmental philosophy; nature writing; land ethics and sustainable agriculture; health promotion, urban ecology and social justice; population, intercultural understanding and peace, women and development; human rights, overcoming poverty, sustainable production and consumption; the role of information and communication technologies and many others (ULSF, 1999). Sustainability would be integrated into faculty and student research on topics such as renewable energy, sustainable building design, ecological economics, indigenous wisdom and technologies, population and development, total environmental quality management, etc (*ibid*). The Unit-based Sustainability Assessment Tool is designed to assist in assessing the extent to which your department is engaging sustainable development concerns in its teaching, research and outreach. It requires you to give your impression on the identified dimensions using the assessment criteria below.

Assessment Criteria	
x = Don't know	no information concerning the practice
0 = None	there is total lack of evidence on the indicator
1 = A little	evidence show poor performance
2 = Adequate	evidence show regular performance
3 = Substantial	evidence show good performance
4 = A great deal	excellent performance

Code	Indicator	Score					
		x	0	1	2	3	4
	Curriculum						
C1	The extent to which the department offer courses that engage sustainability concerns						
C2	The level of integration of sustainability topics in courses referred to above						
C3	The degree to which local sustainability issues and challenges form part of the department's teaching programme						
C4	The degree to which global sustainability issues and challenges form part of the department's teaching programme						
C5	The extent to which the department enrolls students in courses that engage sustainability concerns						
	Teaching approach						
	How far the teaching approach contributes to development of the following characteristics among students:						
T6	The capacity to make informed decisions						
T7	Critical thinking skills						
T8	A sense of responsibility						
T9	Respect for the opinions of others						
T10	Integrated problem solving skills						
	Research/service and scholarship activities						
R11	The extent to which the department (staff and students) is involved in research/service and scholarship in the area of sustainability						
R12	The degree to which global sustainability issues and challenges form part of the department's research and service						
R13	The degree to which local sustainability issues and challenges form part of the department's research and service						
R14	The extent to which your department is collaborating with other institutions and stakeholders in pursuit of solutions to sustainability problems						
R15	The extent to which aspects of sustainable development are used in selection/execution of research/service						
	Examination of sustainability topics						
E16	The extent to which sustainability aspects are examined during course						
E17	The extent to which sustainability aspects are considered in evaluating projects/traineeships						
	Staff expertise and willingness to participate						
S18	The level of expertise of staff members in the area of sustainability						
S19	The extent to which staff members are willing to carry out research and service activities on sustainability aspects/topics						
S20	The extent to which staff members are willing to teach sustainability topics						

Part B: Operations and Management

Institutions committed to sustainability often emphasise some of the operational practices listed below (most were adapted from ULSF, 1999). The Unit-based Sustainability Assessment Tool helps in assessing the extent to which an institution has implemented these practices using the assessment criteria below. It requires you to give your impression on the identified practices using the assessment criteria below. Please complete the chart, add a tick for main/major projects at your institute. Leave blank where the practices are non-existent.

Assessment Criteria		
x	= Don't know	no information concerning the practice
0	= None	there is total lack of evidence on the indicator
1	= A little	evidence show poor performance
2	= Adequate	evidence show regular performance
3	= Substantial	evidence show good performance
4	= A great deal	excellent performance

Code	Practice	Rate	Key	Inadequate info	Reasons for implementing the practice	What can be done to improve the sustainability of the practice
WR1	Waste reduction practices					
W2	Recycling of solid waste (including paper, plastic, metal, etc.)					
TW3	Source reduction of toxic materials and radioactive waste					
AP4	CO ₂ and air pollution reduction practices (including alternative fuel use, renewable energy sources, emission control devices, etc.)					
AQ5	Indoor air quality standards and practices					
BC6	Building construction and renovation based on ecological design principles					
EC7	Energy conservation practices (in offices, laboratories, libraries, classrooms and dormitories)					
LP8	Local food purchasing programme					
PE9	Purchasing from environmentally and socially responsible companies (including buying and using 100% post consumer chlorine free paper)					
OP10	Organic food purchasing programme					
TP11	Transportation programme (including bicycle/pedestrian friendly systems, car pools, bus pass programmes, electric/natural gas campus vehicles)					
BF12	Use of bio-fuel					
WC13	Water conservation practices (including efficient shower heads and irrigation systems)					
PM14	Integrated Pest Management practices (including reduction of pesticides to control weeds)					
SL15	Sustainable landscaping (emphasizing native plants, biodiversity, minimizing lawn, etc.)					
OE16	Integration of operations into the educational and scholarly activities of the university					
	Others (please specify):					

Part C: Students Involvement

Institutions committed to sustainability provide students with specific opportunities and settings. They also encourage students to consider sustainability issues when choosing a career path. Conversely, students can initiate some of the activities. Listed below are some of the opportunities and activities for and by students (some were adapted from ULSF, 1999) which reflect commitment to sustainability. The Unit-based Sustainability Assessment Tool helps in assessing the degree of involvement of students in environmental and sustainability issues using the given assessment criteria. Add a tick (✓) for key project areas and where more information is needed; briefly outline key activities in the area of sustainability).

Assessment Criteria		
x	= Don't know	no information concerning the practice
0	= None	there is total lack of evidence on the indicator
1	= A little	evidence show poor performance
2	= Adequate	evidence show regular performance
3	= Substantial	evidence show good performance
4	= A great deal	excellent performance

Code	Activities and opportunities	Rate	Key area	Inadequate info	Outline of activities (What exactly is being done)
SC1	Student Environmental Centre				
CC2	Career counselling focused on work opportunities related to environment and sustainability				
ES3	Environmental societies or other Student Group(s) with an environmental or sustainability focus				
SD4	Sustainability practices in residences or dormitories by students (e.g. recycling)				
OP5	Orientation programme(s) on sustainability for students				
SA6	Student environmental and sustainability awareness programmes				
VS7	Voluntary community service by students related to sustainability issues and concerns				
SI8	Involvement of student groups across campus in sustainability initiatives				
SR9	SRC involvement in environmental and sustainability initiatives				
SM10	Student collaboration with management in the area of environmental and sustainability				
ES11	Environmental and sustainability activities initiated by students themselves (independent of departments, lecturers, management etc.)				
SW12	Students' willingness to take responsibility in the environmental and sustainability area				
	Others (please specify):				

APPENDIX 3: INTERVIEW GUIDES

1. TEACHING DEPARTMENTS

- i. Do you teach any sustainability or sustainable development topics (e.g. ecological, socio-economic, political, etc.) in courses in your department? Explain and give examples of topics and courses.
- ii. Is it mandatory for students to take a course on issues related to the environment or sustainability?
- iii. In your department, do you/your students undertake research that in a way addresses sustainability or sustainable development issues? Please explain.
- iv. Describe how the knowledge in your field is being applied to sustainability concerns in the surrounding community.
- v. Does your department have an option for students who wish to specialise in sustainable development?
- vi. Are there any sustainable development partnerships between your department and other universities and /or other stakeholders (NGOs, Businesses, Municipalities, etc.) or any other partnerships in which sustainable development issues are given visibility? Please explain.
- vii. Regarding the current sustainability practices in your department (teaching sustainability topics, carrying out research on sustainability issues, partnerships in sustainable development or application of knowledge in sustainability concerns of the community, etc.), what in your opinion are the most important factors that influenced the adoption of these?
- viii. Can you say you have been influenced in one way or another by the global sustainability agenda or by the launch of the Decade of Education for Sustainable Development in your teaching, research or community engagement?
- ix. Did you ever experience any changes in the curriculum due to sustainable development debates?
- x. What other sustainability practices do you emphasise as a department (e.g. switching off lights and computers when leaving, walking to work among others)?
- xi. Do you think there is room for improving the sustainability focus of your department? If so can you explain how that can be done?
- xii. Do you have any other comments you may wish to make regarding this discussion?

2. RESEARCH UNITS AND INSTITUTES

- i. What are the major influential factors that guided you/are guiding you in selecting research projects?
- ii. To what extent was this focus influenced by a concern for promoting sustainable patterns?
- iii. Universities have been challenged to become key players in finding solutions to sustainable development problems through their functions of teaching, research, community engagement and other operations. What can you say is the major contribution of your research unit in advancing this agenda?
- iv. Can you briefly outline some of your major projects which have been successful in advancing sustainability?
- v. How is the knowledge in your field being applied to promoting sustainable development in the surrounding community?

- vi. Have you been influenced to re-orient/alter your research focus in any way due to the global sustainable development agenda? Please explain. What about the launch of the Decade of Education for Sustainable Development in 2005?
- vii. What kind of institutional support do you have in undertaking projects that promote sustainability?
- viii. To what extent do you collaborate with other Rhodes University departments and units, and other stakeholders (NGOs, local government, business, etc.) in your research endeavours? Give examples.
- ix. Mention any setbacks that may be working against your initiatives and how you think they can be addressed?
- x. Regarding the taking up of sustainable development topics/issues in teaching, research, community engagement and other operations at Rhodes University, how do you think this can be encouraged so as to become at least a component of factors influencing the focus of such activities?
- xi. Do you have any future plans which may impact positively on your engagement with sustainability issues and sustainable development concerns?
- xii. Are there any other comments you may want to make regarding this discussion?

3. INSTITUTIONAL PLANNING

- i. How is a concern for and commitment to, sustainability or sustainable development issues given broad visibility at your university? What about through guest speakers, conferences, Earth Day celebrations, for example?
- ii. To what extent is sustainable development in education, research and operations a regularly appearing subject in meetings and in internal and external publication (scientific or other)? Please explain.
- iii. What plans (if any) are there at the university to strengthen commitment to sustainability and sustainable development issues (such as an Environmental Management System, a course requirement on sustainability, or a new strategic plan reflecting sustainability)?
- iv. The take up of sustainability and sustainable development concerns at universities is in most cases promoted by a few enthusiastic individuals. Do you think it is possible at Rhodes University to have the promotion of sustainable practices as an underlying agenda in all functions and operations of the university? If so how can it be achieved?
- v. What other steps do you feel may need to be taken to promote the take up of sustainability concerns and why?
- vi. Do you have any other comments you may wish to make regarding this discussion?

4. HUMAN RESOURCES

- i. Do criteria for hiring staff at Rhodes University recognise faculty member contributions to sustainability (in scholarship, teaching, or campus and community activities)? If so, describe how such considerations are weighed in these decisions.
- ii. Do criteria for tenure and promotion recognise faculty member contributions to sustainability? Please explain.

- iii. To what extent does your college or university provide significant faculty and staff development opportunities to enhance understanding, teaching and research in sustainability?
- iv. Does RU encourage all staff members to underline the importance of a sustainable attitude and behaviour?
- v. (If number iv is no) In your opinion, do you think it is possible to underlie the importance of sustainable development among staff?
- vi. What do you think should be done and how, to improve the institution's performance in the area of sustainability and what role do you think your department should assume in the process?
- vii. Do you have any other comments you may want to make regarding this discussion?

5. RESEARCH MANAGEMENT DIVISION

- i. To what extent are sustainability concerns and sustainable development challenges (ecological, social and economic) given visibility in RU's research policy?
- ii. What criteria do you use in allocating internal Rhodes University research funds? Is sustainable development or sustainability concerns part of the criteria (i.e. research that addresses sustainable development issues)?
- iii. To what extent do external funders emphasise research on sustainable development issues in their guidelines?
- iv. Are there any research collaborations/partnerships between RU and other universities or stakeholders (NGOs, local government, business, etc.) whose focus is sustainability and sustainable development? If so, can you explain the nature of their activities?
- v. To what extent has the focus/orientation of research at RU been in way influenced by the global sustainable development agenda? Please explain. What about the launch of the Decade of Education for Sustainable Development in 2005?
- vi. Promoting integration or the take up of sustainability and sustainable development concerns in university operations and functions (including research) has in most cases been at the level of a few enthusiastic individuals. How can this initiative be promoted to become a focus at institutional level (in research) and what role do you think your department can play in the process?
- vii. Do you have any other comments you may want to make regarding this discussion?

6. COMMUNITY ENGAGEMENT DIVISION

- i. In your email, you indicated that community engagement projects are initiated by individual departments and academics as opposed to being run from a central point. In your opinion, what would be the implications of running Community engagement projects at Rhodes from a central point?
- ii. What challenges do you face in coordinating community engagement work owing to the fact that it is being initiated by various departments?
- iii. From the community engagement website and the documents you gave me, I came across various projects run by the university in partnership with community members which reflect a high level of engagement with sustainable development issues, especially the social and economic well

- being of the community. What influential factors do you think trigger them to chose such kind of projects?
- iv. To what extent does your department emphasise or encourage departments and individuals involved in community engagement work to undertake projects that address sustainable development issues in these communities (e.g. projects addressing issues of social justice, gender, sustainable agriculture, climatic variations, environmental/ecological well-being and many others)?
 - v. Has your department been in any way influenced by the global sustainable development agenda? Please explain. What about the launch of the Decade of Education for Sustainable Development in 2005?
 - vi. Do you have any future plans which may impact positively on your engagement with sustainability issues and sustainable development concerns?
 - vii. Do you have any other comments you may want to make regarding this discussion?

7. ENVIRONMENTAL COMMITTEE

- i. What are the responsibilities of the Environmental Committee?
- ii. To what extent are sustainability and sustainable development concerns given visibility in the activities of the committee?
- iii. In what way are the activities of the committee facilitating/influencing the promotion of environmental responsibility among students and staff?
- iv. In what way are the activities of the committee facilitating/influencing the promotion of sustainability practices on campus?
- v. Has the activities of the committee been in any way influenced by the global sustainable development agenda? Please explain. What about the launch of the Decade of Education for Sustainable Development in 2005?
- vi. Do you have any future plans which may impact positively on your engagement with sustainability or sustainable development concerns?
- vii. Mainstreaming/integration of environmental and other sustainability concerns in teaching, research and community engagement and other university operations has in most cases been a result of a few enthusiastic individuals. What role do you think the Environmental Committee can play in promoting a university-wide approach or initiative in taking up these issues?
- viii. Do you have any other comments you would like to make from what we discussed?

8. ESTATES DIVISION

- i. I came across some of the operations of your division in your website and they reflect a commitment to cost-effectively promote a safe environment on campus. To what extent were/are your projects also driven by the desire to carry forward the sustainable development agenda? Or, in other words is sustainable development part of the agenda or guiding principles behind the operations of your department?
- ii. What factors influenced you to adopt practices that address sustainable development issues. Was there any influence from the global sustainable development agenda or the launch of the Decade of Education for Sustainable Development? If so how was your division influenced?
- iii. Some of the issues you deal with in your division require commitment from the university community, for example waste recycling. How do you promote

- awareness and responsible behaviour among staff and students and how do you encourage them to actively participate in these activities?
- iv. What role can the newly appointed SRC Environmental Officer and the environmental society play in promoting awareness on campus?
 - v. I followed a link from your website which led me to the green clippings e-newsletter, what is your involvement with the newsletter?
 - vi. What other practices which promote environmental well-being would you be happy to see being implemented on campus?
 - vii. How far do you collaborate with other departments and units at Rhodes University in planning and executing the activities of your department?
 - viii. Do you have any future plans which may impact positively on your engagement with sustainability issues and sustainable development concerns?
 - ix. Do you have any other comments you may want to make regarding this discussion?

9. STUDENTS' INVOLVEMENT

- i. What factors triggered you to form the Green Revolutions and Social Solutions environmental society and what do you intend to accomplish?
- ii. What plans you have for next year and what place will sustainability issues have in your plans?
- iii. What institutional support you have from the university and/or which departments/units will you be working with?
- iv. What would you wish to see being done at by the university in terms of environmental and sustainability issues?

APPENDIX 4: NEGOTIATION OF ACCESS AND CONSENT FORM

1. LETTER FOR NEGOTIATING ACCESS

Dear Dr Badat and Dr Johnson

I have a PhD student who wants to conduct a study into systemic approaches to environment and sustainability in universities. This study will form part of our broader involvement in the UNEP/AAU/UNESCO Mainstreaming Environment and Sustainability into Universities in Africa Partnership Programme. Phase 1 of the MESA Universities Partnership worked with 90 academics in 65 universities in 32 African countries, and a substantial network, partnerships and momentum is forming around these issues. UNEP have identified the lack of a systemic approach to environment and sustainability work in universities (and their support for universities) as a key issue arising from the Phase 1 initiative, and have asked whether we have a student who might do some research to inform the broader programme. At about the same time I had an application from a student who had done research on sustainability issues in higher education in Zimbabwe, and she was interested in taking up a research initiative in the context of the MESA programme. As RU has been working in this area for a long time now, and as she has small children, we felt that it would be possible to develop an in-depth case study of RU's work in this area, which could provide methodological guidance and conceptual resources to the broader MESA Universities Partnership.

In this research she will be developing a questionnaire audit tool to find out about the range of environmental and sustainability initiatives that are taking place at RU from academic, research, community engagement and management perspectives, and she will follow up with various people in the university with interviews and document analysis. The research will be informed by a critical realist orientation, which will seek out insights into causal mechanisms and structural dynamics influencing the environment and sustainability work within the university. As such I think it would be a potentially useful document for the university as well as this methodology allows for in-depth contextual insights into activities and processes.

I am writing to inform you of this research since it is a university-wide research project and to find out whether there is a need for her to pursue a more formal approach to getting permission to do the research in the university. She will be presenting her research concept to the Environmental Committee tomorrow, and her research proposal has been considered by the Higher Degrees Committee to be sound and 'do-able'.

Please let me know if there is anything further that she needs to do or if you would like further information on this study.

Sincerely

Heila Lotz-Sisitka
Associate Professor
Murray & Roberts Chair of Environmental Education & Sustainability

2. CONSENT FORM

CONSENT FOR USE OF DATA FOR RESEARCH PURPOSES

Thank you for agreeing to be part of this study. This document serves to obtain your written consent for being involved in this study.

Project title: A systems approach to mainstreaming environment and sustainability in universities: The case of Rhodes University, South Africa.

Participant

- I have received information about this study.
- I understand the purpose of the research project and my involvement in it.
- I understand that I may withdraw from the research project at any stage.
- I understand that participation in this study is done on a voluntary basis.

Name: _____

Signed: _____ **Date:** _____

Researcher

I have provided information about the research to the research participant and believe that he/she understands what is involved.

Name: _____

Signed: _____ **Date:** _____

APPENDIX 5: CASE RECORDS

INTRODUCTION TO CASE RECORDS

Case records contain a compilation of information from the sustainability assessment (where relevant), interview, content analyses and observations (where relevant) for each of the departments/divisions/units. Case records 1-12 are for teaching departments, 13 to 16 present data collected in research institutes and units and 17 to 23 are from university management divisions (including students' initiatives). Part B of the USAT was used in the Estates Division and Part C to assess students' initiatives. The raw data for these two assessments are presented in the respective case records. Indicators for each of these two sections of the USAT will be outlined in each of the case records before presenting the findings.

Part A of the Unit-based Sustainability Assessment Tool was used in teaching departments. Below is an outline of the USAT Part A indicator codes and their description.

Code	Description
	Curriculum
C1	The extent to which the department offer courses that engage sustainability concerns
C2	The level of integration of sustainability topics in courses referred to above
C3	The degree to which local sustainability issues and challenges form part of the department's teaching programme
C4	The degree to which global sustainability issues and challenges form part of the department's teaching programme
C5	The extent to which the department enrol students in courses that engage sustainability concerns
	Teaching approach: How far the teaching approach contributes to development of the following characteristics among students:
T6	The capacity to make informed decisions
T 7	Critical thinking skills
T 8	A sense of responsibility
T 9	Respect for the opinions of others
T 10	Integrated problem solving skills
	Research/service and scholarship activities
R11	The extent to which the department (staff and students) is involved in research/service and scholarship in the area of sustainability
R12	The degree to which global sustainability issues and challenges form part of the department's research and service
R13	The degree to which local sustainability issues and challenges form part of the department's research and service
R14	The extent to which your department is collaborating with other institutions and stakeholders in pursuit of solutions to sustainability problems
R15	The extent to which aspects of sustainable development are used in selection/execution of research/service
	Examination of sustainability topics
E16	The extent to which sustainability aspects are examined during course
E17	The extent to which sustainability aspects are considered in evaluating projects/traineeships
	Staff expertise and willingness to participate
S18	The level of expertise of staff members in the area of sustainability
S19	The extent to which staff members are willing to carry out research and service activities on sustainability aspects/topics
S20	The extent to which staff members are willing to teach sustainability topics

A summary of the raw data from the sustainability assessment for all the departments is captured in Table 1. The raw data for each of the departments is presented again in each case record together with a graphical representation.

Table 1. Departmental scores from Part A of the USAT

Indicator	Manag ement	Accou nting	Educ ation	Bioche mistry	Hist ory	Anthro pology	Law	Ichthyo logy	Env. Sci	Chemi stry	Pharm acy	Geogra phy	Total (48)	% Rating	Average Rate
C1	0	0	4	2	3	2	2	4	4	1	1	4	27	56.3	2.3
C2	1	0	3	4	3	2	1	4	4	3	1	4	30	62.5	2.5
C3	1	0	3	2	3	3	1	2	4	0	1	3	23	47.9	1.9
C4	1	0	2.5	4	3	3	1	3	4	1	1	3	26.5	55.2	2.2
C5	0	0	3	3	3	3	1	4	4	4	0	4	29	60.4	2.4
T6	2	4	4	4	4	3	3	4	4	3	3	3	41	85.4	3.4
T7	3	4	4	4	4	4	4	4	4	3	3	3	44	91.7	3.7
T8	3	3	4	3	4	3	4	3	4	3	3	2	39	81.3	3.3
T9	2	2	4	3	4	4	4	3	4	3	4	3	40	83.3	3.3
T10	2	4	4	4	4	3	3	4	4	3	3	4	42	87.5	3.5
R 11	0	0	3	4	2	2	1	4	3	4	1	3.5	27.5	57.3	2.3
R 12	0	0	3	4	2	3	1	4	4	4	1	3	29	60.4	2.4
R 13	0	0	4	3	2	2	1	4	4	3	1	3	27	56.3	2.3
R 14	1	0	3	3	1	1	0	3	2	3	1	3	21	43.8	1.8
R 15	0	0	2	3	2	1	1	4	4	3	1	3	24	50.0	2.0
E16	1	1	3	3	2	3	1	3	4	2	0	3	26	54.2	2.2
E17	0	1	2	2	1	1	0	0	4	0	0	2	13	27.1	1.1
S18	1	1	3	4	3	2	1	4	3	3	1	3	29	60.4	2.4
S19	1	1	3	4	3	2	1	4	4	3	0	3	29	60.4	2.4
S20	0	2	3	4	3	2	1	4	4	2	0	3	28	58.3	2.3
Total (80)	19	23	64.5	67	56	49	32	69	76	51	26	62.5			49.6
% Rating Average Rate	23.8	28.8	80.6	83.8	70.0	61.3	40.0	86.3	95.0	63.8	32.5	78.1			62.0
	1.0	1.2	3.2	3.4	2.8	2.5	1.6	3.5	3.8	2.6	1.3	3.1			2.5

CASE RECORD 1: ACCOUNTING DEPARTMENT

Results of the sustainability assessment

The Accounting Department obtained low scores across all indicator clusters except teaching approach. All the indicators belonging to the curriculum and research clusters scored zero. Examinations and staff indicator clusters were rated 1 except S20 which scored 2. The total score was 23 (28.8%) out of 80 and the average score for the department was 1.2 (Table 1 and Figure 1, below).

Table 1: Raw data

Indicator	Score
C1	0
C2	0
C3	0
C4	0
C5	0
T6	4
T7	4
T8	3
T9	2
T10	4
R 11	0
R 12	0
R 13	0
R 14	0
R 15	0
E16	1
E17	1
S18	1
S19	1
S20	2
Total (80)	23
% Rating	28.8
Average Rate	1.2

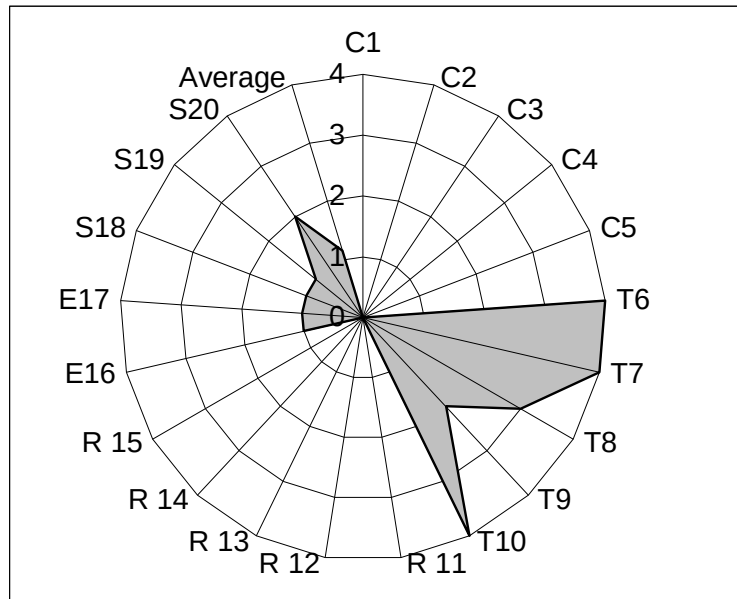


Figure 1. Sustainability performance of the Accounting Department

Curriculum and examinations

The department does not specifically teach sustainable development topics. Instead awareness of these issues is said to be created in Financial Accounting when students are taught to prepare financial statements, the tax effects of trading and how to audit that information. Companies that are in resource intensive operations like forestry or mining use natural resources and therefore face the questions of conforming to regulations regarding their environmental impacts and rehabilitation. Financial statements therefore need to make provisions for such costs which may occur years later. These financial statements are said to be interpreted by different stakeholders and among them, the Green Peace Movement people, for example, would look at the restoration processes in place. While these were not taught in courses, they were said to give students exposure to rehabilitation provisions. Students in addition are said to acquire awareness of environmental issues through

Economics and the requirements of certain acts (e.g. for land restoration/rehabilitation) through Commercial Law.

So there is an awareness that's created but not necessarily an understanding or knowledge of the fundamentals of what it entails (P12, pers. comm., 5 December 2007).

According to the interview, issues like Environmental Accounting therefore are issues which would be picked up by students once they are in the work environment. The department also does examine the calculation and provision of the rehabilitation provisions (ibid.). Courses with sections on provisions include Financial Accounting 1, Accounting 2 and Accounting 3 (RU, 2007). The department offers Ethics as a course and it has a section which deals with corporate social responsibility, a concept directly related to sustainability issues (ibid.).

Research

The department's research was said to be basically in the field of taxation and at the time of the interview, there was nothing which picked up on sustainable development issues (P12, pers. comm., 5 December 2007) even though in the Rhodes University Research Report there were a few publications on ethics (RU Research Report, 2007).

Community engagement

At the time of the study the Accounting Department did not have any community engagement initiatives. This was however not due to a lack of interest or expertise (Figure 3), but was said to be a result of staff shortages (P12, pers. comm., 5 December 2007).

Partnerships

Partnerships in the department were taking place at the level of individuals rather than as departmental initiatives. However, at the time of the study there were no existing partnerships between the department and any other organisations due to commitments at the university (ibid.).

Challenges

The major factor mentioned to be inhibiting the department to pick up such issues is the Accounting curriculum the department follows.

... the curriculum that we follow in the department just doesn't have scope to fit anything more in because the Institute of Chartered Accountants, their curriculum requirements are in fact far too big, ... in fact they have a task team ... at the moment trying to address ways to reduce their requirements because they agree now, after much concern has been expressed by the universities, that the curriculum has become too demanding and students can't cope with it, so there isn't space to fit anything else in (P12, pers. comm., 5 December 2007).

The other problem mentioned is failure by the department to attract new members of staff (P12, pers. comm., 5 December 2007).

How to improve

In terms of improving sustainability focus in the department's activities, there is need for additional resources in the department, especially human resources.

We are under resourced at the moment, we are understaffed and we are standing just to keep the basics covered in the department there is no ways any of us are in a position to undertake additional work of this nature (P12, pers. comm., 5 December 2007).

References

Rhodes University (2007). Calendar 2007. Grahamstown.
Rhodes University Research Report (2007). Retrieved December 29, 2008, from https://www.ru.ac.za/documents/Research/Rhodes_University_Research_Report_2007_WEB.pdf

CASE RECORD 2: MANAGEMENT DEPARTMENT

Results of the sustainability assessment

In the Management Department, generally low scores were obtained across all indicator clusters. All indicators forming part of the examinations and research clusters scored 0. The highest score under staff and curriculum clusters was 1. The scores for indicators belonging to the teaching approach cluster ranged between 2 and 3. The total score out of 80 was 19 (23.8%) and the average score was 1 (Table 1 and Figure 1 below).

Table 1: Raw data

Indicator	Score
C1	0
C2	1
C3	1
C4	1
C5	0
T6	2
T7	3
T8	3
T9	2
T10	2
R 11	0
R 12	0
R 13	0
R 14	1
R 15	0
E16	1
E17	0
S18	1
S19	1
S20	0
Total (80)	19
% Rating	23.8
Average Rate	1.0

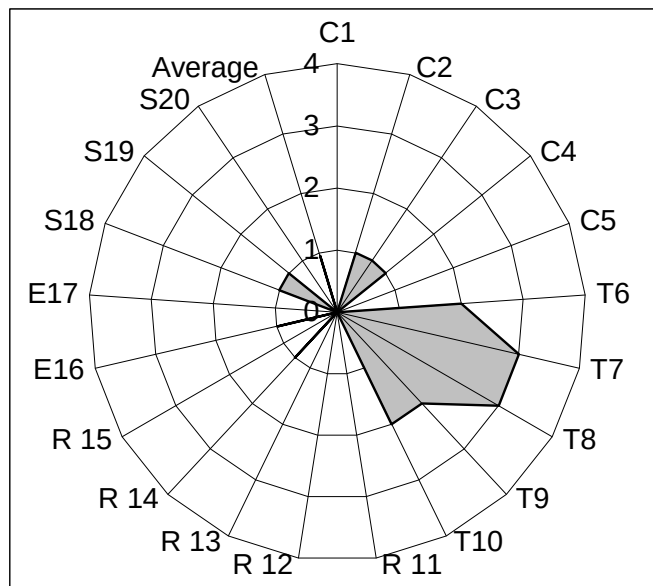


Figure 1. Sustainability performance of the Management Department

Curriculum and examinations

It was established from the interview that sustainable development issues are not directly taught in the curriculum in the Department of Management. Instead the

department teaches corporate social responsibility in Financial Management and Human Resource Management. It is through corporate social responsibility that lecturers pass on the message about keeping the environment ecologically and economically clean of civil imperfections (P18, pers. comm., 13 December 2007). Content analyses of the Financial Management course outline (2007) and the Financial Management examination paper (2007) confirmed the absence of sustainability issues in the course.

Research

According to the interview, the department did not have any research activities in the area of sustainability or which to some extent have any sustainable development implications (ibid.). This was also confirmed through analysing the focus of the 2007 departmental research outputs (RU Research Report, 2007).

Community engagement

Community engagement in the department is said to be centred upon corporate social responsibility around issues of profitability and equality in terms of wealth (P18, pers. comm., 13 December 2007). The department supports the Centre for Applied Social Research and Action (CASRA), a research institute affiliated to Rhodes University and based in the Psychology Department, in running a short course on Organisation Development and the Management of Change. Their support is in the area of Human Resource Management and Strategic Management. The course has been presented six times in the last five years (Psychology Department, 2007).

Partnerships in sustainable development

The department interacts with the local community and municipality through offering Management Development courses. The courses are however said to be directed at managerial skills as opposed to environmental sustainability skills.

... we certainly do interact with the local community and the municipalities and we do give them Management Development courses but not sustainability development courses, they are more Management Development courses, how to become more skilled in how they do their job as opposed to how to apply their skills to the environment (P18, pers. comm., 13 December 2007).

The mainstreaming process

It was mentioned during the interview that the mainstreaming process in the department is not necessarily influenced by global sustainable development agendas but the department generally tries to keep abreast with international agendas. They are influenced by international agendas in terms of managerial skills (ibid.).

Improving sustainability

There was a feeling that room could be created for take-up of sustainability issues in terms of setting aside time for tutorials in this regard.

They (sustainability issues) probably could be incorporated into the existing courses, in other words if you have a module which has got 30 lectures, you might take it as a tutorial in say 5 lectures but certainly not specifically dedicated to sustainable development. It would just be part of the general lecture course (P18, pers. comm., 13 December 2007).

The interview established that the department had never really considered sustainability issues and mainstreaming them in its activities owing to a lack of awareness. This study was said to be the first to mention sustainability issues and

hence may have created the little awareness necessary for the issue to be taken up further in departmental meetings (ibid.). Emphasis in the department was said to be more on “*wealth creation and corporate social responsibility and being socially responsible as far as money matters*” but not in terms of the physical environment (ibid.).

Obstacles to mainstreaming activities

According to the interview, the department does not particularly consider sustainability practices as their responsibility even though they may be part of their private lives as individuals.

We don't pay much attention, in actual fact we leave our computers on overnight though we normally switch off our lights; we are aware of those sorts of things, in terms of being actional ... in our private lives where we live. But certainly we don't sort of pay specific attention ... we don't regard that we should specifically emphasise sustainability projects ... those are the things which are ingrained in students which will come from all the courses that they do. ... that would probably be something from Environmental Science or something like that, certainly we don't emphasise it (P18, pers. comm., 13 December 2007).

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CASE RECORD 3: ANTHROPOLOGY DEPARTMENT

Results of the sustainability assessment

In the Anthropology Department, moderate scores were obtained with most indicators rating between 2 and 3. The teaching approach cluster attained high scores with its indicators scoring between 3 and 4. Only the examination and research clusters had some indicators scoring below 2 (Table 1 and Figure 1). Its total score was 49 (61.3%) out of a possible score of 80. Its average score was 2.5.

Table 1. Raw data

Indicator	Score
C1	2
C2	2
C3	3
C4	3
C5	3
T6	3
T7	4
T8	3
T9	4
T10	3
R 11	2
R 12	3
R 13	2
R 14	1
R 15	1
E16	3
E17	1
S18	2
S19	2
S20	2
Total (80)	49
% Rating	61.3
Average Rate	2.5

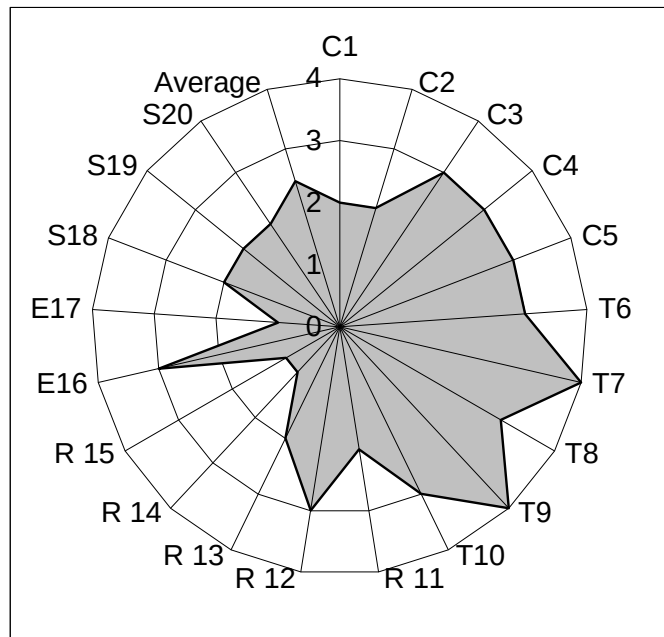


Figure 1. Sustainability performance of the Anthropology Department

Curriculum and Examinations

The department offers modules which address sustainable development issues. The Environmental Anthropology module focuses on the complex relationship between culture/society and nature/environment and the role of other social institutions like politics and economics in understanding environmental issues (Environmental Anthropology Course Guide, 2007). Among other issues, Anthropology of Tourism looks at impacts of tourism on local economies, culture and society (Anthropology of Tourism Course Guide, 2007). The People and Parks module is concerned with the complex relationship between people living within or close to parks and the parks in question which, in this case refer to “all kinds of ‘natural’ areas” which could be “World Heritage Sites, national, provincial, urban and privately owned, as in game farms” (People and Parks Course Guide, 2007, p. 1). The course explores the implications of the concept of sustainable development in the management of parks as Administrative Policy gradually changes from inhumane policy which dominated nature conservation and is being re-oriented towards rational access for residents and exploitation of park resources for local community development. Owen (n.d., unpaginated) called Anthropology “a people-driven discipline” and evidence from the course guides show that the department places people at the centre of its activities. They then approach sustainability issues from the point of view of how these affect people. The 2007 examination papers for the mentioned courses also show evidence of examination of the sustainability issues taught during the course (Environmental Anthropology examination paper, 2007; Anthropology of Tourism examination paper, 2007; People and Parks examination paper, 2007).

Research

There are some research activities taking place in the area of sustainability as evidenced by the USAT results. Examples of sustainability issues researched/being researched by students were given as: studies of how people obtain *muti* (medicinal) plants and the trade in those plants, tourism related issues, people environments and medicinal plant use (P11, pers. comm., 4 December 2007). The 2007 research outputs in the department show a focus on sustainability issues including land restitution, and direct use values for non-timber forest products (RU Research Report, 2007). Some of their projects also reach out to communities. An example is an interdisciplinary, collaborative research project by one of the staff members in Dwesa-Cwebe in the former Transkei where local residents were campaigning for access to the Dwesa-Cwebe Nature and Marine reserve and were finally granted their land claim in 2001 (Owen, n.d.).

Community engagement

Some of the members of the Anthropology Department were/are involved in community engagement work in which sustainability issues are embedded at various levels. The department worked with the Impumelelo Innovations Award Trust “to reward excellence in government and partnerships that reduce poverty in South Africa” (Rhodes University, 2005, p. 3). One member was involved in evaluation of Eastern Cape development projects on behalf of Impumelelo Innovations Award Trust. The purpose of the evaluation was to find out if projects met key criteria before deciding if they qualified as models of best practice. The evaluation also considered issues of cost-effectiveness in problem solving and prospects for long term-sustainability. The range of projects included justice, social welfare, health, infrastructure development, education and training, environment and job creation (ibid.). Another staff member currently serves on the Roman Catholic St. Patrick’s Parish Council and is a member of the GADRA (Grahamstown and District Relief Association) Education Board. GADRA is a South African NGO devoted to assist the blind and partially sighted.

The mainstreaming process (how and why)

The USAT results show that the department, through its teaching approach, promotes the necessary skills for sustainable behaviour. In addition, it is said to have staff members who can and are willing to teach, supervise and research on sustainability issues (P11, pers. comm., 4 December 2007).

References

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- Anthropology of Tourism examination paper (2007).
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CASE RECORD 4: HISTORY DEPARTMENT

Results of the sustainability assessment

Data generated from the sustainability assessment in the History Department show a high level of integration of sustainability issues given the fact that it is a History Department. Indicators under the teaching approach cluster rated very highly with all of them obtaining the maximum score of 4. This was followed by integration of sustainability issues in curriculum and staff expertise and willingness to participate in sustainability teaching and research activities, both of which scored 3 across all indicators. Research and examinations are the clusters which obtained relatively low scores in relation to other indicator clusters (Table 1 and Figure 1). The department obtained a total score of 56 out of 80 (70%) and an average of 2.8.

Table 1. Raw data

Indicator	Score
C1	3
C2	3
C3	3
C4	3
C5	3
T6	4
T7	4
T8	4
T9	4
T10	4
R 11	2
R 12	2
R 13	2
R 14	1
R 15	2
E16	2
E17	1
S18	3
S19	3
S20	3
Total (80)	56
% Rating	70.0
Average Rate	2.8

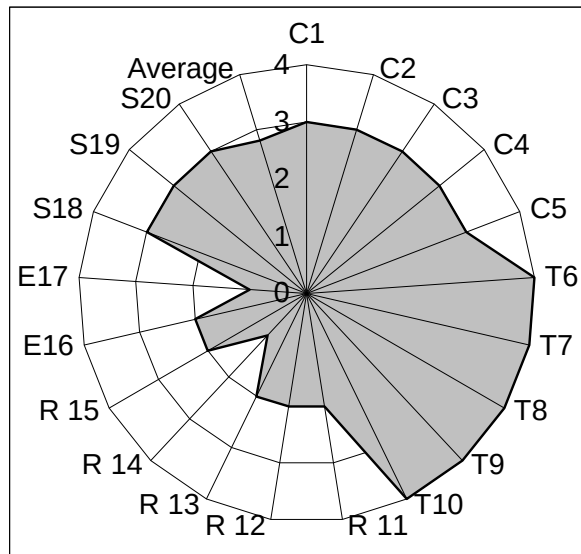


Figure 1. Sustainability performance of the History Department

Curriculum and examinations

The History Department at Rhodes University has various courses which address environmental and sustainability issues. Table 1 is an outline of these courses and the environmental and sustainability topics they address.

Table 2. History courses with sustainability content.

Level	Course	Environmental and sustainability topics in the course
1	HISTORY 102: The World Crisis and its Historical Origins	Technological changes, disease, the division of the world into the rich and the poor, the world debt crisis, the demographic explosion, AIDS (why the 1970s?), environmental disasters (Department of History handbook, 2007, p. 32).
3	History 303: Health, Disease and Society	The impact of disease on the early development of the Cape Colony, contemporary health challenges (including HIV/AIDS) (Department of History handbook, 2007, p. 34).
3	History 311: South African Environmental History	Indigenous ecological knowledge and practice; the impact of colonialism and settler agriculture and pastoralism; the exploitation of wildlife resources; environmental degradation; the rise of conservationism and the move from protectionism to contractual parks (Department of History handbook, 2007, p. 34).
3	HISTORY 306: Africa in Crisis	The African debt crisis and its causes; demographic explosion, AIDS; problems of the 'peasants' and declining per capita food production; the Ethiopian famine of 1984-85; matters of environmental concern (e.g. water, trees, soil erosion, rainfall); problems of industrialisation and poor export performance, Structural Adjustment and the consequences (Department of History handbook, 2007, p. 34-35).
3	HISTORY 302: Gender in Southern African History	Social status in pre-industrial societies, the impact of urbanisation, how gender-based ideologies were developed and enforced, and resistance to roles of subordination (Department of History handbook, 2007, p. 36).
Honours	The Contemporary Global Crisis	Globalization; consumerism; the unequal distribution of global wealth; the global debt crisis; the environment; global warming; other threats to the atmosphere; chemicals; endangered oceans; mass extinctions; population growth relative to food output; water; diseases (Department of History handbook, 2007, p. 37).
Honours	History and the HIV and AIDS Epidemic in South Africa	Understanding the contemporary HIV and AIDS epidemic in South Africa, influence of societal morals and norms in response to the epidemic, roles and responsibilities of corporate, governments, individuals, NGOs, faith-based groups in the epidemic (Department of History handbook, 2007, p. 38).

History 102 (The World Crisis and its Historical Origins) which is a level 1 course is compulsory. According to the interview, second year courses do not emphasise these themes (P15, pers. comm., 10 December 2007). Third year courses are options where students choose four out of eight courses. Two courses are offered every term and students choose one out of the two. History 303: Health, Disease and Society and History 311: South African Environmental History, both of which have sustainability content, are offered in one term. This means students do either of them (Department of History handbook, 2007, p. 34) and hence all have exposure to environmental and sustainability issues. This is especially so for those who do History 311: South African Environmental History, which has more sustainability content than the other (ibid.).

Evidence from documents show that there is examination of environmental and sustainability topics that students are taught in the History Department. History 311 (South African Environmental History) June 2007 examination questions were

focussed on environmental issues in South Africa and some even on Eastern Cape environments (History 311 June 2007 examination paper).

The History Department does not encourage learning by rote among students, it encourage students “to think imaginatively, critically, analytically and independently” (Department of History handbook, 2007, p. 3). This helps students acquire important skills that will help them in their future lives (ibid).

It was established from the interview that specialisation in the environmental and sustainability area in the History Department is not possible at undergraduate level. Honours students were said to be able to do so in their research essay. Doing a masters or doctoral thesis in the environmental and sustainability area was said to be acceptable (P15, pers. comm., 10 December 2007).

Research

The interview revealed that there were no staff members in the department doing research in the area of environment and sustainability. However, some students had done research in those areas. One looked at the World Social Forum, the other one at green washing of corporations as they try to staff for or encounter the environmental movement. All these were at honours level. A third student did research work on the production of cannabis and will be doing a masters in 2008 in that area. At PhD level there was a student researching on HIV/AIDS in South Africa (P15, pers. comm., 10 December 2007).

Sustainability related research outputs in the department in 2007 focused on the following areas:

- gender politics in pre-colonial Africa,
 - the post-apartheid recovery process in South Africa,
 - social justice, and
 - apartheid and the environment.
- (RU Research Report, 2007).

Community engagement

While links between the History Department and the community were said to be weak, there was a professor in the department who was said to be closely involved in the Egazini Project (P15, pers. comm., 10 December 2007). The Egazini Project is a “community arts, culture and heritage initiative” and focuses on “concepts of reconciliation, education, job creation and community tourism development through incorporating History into cultural industries” (Rhodes University, 2005, p20). The project is considered a long-term scheme with positive economic outcomes (ibid.).

Partnerships in sustainable development

The professor involved in the Egazini Outreach Project was said to be working closely with the municipality (P15, pers. comm., 10 December 2007). Even though the focus of the project is not essentially environmental and sustainability, some of these issues form part of the key focus areas of the Project (Rhodes University, 2005, p. 20).

The mainstreaming process

The feeling was that justice was being done in the area of environment and sustainability in the History Department.

We are a History Department and in teaching History we try to cover many different dimensions of the human experience. If we were to overemphasise say sustainability, the environment at the expense of other themes, I think would be inappropriate. But yes there is room for perhaps improving but then we have got to deal as far as we can with the total human experience rather than just focussing on one aspect (P15, pers. comm., 10 December 2007).

At the same time, encouraging students to go into this research area was said to be possible as far as the department would not be forcing students if they are not interested (ibid.).

Mainstreaming was also said to be a result of staff initiatives in response to pressing global challenges.

Well I think there is a strong feeling among most staff members ... that the environment, deterioration of the environment, global warming ... are maybe the most pressing issues facing the world today. So given this concern, we take these issues into our courses (P15, pers. comm., 10 December 2007).

References

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CASE RECORD 5: BIOCHEMISTRY, MICROBIOLOGY AND BIOTECHNOLOGY DEPARTMENT

Results of the sustainability assessment

The sustainability assessment revealed a high level of integration of sustainability issues in the department across all indicators. The curriculum and examination indicator clusters had scores ranging from 2 to 4. Teaching approach and research clusters were in the range of 3 to 4. The department scored exceptionally well in the staff cluster with all indicators rating 4 which was the maximum score. The total score was 67 out of 80 (83.8%) and the average rate was 3.4 (Table 1 and Figure 1).

Table 1. Raw data

Indicator	Score
C1	2
C2	4
C3	2
C4	4
C5	3
T6	4
T7	4
T8	3
T9	3
T10	4
R 11	4
R 12	4
R 13	3
R 14	3
R 15	3
E16	3
E17	2
S18	4
S19	4
S20	4
Total (80)	67
% Rating	83.8
Average Rate	3.4

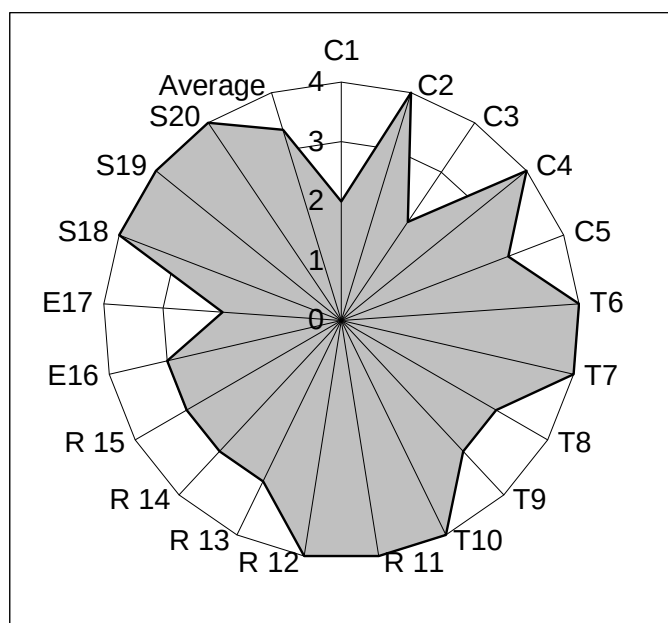


Figure 1. Sustainability performance of the Biochemistry, Microbiology and Biotechnology Department

Curriculum and examinations

According to the interview, courses offered in the department have sustainable development issues embedded in them though they are not formally called sustainable development.

... the issue of sustainability is deeply embedded in the material that we do teach in Biochemistry, Micro-biology and Biotechnology ... while it's not right upfront as under the topic sustainable, or sustainability topics, I think a lot of the courses which we do, have that embedded in the material (P16, pers. comm., 11 December 2007).

It was also established that a major part of the department's undergraduate courses is devoted to environmental microbiology which does examine sustainable biological cycles and teach applied Microbiology and Biochemistry, a substantial amount which is aimed at Environmental Biotechnology and Bioremediation. While the department does not have a mandatory course on sustainable development, all the students at the end of their programmes would have had exposure to sustainability issues (P16, pers. comm., 11 December 2007).

Content analysis of the 2007 Microbiology 3 course revealed that the three modules which include Biosensing and Biodegradation Pathways, Exploiting Micro-organisms and Bio-remediation dwell on environmental and sustainability issues. Among the critical outcomes of Biosensing and Biodegradation Pathways are (i) demonstrating

an understanding of the world as a set of related systems, and (ii) the effective and critical use of science and technology which show a responsibility towards the environment and others. The same document explains the importance of sensing technology as the provision of valuable information on how complex and often toxic molecules degrade in the environment (Microbiology 2007 third year lectures). The Exploiting Micro-organisms Module, among other things, looks at the exploitation of microbial interactions for the benefit of man and the environment, potential use of biological control products in agriculture and bio-fertilisation. Bioremediation is focussed on biological remediation of water pollution (ibid.). There is also evidence from the 2007 examination papers that those sustainability issues which are taught in class are also examined (Microbiology 302 question papers, 2007).

Research

It was established from the interview that most of the research activities in the department by both staff and students have a sustainability dimension though it may not be that explicit. Projects include those which are focused on bio fuels and developing technology for bio-fuels; environmental clean-up, and bioremediation and beneficiation of effluent. The Environmental Biotechnology Research Unit (EBRU) is entirely focused on sustainability issues (P16, pers. comm., 11 December 2007).

Sustainability related research outputs in the department in 2007 were in the following areas:

- bioremediation,
 - waste water treatment,
 - decolourisation and degradation of textile dyes,
 - biosensor detection and monitoring of faecal material in water,
 - heavy metal concentrations in sediment and water, and
 - removal of metal from water
- (RU research review, 2007).

Community engagement

Some of the research projects done in the department are said to be in the form of applied research and therefore reach out to the community. Examples given include a project on river systems and pollution in local river systems where the department is collaborating with the Institute for Water Research. Other projects reaching out to the community are focussed on environmental bioremediation and there is another looking at sustainable game industry in the Eastern Cape, particularly focussing on Rhinoceros and their re-introduction to the Eastern Cape. EBRU is also involved in sustainability projects in the community and works with the money industry, for example, beneficiation of waste water (ibid.).

According to the 2005 Community Engagement Review, the department “promotes public understanding of science locally, nationally and across the African continent”. This is done through a free online magazine which is said to showcase “African scientific achievement and progress to the world in an understandable way” (Rhodes University, 2005, p. 4).

Partnerships in sustainable development

According to the interview, the department does not work with the municipality but several academics are involved in partnership with industries specifically to clean up environmental waste, for example, the mining industry. They also collaborate with other universities but do not have formal projects as a result of such partnership (P16, pers. comm., 11 December 2007).

The mainstreaming process

One of the major factors mentioned which enabled the department to move towards sustainability is the availability of suitable technologies. There was also a feeling that it is the area where their students are going to get employed.

I feel we are ... rapidly moving towards sustainability and the disciplines themselves are uniquely situated, we have the technologies that can enable sustainability, particularly in terms of environmental clean up. ... I think that's where the work lies, and certainly from a future jobs kind of view that's where a lot of our students are going to find jobs, and they need to be trained now to be able to do that (p.16, pers. comm., 11 December 2007).

While the department is influenced by global sustainable development debates, according to the interview, the biggest driver for their field was the availability of research funding in that area. The funders encourage research in projects which are focussed on sustainable development.

While many of us would feel that we would want to do that, one of our major pushes is the fact that there is money, you know, there is research money for projects in that field. And I think that does encourage people to move in that direction (p.16, pers. comm., 11 December 2007).

One of the factors mentioned was that students now have a very strong sense of wanting to make a difference and hence they would want their research to have an application (P16, pers. comm., 11 December 2007).

How to improve

From the interview, it was established that there was room to improve the sustainability focus of the department, for example, through making it more obvious in stated outcomes for courses and more explicit in terms of practical components. Though students have been working in that area already, they do not necessarily see it as sustainability.

I think in the case of sustainability, we are already, our curriculum and the way we do things, the way we educate our students, I think we educate our students, we don't just teach them. I think sustainability is a huge part of what we do, it's just not upfront, and I actually think one of the major things we can do is to add text to that effect on how, when we list the outcomes of our courses, that we want our students to be aware of the need to develop sustainable practice (P16, pers. comm., 11 December 2007).

Encouraging more debate would also make students think about "what they are doing and the consequences of what they are doing before they go ahead and do it" (P16, pers. comm., 11 December 2007).

The other view expressed was that it was easier to talk about sustainability issues to university students in contrast to school children where the majority may come from poverty stricken environments where having enough food and accessing the bare basics are major issues leaving them no time to commit to sustainability issues. The need to keep in mind the fact that some people are more able to act on sustainability issues than others was thus said to be important (ibid.).

The university was also said to have had a big turn around in its attitude to sustainable development and this was evident in its consideration of environmental and sustainability issues when constructing new buildings, for example, issues like

effluent, rain water harvesting, solar power; even though some of the options are expensive in the short term (P16, pers. comm., 11 December 2007).

The need for introducing the issue of sustainability into the university vision and mission statement, to state that the development of the university will be in a sustainable way and that the university will endeavour to minimise its impacts on the environment, was also stressed during the interview. In terms of creating environmental awareness among staff members, the suggestion was that it was necessary to inform people to be involved but through creating incentives that would attract them. Heads of departments, people who are on teaching and learning committees in their departments and even students were said to be the appropriate persons to drive the process. It was suggested that competitions could be used for students, examples being: coming up with ways in which Rhodes University can more efficiently utilise or save energy on campus, rewarding the residence that uses the least amount electricity in a year, or the one that recycles its water or uses the least amount of water or the residence with the least number of leaking taps (P16, pers. comm., 11 December 2007).

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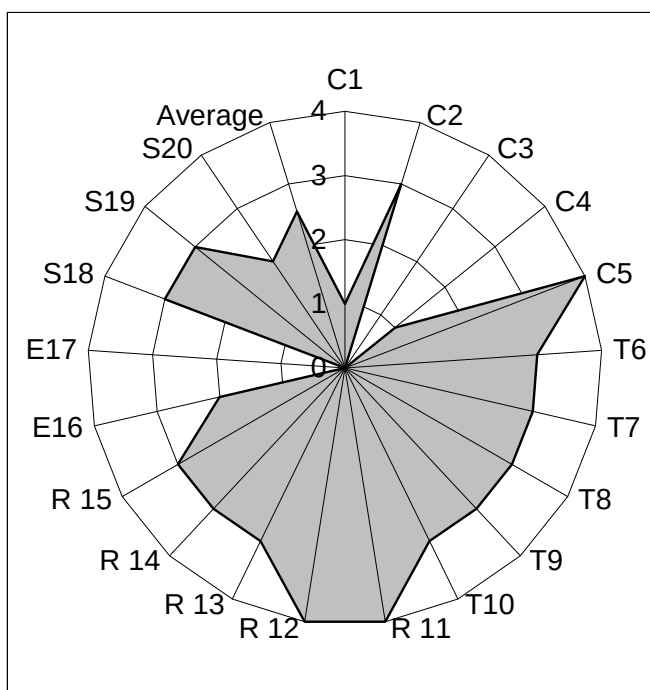
CASE RECORD 6: CHEMISTRY DEPARTMENT

Results of the sustainability assessment

From the USAT assessment, the Chemistry Department shows a high level of integration of sustainability in research activities and also obtained high scores in its teaching approach. The research cluster had the highest scores of between 3 and 4 while teaching approach had all its indicators scoring 3 (Table 1 and Figure 1). These were followed by the staff cluster with a score range of 2-3. Curriculum and examinations clusters had some of their indicators scoring 0. The total score, out of 80 possible scores, was 51 (63.8%) and the average score was 2.6.

Table 1. Raw data

Indicator	Score
C1	1
C2	3
C3	0
C4	1
C5	4
T6	3
T7	3
T8	3
T9	3
T10	3
R 11	4
R 12	4
R 13	3
R 14	3
R 15	3
E16	2
E17	0
S18	3
S19	3
S20	2
Total (80)	51
% Rating	63.8
Average Rate	2.6


Figure 1. Sustainability performance of the Chemistry Department

Curriculum and examinations

It was mentioned during an interview with the head of the Chemistry Department that sustainability issues are taught in the form of ecological rather than socio-economic and political issues in the department. The first year curriculum has a section on inorganic systems and the environment which deals with chemical implications of acid rain, the ozone layer and the greenhouse effect for example (P25, pers. comm., 14 February 2008, Chemistry 1 General information and course contents, 2008).

According to the interview, third years do a topic on Green Chemistry where they explore the use of more environmentally friendly reagents and how to design reactions which are less wasteful of resources etc. (P25, pers. comm., 14 February 2008). It was also established that students do an industrial project where they are given a topic to work on as a team. The project requires them to design a plant to manufacture a particular chemical and in the process, taking into account consideration of environmental and sustainability issues for example, environmental impacts of the operations of the plant (P25, pers. comm., 14 February 2008). Content analysis of the Chemistry 3 course outline (2008) confirmed the existence of both Green Chemistry and the industrial project in the third year curriculum. According to the interview, the mentioned sections of the curriculum are not optional hence all students get exposure to sustainability issues.

Students could also do Environmental Science but they cannot major in both Environmental Science and Chemistry due to timetable restrictions. However, the

sentiment was that it was necessary for students to do both Chemistry and Environmental Science (P25, pers. comm., 14 February 2008).

I think that there is a real need for chemically competent people to develop expertise in Environmental Science as well, because there are real challenges there. I think that ... you need both, if you are going to face chemical challenges, environmental challenges you need the Chemistry background to do it sensibly. At the moment Environmental Sciences I think requires only one semester of Chemistry (P25, pers. comm., 14 February 2008).

Content analysis of the Chemistry 102 examination paper (2007) showed that the environmental and sustainability issues that are taught are also examined at the end of the semester. Green Chemistry is examined in students' projects where they are supposed to write about it in their project outline.

Research

While research in the department does not directly address environmental and sustainability issues, the interview established, there is a major emphasis in the department on Medicinal Chemistry.

we have projects looking at anti-malarial, developing anti-malarial agents, anti-TB agents, HIV protease and integrated inhibitors, oesophageal and other types of cancer, ... marine natural products with medicinally active components ... medicinal applications (P25, pers. comm., 14 February 2008).

In the past, there was research in the area of removing metals from waste. The focus was on recovering valuable metals from waste flows from refinery processes, which is a remediation process as well as an economic beneficiation of waste. However, according to the interview, those were chemically orientated projects looking at trying to recover the metal of interest (ibid.). No 2007 research outputs were identified to be explicitly addressing sustainability issues (RU Research Report, 2007).

Community engagement

At the time of the interview, it was established that there were no community engagement activities which were focussed on environmental and sustainability issues (P25, pers. comm., 14 February 2008). However, staff members from the department were involved in coordinating and running the Khanya Maths and Science Club aimed at bringing about "a love of Maths and Science amongst its members" (Rhodes University, 2005, p. 14). The department is also involved in capacity building of teachers and support the provision of educational materials.

Partnerships in sustainable development

The interview established that there were no existing sustainable development partnerships between the department and other universities and /or other stakeholders (P25, pers. comm., 14 February 2008).

The mainstreaming process

According to the interview, it was difficult to point out the important factors that influenced mainstreaming of the sustainability issues mentioned above as they have developed over time. Staff members were involved in projects which developed from a realisation of the need to give students "a broader view of the application of Chemistry in society", so that they would go out with "a broader view to the whole industrial sector on the kind of issues that would be involved" (P25, pers. comm., 14 February 2008).

It was also mentioned that there is need to keep abreast with new developments alongside the teaching of the fundamentals of the subject. Commenting on the possible influence of the global sustainability agenda, it was agreed that all people are being influenced as it (the global sustainability agenda) made them increasingly sensitive and aware of those issues. They are therefore becoming increasingly aware of what they do with waste and how they handle it. This awareness was said to be extended due to the challenges being faced in Grahamstown, for example, fluctuating water and electricity supplies. In the case of integration of Green Chemistry in the curriculum, this was said to be a natural development in Chemistry and hence it was not clear whether it came as a result of the international debates.

Other sustainability practices

Observations made during a tour of the various facilities in the department established the existence of a storage room for chemical and other waste from Chemistry and other departments like Biochemistry and the Pharmacy Faculty. Waste is collected in separate labelled containers and stored for collection by Psychem, a contracted waste collection company. The department has storage facilities for various chemicals and solvents. Flammable materials are stored in asbestos lined closets to reduce heat penetration. Fire extinguishers are distributed all round the department and in the solvents distillation room. Though it was established from the interview that the department does not monitor the fumes it releases, it has fume hoods with shatterproof glass doors and they use a suction system to remove the fumes (P25, pers. comm., 14 February 2008). It was also mentioned that when working with reactions that produce poisonous or toxic fumes, there has to be a scrubbing system in which the gas will be bubbled through a solution to trap and scrub the gas before it is lost (ibid.).

It was mentioned during the interview that the sample sizes of the chemicals used were small and therefore the volume of fumes was also very small. At the same time, students work in different project areas and therefore use different chemicals. The fumes released were therefore diverse making it difficult to monitor specific components (P25, pers. comm., 14 February 2008).

According to the interview, the department has safety rules for students which they are expected to know when working with chemicals, for example, how to handle them, how toxic they are and the proportions that have to be used (ibid.).

Unsustainable patterns

Observations revealed that the department has mass spectrometers which they do not switch off together with air conditioners as the spectrometers have to be kept at a constant temperature. This has implications on the electricity consumption of the department. Computers in their modelling lab should also be kept running as modelling runs of various systems takes time to complete and get disrupted by power interruptions. Therefore, according to the interview, even though there is a growing sensitivity to such issues; the department is somewhat trapped on this issue (P25, pers. comm., 14 February 2008).

While the Chemistry Department was said to emphasise switching off lights, not everyone adheres to this and it is complicated by the fact that the technical staff responsible for that finish work early while some lectures run late. Other staff members also preferred to leave computers running overnight though some were said to be switching them off on a daily basis (P25, pers. comm., 14 February 2008).

How to improve

It was pointed out during the interview that the area that required improvement in the department was switching off lights after work. The suggestion was that the security people who lock the building could do it even though it is a difficult situation to control with students working after hours (ibid.).

Improving exposure of students to sustainability issues was said to require greater timetable flexibility so as to allow students to major in both Chemistry and Environmental Science which they could not do at the time of the interview due to timetable clashes (P25, pers. comm., 14 February 2008).

It was pointed out that this was a timeous consideration of sustainability issues and there was a need for all people to start thinking about how to tackle them.

I think issues of sustainability are all challenges confronting the entire world and I think all of us have to begin to think more creatively about how we tackle them (P25, pers. comm., 14 February 2008).

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CASE RECORD 7: ENVIRONMENTAL SCIENCE DEPARTMENT

History of Environmental Science Department

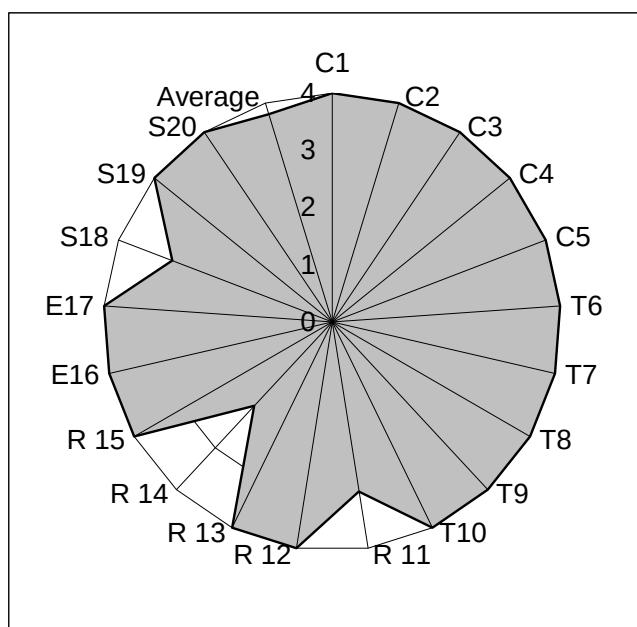
The Department of Environmental Science was established as a cross-departmental programme in 1998 and grew to a full department by 2002 (About Environmental Science at Rhodes University, 2007). It was established as a way of responding to the international growth in environmental issues (P23, pers. comm., 13 February 2008) and a demand for suitably qualified environmental professionals owing to increasing awareness of environmental and sustainable development issues (About Environmental Science at Rhodes University, 2007).

Results of the sustainability assessment

Results of a sustainability assessment in the Department of Environmental Science show a very high level of integration of sustainability issues in the curriculum as represented by the curriculum cluster of indicators in figure 1. The same goes for the teaching approach and examinations clusters. All indicators belonging to the mentioned clusters scored 4, the maximum possible score. Research and staff expertise clusters of indicators had score ranges of 2-4 and 3-4 respectively. In general, most indicators (17 out of 20) attained the maximum possible score of 4. The total score out of 80 was 76 (95%) and the average score was 3.8 (Table 1 and Figure 1).

Table 1. Raw data

Indicator	Score
C1	4
C2	4
C3	4
C4	4
C5	4
T6	4
T7	4
T8	4
T9	4
T10	4
R 11	3
R 12	4
R 13	4
R 14	2
R 15	4
E16	4
E17	4
S18	3
S19	4
S20	4
Total (80)	76
% Rating	95.0
Average Rate	3.8


Figure 1. Sustainability performance of the Environmental Science Department

Curriculum and examinations

From the interview, it was established that the curriculum in the department has an interdisciplinary perspective and their approach is interdisciplinary too (P23, pers. comm., 13 February 2008). They address social, economic and ecological dimensions of sustainable development. On campus, Environmental Science is open to all faculties and hence, even though most students are from the sciences faculty, they draw students from humanities, commerce and law. Students from any of the faculties were also said to have the freedom to opt to major in Environmental Science from their second year and the department is not particular about their background provided they have the required pre-requisites. The pre-requisites were outlined as Geography 1 and one of Anthropology, or Botany or Zoology, or Geology 1 (P23, pers. comm., 13 February 2008). The department does not have an option for students to specialise in sustainable development through coursework (ibid.).

Content analyses of course outlines confirmed the intense presence of environmental and sustainability issues in the department's curriculum. Courses offered by the department range from those which are introductory, to those which teach application of skills and tools and those which develop professional skills among students within the Environmental Science discipline. All the courses have an interdisciplinary approach in dealing with the dimensions of sustainable development, that is, social, economic and ecological issues. Introduction to integrated environmental systems focuses on introducing integrated complex systems and then looks at social, economic and ecological systems. "It teaches learners to view the environment as a dynamic, integrated social-ecological system" (Introduction to Integrated

Environmental Systems (Env 201) course outline, 2008, p. 1). The purpose of the other course, Environmental Issues of Global Concern, is to teach application of skills and tools at global, regional and national levels. It also draws from local case studies. The major sustainability issues of focus are biodiversity, integrated pollution and waste management, poverty and the environment, water scarcity, land degradation and transformation (Environmental Issues of Global Concern (Env 202) course outline, 2007). Environmental Monitoring and Monitoring Systems deals with the “design and implementation of environmental monitoring systems” at “different spatial and temporal scales integrating across the biological, social and economic components of an environmental system”, for example industrial, terrestrial and aquatic systems (Environmental Monitoring and Monitoring Systems (Env 301) course outline, 2008). Environmental Management Concepts and Methods course deals with the following topics: local environmental planning for sustainability, business and the environment, terrestrial ecosystem management, integrated water resources management (Environmental Management Concepts and Methods (Env 302) course outline, 2007). Content analyses of selected 2007 examination papers revealed that the sustainability issues taught are also examined (Env 201 examination paper 1, 2007; Env 201 examination paper 2; 2007 and Env 301 examination paper 1, 2007).

Research

Postgraduate programmes in the department are done through a research dissertation and most of the research projects relate to sustainable development issues (P23, pers. comm., 13 February 2008). In 2007, third year students undertook various research projects on campus which were basically on environmental and sustainability issues. A list of the postgraduates' 2006 research topics confirmed that all students addressed various sustainability issues and some in particular the interface between the social and ecological systems (Department of Environmental Science, 2006).

Sustainability related research outputs for 2007 were in the following areas:

- restoring natural capital in communal areas,
 - land cover change,
 - fuel wood,
 - poverty alleviation,
 - community-based natural resources management,
 - green spaces,
 - invasive alien plants,
 - medicinal plants,
 - rural livelihoods and forest products,
 - municipal commonages,
 - HIV/AIDS and food security, and
 - ecosystem services
- (RU Research Report, 2007).

Community engagement

Contribution to community engagement in the department is said to be through applied research, especially by students.

We have postgraduates in rural areas and they are undertaking research and 99% of them in a way that we might call applied research and certainly community sensitive research in that they will feed-back results, they will involve the community in the process and I would think that results goes to the community and agencies in the area that reviews those results, like

NGOs, government departments and so on (P23, pers. comm., 13 February 2008).

An example given is a research programme which looked at commercialisation of natural resources.

We had a three and half year programme looking at what is driving the increasing commercialisation of natural resources in South Africa. Why are the rural people, or increasing numbers of rural people selling natural resources, what's driving them? (P23, pers. comm., 13 February 2008).

The department is also said to be involved in big projects which inform policy. Besides involving communities in the research process, results of such researches are fed back to policy-makers at the end of the research programmes through policy workshops.

... at the end of that process we have to feedback to the communities ... as a government department what can you do or what should you be doing on the basis of these research findings, as an NGO what should you or could you be doing, as a donor, as a financier what should you or could you be doing (P23, pers. comm., 13 February 2008).

The department “boasts” of a strong commitment to community engagement with a large proportion of research having a strong applied dimension, and the benefits extending beyond the local community (Department of Environmental Science, 2006). Community engagement initiatives in 2006 were numerous and focused on a diversity of issues including support for the establishment and running of a community vegetable garden, using waste water purified via algal ponds, developing local institutions for ecosystem management, developing a management plan for and initiating the establishment of a conservancy, donation of indigenous trees for National Arbor Week to local schools etc. (ibid.).

The department assisted with funds to build toilets, repair a bridge, provide food parcels and make donations of citrus trees in the Kat River area. The department also helps communities with skills transfer where the potential for income generating projects based on natural resources is identified. The skills transfer will be in areas such as product development, marketing and client relations (Rhodes University, 2005).

Partnerships in sustainable development

The department is said to be involved in collaborative relationships with various organisations and the nature of the relations include joint funding of programmes, joint research programmes, joint teaching of courses etc. However, according to the interview, they do not necessarily have an agreement in which they commit to sustainable development. An example given of such collaboration is through running the Environmental Impact Assessment course with the Coastal and Environmental Services at honours degree level. The course is run through the department but is coordinated and some of the courses are taught by the Coastal and Environmental Services (P23, pers. comm., 13 February 2008).

The mainstreaming process

It was mentioned during the interview that the Department of Environmental Science considers sustainable development as one of its core concepts. As a result sustainable development is said to have always been part of their focus and the department itself was created to respond to such issues.

This department was created because of the growing lobby on environmental issues and Rhodes therefore wanted to train a generation of professionals who can contribute and address the sustainability issues of the country and southern Africa. So everything we do, that's why we are here, our job is sustainable development (P23, pers. comm., 13 February 2008).

It was also established that debates like the sustainable development agenda influence them and hence their activities change in light of such debates.

We are kind of encouraging students to engage in debates, to develop those critical thinking skills to interpret what going on around them. So ... our courses are evolving as debates around sustainability and environmental issues evolve internationally (P23, pers. comm., 13 February 2008).

However, the interview revealed that they were not influenced by the launch of the United Nations Decade of Education for Sustainable Development (ibid.).

Approach to sustainable development

The department has an integrated or holistic approach to sustainable development issues.

Sustainable futures is the ... conscious trade off between social, environmental, ecological, it's what we teach and that's why we are here. So we don't have a particular economic focus, we don't have a particular social focus, we don't have a particular ecological focus, we put these issues together (P23, pers. comm., 13 February 2008).

Environmental Science was defined as “the study of the relationship between humans and their environment”, which is a multi-disciplinary approach to sustainable environmental management. The department therefore “seeks to attract students from a range of academic disciplines” (About Environmental Science at Rhodes University, (2007, unpaginated).

Room for improving

In terms of improving their practice, the feeling was that in teaching and research, everything they could do was being done and students did very well in class and in their research. However, there was room for improvement in terms of practice where students should look at practices in their own lives and at home.

It just pains me to see students who just sit around in our internal debates and debate sustainability, but they don't recycle their paper, they don't take their glass anywhere, so they don't internalise the things that their research project is all about or the course that they have just passed. They don't internalise that for their own purposes (P23, pers. comm., 13 February 2008).

The suggestion was that people should live by example and use multiple strategies to create a more enabling environment around them (ibid.).

Other sustainability practices

The department encourages a number of sustainability practices including recycling and saving water and energy (switching off lights). The following were said to be in place: recycling bins in all offices and all strategic points around the department, notes about switching off lights and notes in the washrooms about using water carefully. Observations of these facilities were also made and they were confirmed to

be in place. The interview with the head of department revealed that the department asked the university to link water from the wash-basins to toilet cisterns so that the water used to wash hands will then be used to clean the toilet but this hasn't been done. It is also said to have committed itself to buying new printers which can print on both sides of the paper. Two students in the department were said to be undertaking a research project on the carbon footprint of the Environmental Science building with the intention of offsetting it (P23, pers. comm., 13 February 2008).

It was also mentioned that the department played a role in supporting the creation of the SRC Environmental Portfolio and made sure that one of their students stood for it, and committed itself to ensuring that the Environmental Portfolio works in the SRC (ibid.).

Recommendations

One recommendation given was to encourage the university to adopt a policy of printing on both sides of the paper, two pages on each side in some student laboratories where a considerable amount of printing happens (P23, pers. comm., 13 February 2008). Rhodes University through the Information Technology Division, uses approximately 4000 reams of paper a year (Recycling and waste at RU, n.d.).

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CASE RECORD 8: GEOGRAPHY DEPARTMENT

Results of the sustainability assessment

Data generated from assessing sustainability in the department revealed a high level of integration of sustainability issues in the department's functions. The majority of indicators scored 3 with curriculum and teaching approach indicator clusters having a few of their indicators scoring 4. Two indicators, one under teaching approach and the other under examinations clusters scored as low as 2. The average score for the department was 3.1 with the total score being 62.5 (78.1%) out of a possible total of 80 (Table 1 and Figure 1).

Table 1. Raw data

Indicator	score
C1	4
C2	4
C3	3
C4	3
C5	4
T6	3
T7	3
T8	2
T9	3
T10	4
R 11	3.5
R 12	3
R 13	3
R 14	3
R 15	3
E16	3
E17	2
S18	3
S19	3
S20	3
Total (80)	62.5
% Rating	78.1
Average Rate	3.1

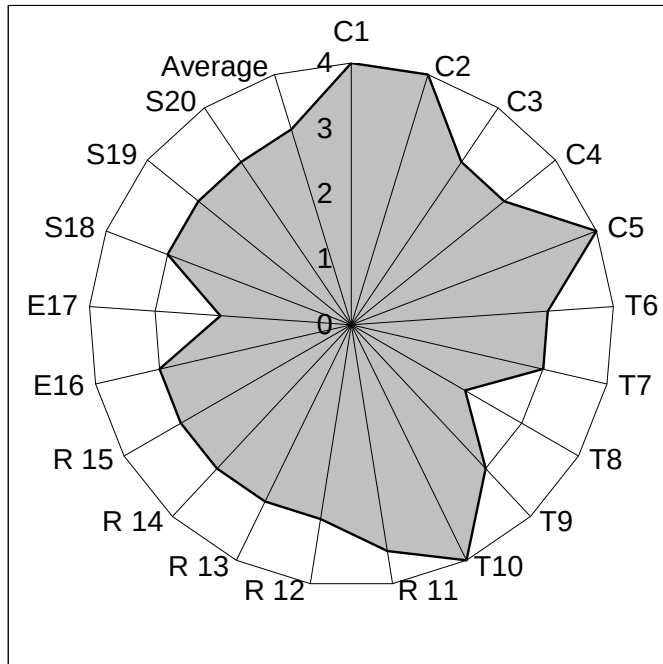


Figure 1. Sustainability performance of the Geography Department

Curriculum and examinations

During the interview, it was mentioned that the main focus of the Geography Department was linking development to the environment; hence sustainability is what the discipline is about.

If you are looking at environment and development, from discipline foci, then you are going to have to be looking at issues of unsustainable development (P20, pers. comm., 22 January 2008).

The major thrust in geography was said to be spatial issues with other sustainability issues, for example gender concerns, coming to the fore if they have an impact on spatial issues. Political issues would be addressed in Human Geography. Different sustainability issues were also said to be emphasised in varying degrees in different parts of the courses (ibid.).

Even though they don't have a separate course on sustainable development, all geography students get exposure to sustainability issues during their studies.

Our courses are all at the end of the day about issues around sustainable development (P20, pers. comm., 22 January 2008).

Honours students do a course called Rural Economy and Land Utilisation in Africa which looks at the links between household economics and the sustainable use and development of land. According to the interview, this is their course which is more directly linked to sustainable development. Other courses which also deal with sustainability issues include one on water resources management and the geography of economic development. The three courses at honours level are the ones which are said to be most upfront in terms of sustainable development content (P20, pers. comm., 22 January 2008).

Content analysis of course materials confirmed that the department teaches sustainability issues in several courses. Geography 1: Introduction to Global Development, has sub-courses like Demography which has topics including people and the environment and impacts of HIV/AIDS. Another sub-course, Urbanisation Processes covers aspects of housing and infrastructure provision (Geography 102 handbook, 2007). Geography 201 (Urban and Rural Structures) is composed of two sub-modules, Rural Settlement and Land Use, and Urban Types, both of which explore significant issues in sustainable development. These include the relationship between rural settlement and land use and the biophysical environment; post colonial rural development policies, impact of global processes (agricultural intensification/modernisation) on African development in the first sub-course (Rural Settlement and Land Use); and housing issues, employment and economic development in the second sub-course (Urban Types) (Geography 2, 2007). Environment and Development in Africa, which is a third year course, also explores the interrelated nature of Africa's environment and its development which are salient aspects in sustainable development (Geography 3, 2007). Content analysis of the Environment and Development in Africa past examination paper revealed that the department examines the sustainability issues taught during the course (Environment and Development in Africa examination paper, 2007).

Besides inclusion of sustainability content in teaching and examinations, the department also intends to produce graduates who are "self-motivated, independent, critical thinkers" and are "well equipped" with the necessary skills to enable them to contribute to national development (Geography 102 handbook, 2007). These are some of the skills that are necessary in promoting sustainable behaviour among students.

Research

A considerable amount of research is also taking place in the area of sustainability in the department. The major research areas were given as environmental water management, local economic development and rural development. In the past, students were said to have done research on water management issues in the Kat River Valley, environmental and sustainability issues surrounding water management (ecological focus), the impact of the Fast Track Land Programme on environment and development in Zimbabwe. Examples of current research in the sustainability area include local development issues and the impact of clearing alien vegetation on channel morphology (P20, pers. comm., 22 January 2008). The interview also revealed that specialisation in the area of sustainable development through a thesis was possible in the department.

In 2007, sustainability related research outputs were focussed in the areas outlined below:

- catchment management issues,
- land reform and land degradation,

- green spaces,
 - urban local economic development,
 - urban agriculture,
 - community development,
 - alien species invasion,
 - drought,
 - game reserves,
 - rainfall reliability, and
 - climate change
- (RU Research Report, 2007).

Community engagement

Some of the staff members in the department were involved in national bodies that deal with local economic development, hence their research findings were said to be feeding through to these national bodies. The interview established that some of the research activities in the department are applied, for example, the Catchment Research Group was helping people in the Kat River Valley to develop water management institutions. It was revealed through the interview that the department was involved in the alien rehabilitation project where it was applying research findings to rehabilitation (P20, pers. comm., 22 January 2008). According to its mission statement, the department endeavours to advise government and community organisations through applied research (Geography 102 handbook, 2007).

Geography Department staff members are in an ongoing engagement with local and other communities as part of their teaching and research (RU 2005/6 Community Engagement Review). The department's two flagship community engagement initiatives were given as the teacher support programme and the development initiatives that took place during its research in the Kat River Valley. "Engagement with local communities has resulted in an environmentally well-educated community who are keen to participate in further research efforts that will allow them to make informed decisions about managing their land and water resources" (Rhodes University, 2005, p. 28). The Department, with the help of the Provincial Department of Education, coordinated a series of meetings with geography and natural science educators in the Makana area to help improve the basic skills of the students entering the university to study Geography (ibid.).

Partnerships in sustainable development

It was established that the department is involved in a partnership with Department of Water Affairs in looking at water issues inclusive of sustainability concerns, for example, encouraging a participatory framework in water management and promoting the sustainable management of water. One of the members of staff was said to be in partnership with Local Economic Development (LED) organisations and their focus in terms of sustainability issues is the sustainability and impacts on the environment etc. of local development (P20, pers. comm., 22 January 2008).

The mainstreaming process

In terms of the influence of the global sustainable development agenda it was established that the department was most certainly influenced and it always adapts to what is happening.

<i>We are always aligning our teaching to what's going on in order to have a current agenda so we are going to be bringing in those into our teaching where it's relevant... So our courses change every year (P20, pers. comm., 22 January 2008).</i>

However, there was no familiarity with the Decade of Education for Sustainable Development (P20, pers. comm., 22 January 2008).

How to improve

In terms of improving the sustainability focus of the department the feeling was that "there is always room for improving" (P20, pers. comm., 22 January 2008). The suggestion was to strengthen the understanding of basic processes underlying the understanding of sustainable development issues rather than increasing the amount of teaching on sustainable development, for example, "to give students a better understanding of the basic climate processes so that they can then interpret global warming, they can be more critical about it" (ibid.).

Challenges

The major challenge mentioned during the interview which needed to be addressed to improve research on sustainable development issues in the department was the need for a field worker (interpreter) to help with community projects and funding to facilitate hiring such a person (P20, pers. comm., 22 January 2008).

Future plans which have a bearing on sustainability issues

The department was said to be in the process of developing a programme looking at the role of game playing in raising student's understanding about sustainable development issues. In the game, students will play out the role of different characters (e.g. the farmer, trader, banker etc.) and they have to make the country run, thus getting an understanding of how the environment impact on people's activities (P20, pers. comm., 22 January 2008).

Other sustainability practices

According to the interview, there were a number of things that the department was doing in terms of sustainability practices, e.g. recycling of paper. Some staff members were in the habit of handing out few lecture notes, limiting the amount of trampling and walking to work (P20, pers. comm., 22 January 2008). However, the feeling was that as a department there was nothing much they could do, and that the university was better positioned to promote sustainable development initiatives. It could, for example, promote building designs which do not require much air conditioning, use solar power or facilitate water harvesting (ibid.).

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CASE RECORD 9: ICHTHYOLOGY AND FISHERIES SCIENCE DEPARTMENT

Results of the sustainability assessment

The Department of Ichthyology and Fisheries Science (also referred to as the DIFS or Department of Ichthyology) scored highly in most of the indicators showing high integration of sustainability issues across its activities. Most indicators scored 3 to 4 except C3 which scored 2 and E17 which scored 0. The average score for the department was 3.6 and the total 69 out of 80 (86.3%) (Table 1 and Figure 1).

Table 1. Raw data

Indicator	Score
C1	4
C2	4
C3	2
C4	3
C5	4
T6	4
T7	4
T8	3
T9	3
T10	4
R 11	4
R 12	4
R 13	4
R 14	3
R 15	4
E16	3
E17	0
S18	4
S19	4
S20	4
Total (80)	69
% Rating	86.3
Average Rate	3.5

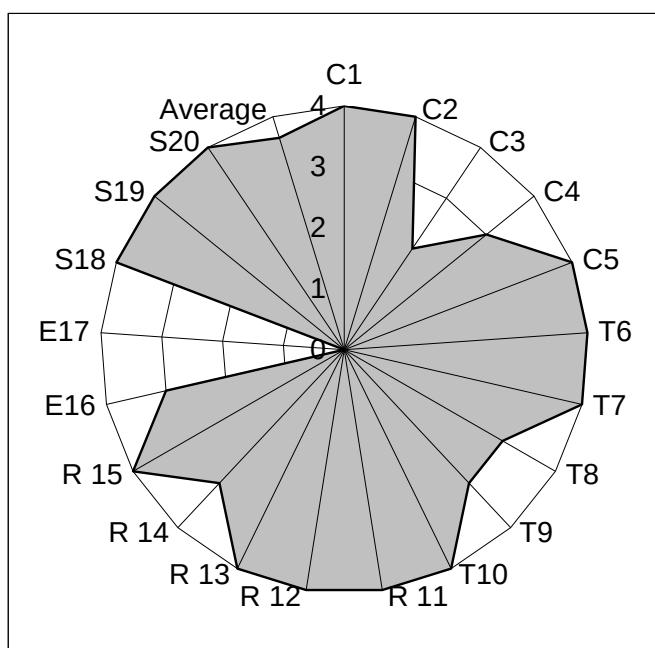


Figure 1. Sustainability performance of the DIFS

Curriculum and examinations

The department teaches fundamental knowledge about fish and the environment, for example, anatomy, evolution, ecology and genetics. Besides that, they are involved in teaching about ecosystems, conservation, ichthyology, fisheries and resources management and aquaculture (Ichthyology 201, 301 and honours handouts). The sustainability aspects that are taught during the course of the programme are also examined. In 2007 for example, questions were on fish form and behaviour, fish environments, conservation, factors affecting fish populations and management of fish, design and management of aquatic ecosystems and development of aquaculture as a food production industry (Ichthyology 201, 301 and honours 2007 examination papers). Most of the courses have an element which addresses sustainability and all students who study in the DIFS have exposure to sustainable

development issues through taught courses. According to the interview, there is no option for students to specialise in sustainable development as this is not addressed as a topic in itself but a part of or an application of what they do in sustainable utilisation of ecosystems (P19, pers. comm., 17 January 2008).

Research

It was established from the interview that the department takes on students in research with anything to do with fish: generating fundamental knowledge about fish and the environment and including topics like evolution, ecology, genetics, all the fundamental biological disciplines and in a way this relates to sustainability.

By providing more information about fishes, it helps society understand our environment which obviously contribute to sustainable management (P19, pers. comm., 17 January 2008).

The department is said to be involved in more direct projects concerned with managing the environment sustainably as well as applied work, for example “devising management plans for aquatic systems and that will include biological as well as an economic and a social dimension” (ibid.). According to the interview, students take on multidisciplinary or transdisciplinary projects with a developmental angle where they address biological as well as social and economic issues. However, though they do contextualise social and economic aspects, the department has a biological focus in its approach.

We do broadly speaking teach students about environmental management but with a focus on biology and we do contextualise the relevant social and economic aspects (P19, pers. comm., 17 January 2008).

In 2007, the department released research outputs which included focus on the following sustainable development areas:

- fisheries management
 - fish growth, structure and distribution
 - fish reproduction
 - aquaculture production
 - sustainable fisheries, and
 - water quality
- (RU Research Report, 2007).

Community engagement

In the community the department looks at livelihood opportunities, for example utilisation of dams for fishing by Eastern Cape rural communities. At the time of the interview, it was said to be working with provincial departments of agriculture to promote aquaculture (fish farming) in all the provinces and sustainable management of aquatic ecosystems. It reaches as far as the SADC region in development projects based on aquatic resource utilisation (ibid.).

The DIFS initiated the Rural Fisheries project (RFP) which aims to provide sustainable livelihoods for rural communities based on freshwater and marine resources. The RFP works in collaboration with local councils in developing fishery projects for their integrated development plans (IDP's) (Rhodes University, 2005).

Sustainable development partnerships

The DIFS is involved in a partnership with the National Department of Agriculture to promote aquaculture as part of sustainable development in rural areas. They also

have an ongoing partnership with Marine and Coastal Management to teach and do research on marine aquaculture (P19, pers. comm., 17 January 2008). At the same time, they have a Rural Fisheries Unit involved with various municipalities on sustainability work.

Our Rural Fisheries Unit has a relationship with various municipalities and undertakes projects particularly in the Eastern Cape which promote sustainable development, for example, trout fishing in the mountainous areas, projects on the coast in the Transkei which will create jobs through tourism and fishing (P19, pers. comm., 17 January 2008).

The mainstreaming process

Content analyses of documents showed that the department is oriented towards sustainability issues. Its vision and mission statement reads

To be a leading African academic institution supporting the sustainable utilisation and study of fish through the teaching and training of students, research and appropriate service provision (Britz and Davies, 2007, p. 3).

The topic area of the department is fish and aquatic environments and sustainability is an integral part of their mission. This is why the department has managed to highly integrate sustainability issues. The department is said to consider national needs which include alleviating poverty, looking at how best communities can use available natural resources to create livelihoods and also regional needs like SADC policies on fisheries and Food and Agricultural Organisation (FAO) policies on responsible fisheries and aquaculture and how to promote these. This nature of focus in the department has therefore led to high integration of sustainability issues. It was established that the department works a lot with government departments and donors to promote these policies in a particular context usually through contract research. It is therefore influenced by international sustainability movements like the WSSD (P19, pers. comm., 17 January 2008).

The department's work is closely linked to sustainability and the feeling was that there seems to be no room for improving its sustainability work.

I think everything we do is about sustainability so we are 100% focussed on sustainability and there is actually too much to do, there is more work and more projects than we can cope with as a small department (P19, pers. comm., 17 January 2008).

To improve the department's performance in engaging sustainability concerns across its functions of teaching, research and community engagement, the department would need, according to the interview, more resources especially in terms of manpower (P19, pers. comm., 17 January 2008).

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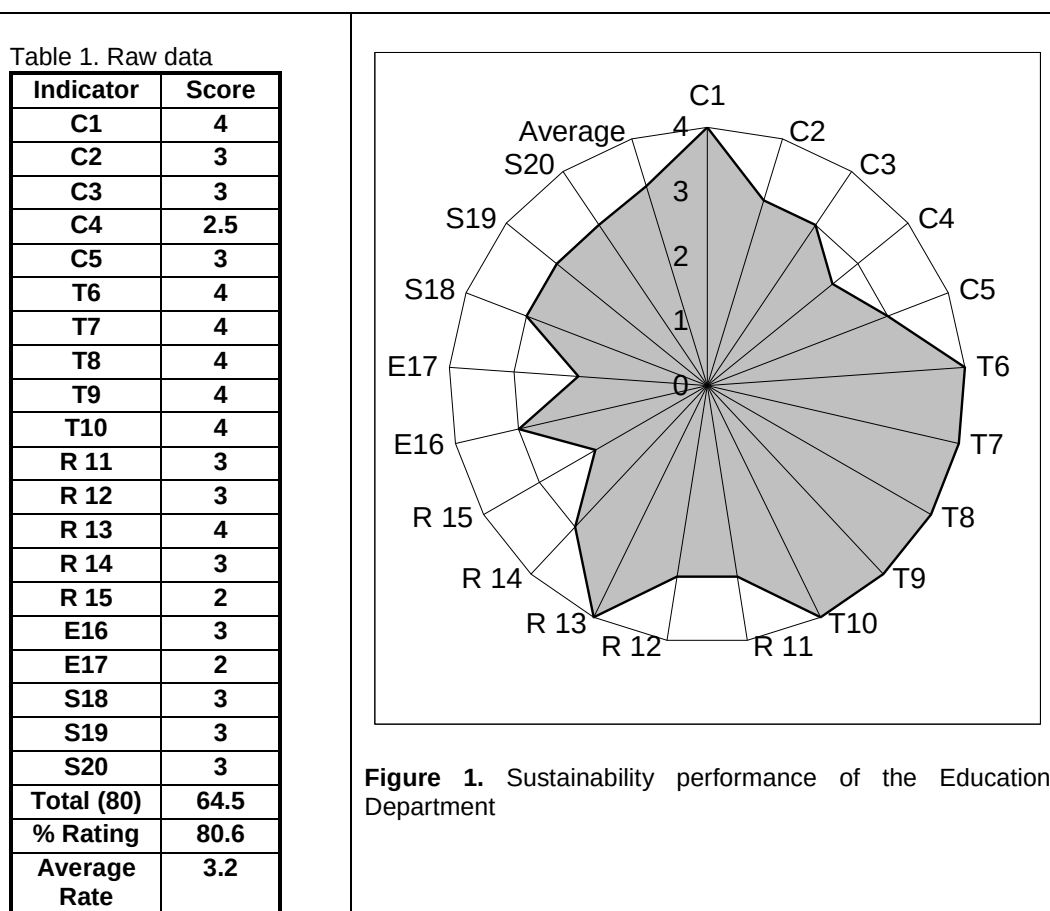
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CASE RECORD 10: EDUCATION DEPARTMENT

Results of the sustainability assessment

The department scored highly across all the indicator clusters defined by the USAT. Highest scores were obtained in the teaching approach cluster where all indicators rated 4, the maximum possible score. In general, indicators obtained scores ranging from 2 to 4 with 3 being the most frequent. The total score was 64.5 out of 80 (80.6%) with the average being 3.2 (Table 1 and Figure 1).



Curriculum and examinations

The Department of Education has environmental and sustainability topics in most of its courses. While a number of environmental and sustainability issues are embedded in courses, the interview revealed that they are not necessarily explicit but are ingrained in courses in a more implicit manner (P17, pers. comm., 11 December 2007). Technology education was given as one area where sustainability issues are explicit.

In technology education, the notion of sustainability is explicit all the time, so students have to deal with those dilemmas and have to unpack all those issues all the time (P17, pers. comm., 11 December 2007).

According to the interview, there is no policy in the department which makes it mandatory for students to take on courses with sustainability topics; hence, not all students do them. However, at the same time, students do not have a choice not to do them as they are embedded in most of the courses. The department has an option for students who wish to specialise in environmental and sustainability issues through its Environmental Education and Sustainability Unit (EESU) (ibid.).

An interview with a staff member in the EESU confirmed that environmental and sustainability issues were highly integrated in the courses they offer.

There are all kinds of levels at which we integrate sustainability issues because we are an Environmental Education Unit, so almost everything we do would be indirectly connected to sustainability issues even if we don't necessarily call it sustainability every time (P1, pers. comm., 15 November 2007).

The EESU has Environmental Education programmes and sometimes offers Environmental Education modules in other broad Education Department programmes as follows:

- Advanced Certificate in Education (Environmental Education) – a two-year part-time qualification offered by the unit;
- Advanced Certificate in Environmental Education (EEAC) - a two-year part-time course offered by the unit to professionals working in education, conservation, development, environmental management;
- Post Graduate Certificate in Education (PGCE) (Primary or Secondary Education) - Environmental Education is taught as a module within this post-graduate diploma;
- Bachelor of Education (Honours) (BEd - Hons) - a module in Environmental Education is offered as an optional part of this post-graduate qualification;
- Master of Education (MEd): Coursework and thesis or full thesis – offered by the unit. The majority of students who have taken this degree have been of mature age and working in decision-making capacities in the Environmental Education arena. They include teachers in formal education and higher education, agricultural educators and trainers, health workers, development and communication practitioners as well as conservation educators and industry trainers; and
- Doctor of Philosophy (PhD) (Environmental Education) - offered by the unit. (RUEESU Annual Report, 2007, Professional qualifications, n.d.)

The unit also offers short courses in Environmental Education and sustainability areas and in 2007 the following courses were offered:

- Gold Fields participatory course in Environmental Education (in partnership with Cape Action for People and the Environment (C.A.P.E.);
- Rhodes/South African National Biodiversity Institute (SANBI) participatory course in Environmental Education;
- International Certificate Course in Environmental Education (Southern African Development Community (SADC) two-month course;

- Certificate course in Environmental Education (Speciss College, Zimbabwe);
 - Certificate course in Environmental Education Tutoring and Learner Support;
 - Marine Protected Area Management Training Course (Kwazulu-Natal); and
 - Schools and Sustainability Course.
- (RUEESU Annual Report, 2007)

During the interview with the EESU staff member, the Advanced Certificate in Education programme was given as an example of a programme which addressed sustainability explicitly. Specific issues addressed include the discourse around sustainability at international level, how people understand sustainability and contemporary issues relating to sustainability, for example global warming, agribusiness, biotechnology and biodiversity (ibid.). This was also confirmed through content analysis of the Environment, Environmental Issues and Sustainability Module, which is Module 1 of the Advanced Certificate in Education (Environmental Education) (ACE EE) course: Ecology and Environment. The module basically teaches environmental and sustainability issues and addresses key environmental and sustainable development issues. It touches on all the dimensions of sustainable development which are social, economic, bio-physical and political issues (The Environment, Environmental Issues and Sustainability Module, 2007/8). Students in the department doing the Postgraduate Certificate in Education, who do not specialise in Environmental Education, have to do a mandatory Environmental Education module. At the Bachelor of Education (BEd) honours level, there is an Environmental Education elective (ibid.).

Research

Many students were said to undertake researches that address sustainability issues, particularly in the EESU, while in other areas it comes up implicitly. Generally, most of the research in the department is linked to sustainability as education is a sustainability issue and the department is there to perpetuate quality education.

All our research deals with sustainability and most of our research deals with quality at the end ... that is what we are here for, we are here to improve education, we are here to address, the quality perpetuation of education ... sustainability of quality education (P17, pers. comm., 11 December 2007).

Research in the EESU explicitly addresses Environmental Education and Education for Sustainable Development issues. The 2007 research programmes in the unit were as follows:

- research methodology encounters – where among other issues focus was on exploring the possibilities that a critical realist underlabouring offers for Environmental Education researchers, and the potential of relational epistemology and ontology for post-colonial scholarship in Environmental Education;
 - the health, environment, poverty education interface;
 - quality and relevance in education;
 - bioregional conservation initiatives, natural resources management human well-being and learning in context;
 - development initiatives, capacity building, and workplace-based learning;
 - encounters with environmental ethics; and
 - sustainable development in local, national and international policy discourses and the United Nations Decade of Education for Sustainable Development.
- (RUEESU Annual Report, 2007)

The 2007 EESU research outputs were in the following areas:

- learning interactions in contexts of socio-ecological risks,
 - Environmental Education courses,
 - Education for Sustainable Development Innovations course for Universities in Africa,
 - environmental and sustainability education,
 - school-based national Arbor week activities,
 - indigenous knowledge systems,
 - conservation education,
 - risk and vulnerability,
 - integration of natural resources management in curricula,
 - environmental ethics and education,
 - Regional Centres of Expertise in Education for Sustainable Development, and
 - local community knowledge in plant use, and traditional cultivated food plants.
- (RU Research Report, 2007; RUEESU Annual Report, 2007)

Community engagement

Much of the department's research was embedded in the community (P17, pers. comm., 11 December 2007). The department works with practitioners from different fields to deliberate on and build learning capabilities around commonly defined issues, which creates space for interaction among members of the community including teachers and Rhodes University staff (RUEESU Annual Report, 2007).

The Education Department works with the community on a local, provincial, national and continental level through "policy work, research, practical interventions and individual involvement in education development organizations" (Rhodes University, 2005, p. 18). An example of a practical intervention is the development of a computer laboratory at a formerly disadvantaged primary school in Grahamstown (ibid.).

The Environmental Education and Sustainability Unit works from more of an integrated approach to community engagement where there are links between teaching, research and community engagement initiatives (RUEESU Annual Report, 2007). It has worked at building capacity at school and community level, and in a variety of contexts including conservation organizations and industries in addressing challenges and risks presented by environmental issues. It also provides a formal and informal support base for community-based environmental activities in Makana. It supports the improvement of environment and health in the Makana District through curriculum work with teachers. It supports Eco-Schools, the Millennium Tree Planting project and has a schools and sustainability initiative. It also co-ordinates the Makana Regional Centre of Expertise (RCE) which aims to translate the concept of sustainable development into "local realities that are of genuine benefit to communities" (Rhodes University, 2007, p. 11). The RCE thematic areas in 2007 were as follows:

- development of modules (environmental and sustainability related) on school community issues for teacher education programmes,
- improvement of quality in educational programmes,
- schools and sustainability interventions (e.g. health promotion, environmental management, curriculum activities for a health environment etc.),
- biodiversity, greening and health activities,

- improving workplace-based (environmentally related) learning (e.g. for municipal officials),
- youth service learning, and
- participatory monitoring involving school and communities in sustainability monitoring, with a view to exploring the potential of this process as a learning process.

(RUEESU Annual Report, 2007)

In the EESU, knowledge was also said to be applied in the community through action research by students doing their masters projects (P1, pers. comm., 15 November 2007). The unit is also working on the Cape Action for People and the Environment conservation education project which is a United Nations Development Programme/World Bank project that is responding to biodiversity conservation issues in the Cape Floristic Region (RUEESU Annual Report, 2007).

Partnerships in sustainable development

The department is involved in a partnership programme with other universities in Africa, the Mainstreaming Environment and Sustainability into African Universities (MESA) partnership programme. Its major objective is mainstreaming of environmental and sustainability issues in universities in Africa. The Environmental Education and Sustainability Unit in the department collaborates with other departments/units/divisions in sustainability work at the university. In 2008 it hosted the International Training Programme workshop related to the MESA Universities Partnership in which it collaborated with the following divisions at the institution:

- the Rhodes University Environmental Committee,
- the Arts Faculty,
- Environmental Science Department,
- Academic Development,
- Commerce Faculty,
- Environmental Committee, and
- Students.

(Lotz-Sisitka, 2008)

It is also a Regional Centre of Expertise for Education for Sustainable Development (RCE) and coordinates research in sustainability in the Makana area. There are other initiatives which have the sustainability dimension where staff members are involved in different NGO activities and practices on a private basis. The department also collaborates with the Centre for Social Development (CSD), the Rhodes University Mathematics Education Project (RUMEP) and has links with the Southern African Association for Research in Mathematics, Science and Technology Education (SAARMSTE) (P17, pers. comm., 11 December 2007).

The EESU works with local schools and has connections with a number of the local organisations, non-governmental organisations, community based organisations in trying to promote take up of environmental and sustainable development issues in the school curriculum (P1, pers. comm., 15 November 2007).

The mainstreaming process

The major factor behind mainstreaming of sustainability issues in the department was put forward as “quality in education and sustainability of that quality education” (P17, pers. comm., 11 December 2007). The sustainability agenda is said to have influenced the department too but the other major issue was the South African

context in which issues of sustainability are of great concern. Sustainability is therefore said to always have been part of the department's discourse (ibid.).

Other sustainability practices

Besides recycling of paper which is campus-wide initiative, the Faculty of Education encourages saving energy through switching off lights. The "last to leave, please switch off" notes are stuck by each switch in the Faculty (Figure 2).



Figure 2 A note stuck by a light switch in the Education Department

Room for improving

The sentiment was that there is always room for improvement in terms of sustainability focus, for example, improving links in the community and contributing to the global debate (P17, pers. comm., 11 December 2007).

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CASE RECORD 11: LAW FACULTY

Results of the sustainability assessment

In the Faculty of Law, high scores of between 3 and 4 were obtained in the teaching approach cluster of indicators. All other indicator clusters obtained low scores. Curriculum had only one indicator with a score of 2; all others scored 1. Indicators belonging to the research and examinations clusters scored between 0 and 1 while the staff cluster had all indicators scoring 1. The total score obtained was 32 out of 80 (40%) and the average score was 1.6 (Table 1 and Figure 1).

Table 1. Raw data

Indicator	Score
C1	2
C2	1
C3	1
C4	1
C5	1
T6	3
T7	4
T8	4
T9	4
T10	3
R 11	1
R 12	1
R 13	1
R 14	0
R 15	1
E16	1
E17	0
S18	1
S19	1
S20	1
Total (80)	32
% Rating	40.0
Average Rate	1.6

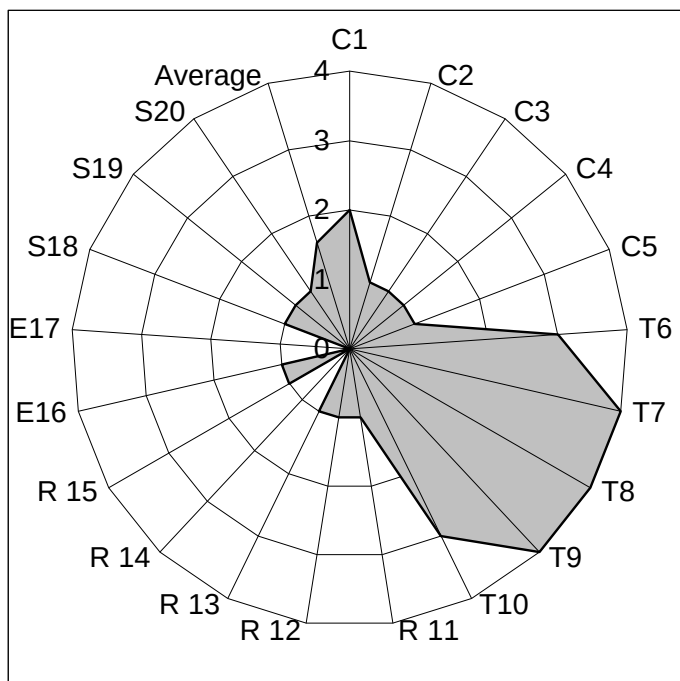


Figure 1. Sustainability performance of the Law Faculty

Curriculum and examinations

While the focus in the Law Faculty is more on professional competencies, the faculty has a few courses which deal with sustainable development in varying degrees. In Environmental Law, sustainable development comes up as one of the themes of the course. International Trade Law also deals with sustainable development issues and this was said to be due to the fact that these have become part of trade issues in many instances; but sustainable development is not its prime focus. The other course mentioned which marginally touches on sustainability issues is Public International Law. Of the three, only Public International Law is compulsory, the other two courses are electives and hence are not compulsory (P9, pers. comm., 29 November 2007). The faculty also focuses on other issues related to sustainable development in other courses.

We touch on quite a whole lot of other sustainable development issues when we teach Law as well, but not through the glasses of sustainable development but through the glasses of the Law and these are topics that you might be able to link to sustainable development issues (P9, pers. comm., 29 November 2007).

Content analysis of the Environmental Law course outline established that the course is concerned with enabling students to understand and analyse legal rules relating to the environment. Specific environmental and sustainability aspects of focus, among other issues, include land-use planning and development, natural resource conservation and utilisation and waste management and pollution control (Environmental Law elective course outline, 2007). The environmental and sustainability issues taught during the course were also examined (Environmental Law examination paper, 2007).

Research

It was established from the interview that research in the area of sustainable development in the faculty is done by staff members teaching Environmental Law, though it is not one of the faculty's themes and it is usually a single lecturer at any one time in the faculty.

All the lecturers that we have had teaching Environmental Law in the last couple of years have all researched in Environmental Law and have been good researchers in Environmental Law, including issues of sustainable development in some instances (P9, pers. comm., 29 November 2007).

The faculty is also said to have had masters' students in Environmental Law, but not on a regular basis. Research in Constitutional Law, Property Law and Customary Law is also said to sometimes focus on issues related to broader sustainable development issues. At the time of the interview, there was a PhD student looking at the patent ability of indigenous knowledge to protect copyright and intellectual property protection for indigenous knowledge (ibid.).

Research outputs with a focus on sustainability related issues in 2007 were in the broad area of social justice with the specific issues being:

- the cost of small money loans,
- divorce,
- humanness and homelessness,
- racial discrimination, and
- governance.

(RU Research Report, 2007)

Community engagement

According to the interview, the faculty reaches out to the community through the Legal Aid Clinic which has branches in Grahamstown and Queenstown. At the same time, there are opportunities for students to participate in extra-curricular activities. According to the Faculty Size and Shape Document (2007), the approach in the faculty is not to view community service as an add-on activity, but instead to integrate intra- and extra-curricular community service into the overall educational services that the faculty provides.

The primary focus of the Legal Aid Clinic is to provide free legal services to poor people while, at the same time, developing and educating Rhodes University Law

students in the practical application of law (Rhodes University, 2005). Various staff members are also involved in their individual capacities with the community and an example given is that of previous staff members who were involved in giving advice on environmental issues to surrounding communities. Another staff member has a facilitating role in various Environmental Monitoring Committees, for example, the Coega-Ngqura Development Project (Port Elizabeth), Aloes Waste Disposal (Port Elizabeth) and Roundhill Waste Disposal (East London) (P9, pers. comm., 29 November 2007).

Partnerships in sustainable development

The interview established that the faculty was not formally involved in any sustainable development partnerships at the time of the interview. In the past however, one of the lecturers is said to have been involved in a research project developed by the University of the North-West involving environmental issues and trans-boundary issues with Mozambique and South Africa (ibid.).

The mainstreaming process

The major factor behind the mainstreaming of environmental and sustainability issues in activities in the faculty was identified as the personal interest of individuals. Environmental Law was established by a lecturer whose field of expertise was Environmental Law hence it was due to an individual passion.

Improving the faculty's performance in sustainability initiatives

The first issue that was mentioned as important in improving the focus on sustainable development issues is continuity in terms of having staff for Environmental Law. The second was collaboration between the Environmental Law person and other departments/faculties at the university e.g. Zoology, Biochemistry or Chemistry. Such a network was believed to be in a position to sustain what they are doing as a faculty.

At the moment our focus is primarily teaching one course in the LLB curriculum but, for it to become sustainable and to develop it into the next level, to get more masters students in etc., one would have to start developing interdisciplinary research network, to provide that node around which one can work (P9, pers. comm., 29 November 2007).

The other issue mentioned was that there were tendencies by universities to tell other people how to do things which they themselves are not good at. This makes it necessary for faculties like Law to look at their sustainability practices and rectify them, for example, issues of energy management (lights left on all night or on weekends). The problem may also lie with awareness of sustainable development issues.

We probably are not in our own daily lives as aware of sustainability issues as we should be (P9, pers. comm., 29 November 2007).

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CASE RECORD 12: FACULTY OF PHARMACY

Results of the sustainability assessment

From the sustainability assessment, the department obtained low scores in all indicator clusters except teaching approach. Indicators belonging to the teaching approach cluster scored between 3 and 4. All indicators under the research cluster scored 1, while those under examinations and staff obtained a score of 0. The curriculum cluster of indicators scored between 0 and 1. The department obtained a total score of 26 out of 89 (32.5%) and the average score was calculated to be 1.3 (Table 1 and Figure 1).

Table 1. Raw data

Indicator	Score
C1	1
C2	1
C3	1
C4	1
C5	0
T6	3
T7	3
T8	3
T9	4
T10	3
R 11	1
R 12	1
R 13	1
R 14	1
R 15	1
E16	0
E17	0
S18	1
S19	0
S20	0
Total (80)	26
% Rating	32.5
Average Rate	1.3

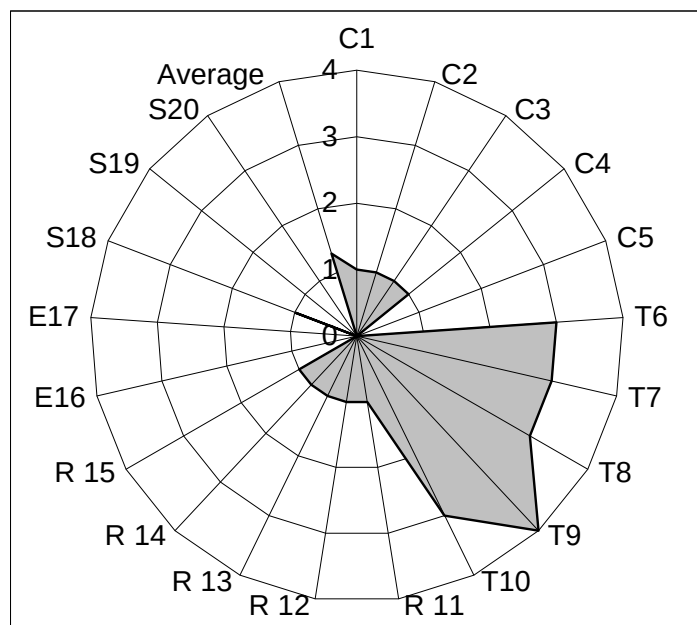


Figure 1. Sustainability performance of the Faculty of Pharmacy

Curriculum and examinations

While the interview revealed that sustainability is not an integral part of their focus, the Faculty of Pharmacy teaches about health promotion and sustainable production and consumption among other things and this is part of their Pharmacy Administration and Practice course. There was however a feeling that the faculty could not teach on sustainable development as it was outside their area of focus.

We can't focus on something that is purely, ... it's not part of what we have to do (P24, pers. comm., 18 February 2008).

According to the interview, students from the Faculty of Pharmacy were not in a position to do courses in Environmental Science Department due to the high

demands of their programme. The programme is mandated by the South African Pharmacy Council to ensure that students obtain entry level competencies to practice Pharmacy and, according to the interview, those demands do not leave them time to focus on other issues (P24, pers. comm., 18 February 2008).

It's a very structured course, it's not like a BSc or a BA where you can select majors in Mathematics or Biochemistry, Microbiology and Economics, you can't do those mix and matches like the other subjects can do. So it's very difficult to have a one year course on Environmental Science, when we have four years to get through a very crowded curriculum (P24, pers. comm., 18 February 2008).

The argument put forward during the interview is that there are aspects of what students do which are Environmental Science in nature and that Environmental Science was not necessarily outside the scope of Pharmacy as a discipline but, there was no flexibility in terms of allowing students to do Environmental Science (P24, pers. comm., 18 February 2008).

Content analysis of the Pharmacy Administration and Practice syllabus showed that the course focuses on sustainability issues. Among other issues, Pharmacy Administration and Practice 3 is concerned with the effective management of patients and business organisations and offers a course in economics and the economic overview of the health care system. Pharmacy Administration and Practice 4 deals with the comprehensive provision of pharmaceutical services to patients, patrons, other members of the health team and the community. It looks at the role of the pharmacist in hospital, manufacturing and community settings with particular attention on the provision of community health care. The second part of the course, among other things, looks at an in-depth examination of professional and medical ethics (Syllabuses for the Bachelor of Pharmacy Degree, n.d.). Sustainability issues which form part of both courses are also examined (Pharmacy Administration and Practice 3 examination paper, 2007; Pharmacy Administration and Practice 4 examination paper, 2007).

Research

It was established though the interview that it was unlikely for staff and students in the faculty to undertake research that directly address sustainable development issues. However, at the time of the interview, there were students who were looking at health promotion and health literacy in a Pharmacy practice environment (P24, pers. comm., 18 February 2008). This was also confirmed through content analysis of documents which established that the faculty was involved in investigating ways of improving the quality and comprehension of health information by patients (Research handbook, 2007). The other group of students touching on sustainable development issues at postgraduate level were said to be dealing with solvents and chemicals and how and when to dispose of them (P24, pers. comm., 18 February 2008).

Some research projects in Pharmaceutical Chemistry deal with marine micro-organisms (Research handbook, 2007) and one of the major problems faced was lack of sufficient quantities of material for testing and clinical trials. Therefore there is awareness of the need to preserve raw material sources and hence pharmacists try and synthesise them rather than use the product material (P24, pers. comm., 18 February 2008). A collaborative project with the Microbiology Division under the Department of Biochemistry involved the isolation and cultivation of such organisms.

Materially we are very aware of the fact that if you can't synthesise a molecule you are going to have to grow large crops to be able to make the product environmentally or economically viable (P24, pers. comm., 18 February 2008).

These projects therefore pick on and promote sustainable development (Research handbook, 2007).

The Faculty of Pharmacy produced research products which touch on the following sustainability related aspects in 2007:

- human health,
 - pharmaceutical service provision,
 - service learning,
 - quality and safety of generic medicine,
 - healthcare professionals practices, and
 - culture and Pharmacy practices.
- (RU Research Report, 2007)

Community engagement

The Faculty Pharmacy has a credit bearing Community Experience Programme which is part of the fourth year Pharmacy Administration and Practice course. The programme is said to provide fourth year Pharmacy students with “a unique experiential approach” and is designed to “allow students to work within disadvantaged communities”, exposing them to “the social context and socio-economic factors that impact on the health of members of these communities and their ability to comply with their medicine regimes”. At the same time, it is said to give students the opportunity to make significant contributions to “the development of more effective healthcare” (Rhodes University, 2005, p. 44).

Through service learning, students therefore assist members of the community in terms of health promotion which is a sustainable development issue.

Well, in terms of sustainability concerns in the surrounding communities a pharmacist is a key health care professional, so in terms of health promotion, It's actually straightforward. I mean, being a pharmacist means that you have to, not only know about drugs, but you also need to know what people need to do to prevent the use of drugs or drug products. So good pharmacists will not only dispense for you but will also be a lifestyle counsellor for patients (P24, pers. comm., 18 February 2008).

However, it was also established from the interview that such a practice was being challenged by the shortage of pharmacists in the public sector even though students are equipped with the necessary skills.

They don't have time to spent talking to a patient about going to eat this rather eat that ... it depends on the working environment as to how well they can implement that (P24, pers. comm., 18 February 2008).

Partnerships in sustainable development

The faculty was, according to the interview, not involved in purely sustainable development partnerships, but was in partnership with the Bisho government and the Day Hospital where students go and see patients in their homes as part of an experiential learning programme (P24, pers. comm., 18 February 2008).

The mainstreaming process

It was established from the interview that some of what is done in Pharmacy was promoting sustainable healthcare.

I suppose if we improve the quality of health care and are able to encourage people to stay in the public health system then you are providing a sustainable health care system (P24, pers. comm., 18 February 2008).

This is therefore one of the factors influencing the faculty to have a sustainable development dimension in its activities.

It was established that the activities of the faculty are not directly influenced by sustainable development agendas, but are guided by rules and regulations that pertain to the pharmaceutical industry. The Pharmacy curriculum is regulated by the Drug Administration and Medicines Control Council. They are the ones who take cognisance of sustainable development issues in terms of; for example, environmental emissions to which the faculty will have to conform. The amendments by the regulators will then be taught to students at undergraduate and post-graduate levels and will have to be considered by students working in such kind of projects (P24, pers. comm., 18 February 2008). According to the interview, this leads to an indirect influence of sustainable development agendas on the activities of the faculty. The courses thus change on an ongoing basis as the laws change though the fundamentals do not change that much (ibid.).

Other sustainability practices

Other sustainability practices in the faculty were given as

- switching off lights,
- collecting materials to dispose of and advising students on what to throw away (the waste is then disposed through Waste Tech, a waste disposal company),
- incineration of biological waste at Settlers Hospital (P24, pers. comm., 18 February 2008).

Room for improvement

With regard to ways of improving their sustainability focus, the response was that instead of changing the focus of what they teach they can make people more aware of some of the sustainability issues as they pertain to Pharmacy. While the faculty might need help in defining issues, aspects like health promotion, human rights (e.g. the right to water) and sanitation are facets they could touch on (P24, pers. comm., 18 February 2008).

The other potential area of improvement was said to be focusing on sustainability issues which form part of the postgraduate research area and making them part of the undergraduate curriculum. This could be done through identifying aspects specifically related to Pharmacy and Pharmaceutical Practice and seeing how they can be built into the curriculum (P24, pers. comm., 18 February 2008).

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CASE RECORD 13: ENVIRONMENTAL BIOTECHNOLOGY RESEARCH UNIT

Integration of sustainability issues in EBRU activities

The Environmental Biotechnology Research Unit (EBRU) is involved in a variety of sustainability projects. The very nature of environmental biotechnology work puts environmental sustainability at the forefront.

Basically environmental biotechnology is using a biotechnological approach to dealing with the full spectrum of environmental problems that is, not only remediation and fixing up environments that have been degraded for some reason or other, but also establishing sustainable practices so that we move away from unsustainable use of environmental services and use biological systems in order to achieve sustainable use of our services (P7, pers. comm., 26 November 2007).

At the time of the interview, one of their projects was focusing on multiple cycles of water use in the Witwatersrand, a water scarce area responsible for about 60-70% of industrial production in South Africa. In the area is the Vaal river system, a minor river, which, according to the interview, is being polluted by sewage treatment works upstream and water filling up closed mines and decanting into the environment and finding its way into the river, hence raising salinity. The unit has therefore developed a range of systems using algae and bacteria to remove salinity from those waste waters (ibid.). The EBRU research group developed a very high profile process called the Rhodes Bio-sure Process.

The Rhodes Bio-sure Process ... uses the Rhodes name to identify a process for treating mine water specifically and in order to reduce the salinity pollution load going into the Vaal river system. ... that is now being rolled out in a big plant and it will probably be implemented world-wide (P7, pers. comm., 26 November 2007).

It is inexpensive and environmentally friendly and is said to be the most cost-effective solution on the market to treat sulphate-rich water (The Rhodes Bio-sure Process flyer, n.d.). With 25 patents in technology in the environmental biotechnology area (P7, pers. comm., 26 November 2007), the unit has made a considerable intellectual contribution in the sustainability area.

Rhodes has in this regard, in this unit, had a major influence in profiling the university in this area as an international player, but I also I think has underscored the role of the university and the role that the university can play in the development of novel intellectual property based on teaching students and students research, to develop novel ideas in dealing with our problems because largely these types of technologies and this type of stuff can't be imported from overseas, ... you can't import the technology ... If we don't develop it ourselves nobody is going to do that. ..., the destiny is in our own hands, the ability of the university system to produce the innovation that is required to deal with our specific, local specific environmental problems (P7, pers. comm., 26 November 2007).

EBRU also engages with the community in projects which promote sustainable development. The unit is said to have worked on low-cost sewage treatment systems appropriate for small rural or peri-urban communities. These are normally informal communities with very low incomes and are in need of waterborne sanitation. The unit developed an Integrated Algae Ponding System which uses natural biological processes for effecting very high quality of water treatment without requiring large investments of capital, or higher levels of technical expertise to operate them (Rhodes University, 2005; P7, pers. comm., 26 November 2007).

A related project by the unit is beneficiation of the treated waste water in job creation or wealth creation by the local community (Rhodes University, 2005).

One of our projects has been to say not only do we want to treat water, but we want to say when we produce the clean water, can that water be utilised by the community in some cycle of production. ... we have done a lot of work on looking at the use of the treated water out of such systems as a basis of some cycle of job-creation and wealth creation by those communities (P7, pers. comm., 26 November 2007).

According to the interview, these are normally communities with no other means of production, for example land, capital and skills but the treated waste water can be used for production. The system is being used in the Gauteng area in Johannesburg (ibid.).

Influential factors

The criteria put forward as guiding the selection of sustainability projects by EBRU include sustainability of large populations of people, intensive industrial production and seriously threatened environments (P7, pers. comm., 26 November 2007). It is therefore a mix of socio-economic and ecological issues.

What we look at is a system that we can bring to bear that deals with all three of those triple bottom line items, that will enable us to deal with environmental problem, deal with social sustainability and in fact do some form of economic sustainability based on an issue like water treatment. ... the underpinning thing entirely would be driven by sustainability criteria (P7, pers. comm., 26 November 2007).

EBRU projects are closely related to global sustainability agendas and are aligned directly with the Millennium Development Goals (MDGs). At the World Summit on Sustainable Development in 2002, EBRU launched a twelve volume series on *Salinity, sanitation and sustainability: A study in Environmental Biotechnology and integrated wastewater beneficiation in South Africa*. This is a summary of a decade of the Unit's work (ibid.). The study investigated an environmental biotechnology approach in integrating management of saline and sanitation waste water systems and was an investigation of enabling technologies based on studies in saline biotechnology initiated in the mid-1980s at the university (Rose, 2002). The objectives of the programme were "informed and shaped" by the emergence of the sustainability agenda during the time of the World Commission on Environment and Development and the period leading to the Rio Earth Summit (ibid., p. ix).

Collaboration

EBRU works in collaboration with other departments at RU and other universities in and outside South Africa; and various other institutions.

We are a very collaborative organisation so we have active collaborations at the moment with the department of Biochemistry, Microbiology, Chemistry, Geology, Ichthyology, Botany. We collaborate with ... UCT Civil Engineering and University of Natal Chemical Engineering Departments ... we work also with other institutions like the Water Research Commission and the Department of Trade And Industries ... biotechnology regional innovation centres, ... BioPAD is one of those. We also have strong links with overseas institutions for instance the University of Newcastle, University of Wales and a range of other institutions overseas (P7, pers. comm., 26 November 2007).

Set backs

The main setbacks to the unit's work were identified as technological problems and securing a consistent supply of funds from funding agencies (ibid.).

Take up of sustainability issues

Rhodes University used to have an Environmental Programmes Committee which regularly met to share information and members showed interdisciplinary interest and collaboration in various things. This was said to have been a good thing and an environmental forum was recommended to promote take up of sustainability issues.

One of the best things we could do is to have an environmental forum at the university where the people who are involved in environmental studies meet regularly. Interaction between departments active in sustainable development topics provides a focus for ongoing debate within that community (P7, pers. comm., 26 November 2007).

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CASE RECORD 14: INSTITUTE FOR WATER RESEARCH

Integration of sustainability issues

The Rhodes University Institute for Water Research (IWR) is a multi-disciplinary research institute. Its objective is to contribute to the knowledge of sustainable water resources management and to promote the understanding and wise use of natural water resources in Southern Africa (IWR, 2007; IWR, n.d.). The institute was established because of the need for the kind of research it is involved with and the availability of funding.

... our continued existence relies on the continued availability of that kind of funding ... as long as they (funding agencies, i.e. Water Research Commission, the Department of Water Affairs, the European Union) continue to understand, believe in our kind of research, then we will continue to exist. If they don't understand then I guess they won't put money over and we will not continue to exist. ... the most important issue is, we cannot do what we do with small amounts of money we actually need quite a lot of money to keep all the staff members paid and to fund the necessary infrastructure to undertake research (P8, pers. comm., 29 November 2007).

It was established from the interview that most of the institute's work is in the area of sustainable development.

... the institute is an interdisciplinary group which focuses on hydrology, ecology and environmental water quality. And if you put all of those three together you inevitably always going to be doing research on sustainable development issues (P8, pers. comm., 29 November 2007).

The institute is involved in research around sustainable development and, according to the interview, do quite a significant amount of consultancy work in that area. The same is said to be reflected in the little teaching they do in other departments like Environmental Science and Biochemistry (ibid.).

Many of their projects involve direct interaction with communities, with the aim of promoting the understanding and wise use of natural water resources (Rhodes University, 2005). Around sustainable water resources development, the institute has been involved with the ecological reserve of the National Water Act (NWA) which says that water should be left in rivers, wetlands estuaries to ensure some degree of ecological function and its sustainability in future. The institute was involved in making sure that this becomes part of policy. One of the members of the institute is said to be involved in a project with the community in which they carry out activities related to environmental awareness, environmental protection and sustainable development (ibid.). Research activities by the institute include wetlands rehabilitation by the wetlands group and the Southern Africa FRIEND project in which the central objective is hydrology and water resources for sustainable development (IWR, n.d.).

The 2007 Rhodes University Research Report outlined research outputs in the institute which picked on the following environmental and sustainability issues:

- water resources modelling in arid and semi-arid areas,
 - rainfall, run-off and drought issues,
 - river systems,
 - water quality issues,
 - waste water treatment,
 - the ecological reserve, and
 - groundwater, hydrology, and water resources management.
- (RU Research Report, 2007)

Factors influencing sustainability

Sustainability was said to have always been the focus of the institute.

... we have always been doing research into sustainable development of water resources. ... we have been doing it for 30 years (P8, pers. comm., 29 November 2007).

The institute's research has to respond to the policies of the Department of Water Affairs and has to be relevant to the National Water Act for them to get funding. However, it was stressed during the interview that the global sustainability agenda was political and the institute does not respond to politics except local political issues through development policy. At the same time, there was a presumption that the institute began work on sustainability issues even before the global development agendas (ibid.).

Partnerships

According to the interview, the IWR collaborates with many other university departments, the national government, funding agencies, consultants (e.g. consulting engineers and environmental consultancies), NGOs, and anybody involved in the same work.

... we have worked with local government through Makana Municipality on a project which is looking at the local municipality's ability to implement the National Water Act, their component of the National Water Act, which is all around water sustainability (P8, pers. comm., 29 November 2007).

Enhancing mainstreaming activities

Sustainability aspects were said to already form part of teaching and research activities but further encouragement was needed in terms of community engagement.

... community engagement is probably the one that needs further encouragement ... I think it's quite difficult to get sustainable development onto communities' agendas when they have got so many other issues, I mean this is part of the problem within municipalities that they are so concerned at the moment with lack of capacity, service delivery and so on, but to get them to actually focus from the unsustainable development, it's difficult. It's not a concern of communities, their concerns are where their next meal is coming from or whether they have got a roof over their house, and to get them to focus on sustainable development is maybe quite difficult (P8, pers. comm., 29 November 2007).

To improve the university's sustainability focus, it was suggested that the university had to improve its community engagement but using an approach that addresses both sustainability issues and the immediate needs of the community.

Rhodes has to get into the community more and make people more aware of the involvement, but I think they have to do that in a way which is cognisant of the community's issues as well. Essentially poverty is a much bigger issue with the community. They haven't got a sustainable lifestyle at the moment ... until they have got a sustainable lifestyle they are probably not actually going to worry ... much about sustainable development issues. What they are concerned about is where the next meal is coming from or where their next job is coming from. ... I think, you can look at an example of say rural Eastern Cape, the former Transkei, if you went there and tell everybody please try to stop cutting down trees from the environment because virtually the trees will sustain the growth until they are going to prevent soil erosion, they are going to say to you "yah but what am I going to cook my next meal on?" (P8, pers. comm., 29 November 2007).

However, the need to contextually define sustainable development was also stressed. In the South African context, this was said to be in terms of the need to strike a balance in the way of sustainable alternatives regarding both environmental and social sustainability.

One of the issues around sustainable development is actually defining what sustainable development is, because it's not sustainable if it's not going to provide the communities of today some sort of a livelihood or some sort of living or some sort of basic services. ... it's a question of finding a compromise between development and some kind of, some level of environmental protection. ... There are very few places in the world where you can continue to have development without impacting on the environment in some way (P8, pers. comm., 29 November 2007).

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CASE RECORD 15: SOUTHERN AFRICAN INSTITUTE FOR AQUATIC BIODIVERSITY

Major activities of the institute

The Southern African Institute for Aquatic Biodiversity (SAIAB) is a national facility of the National Research Foundation situated on the Rhodes University campus and working in close association with the Rhodes University Department of Ichthyology and Fisheries Sciences (DIFS). It is a research institute, a fish collection centre and a communication area for environmental information. Its major activities were identified as researching in the area of aquatic biodiversity, managing and caring for the national fish collection and communicating environmental information. The major contribution of SAIAB in advancing the sustainable development agenda was given as education and research.

... the institute now has a 30-40 year track record of research in this area of biodiversity and we also have been involved since the early 70s in the training and education of students. ... many of the researchers such as myself are involved in sustainable projects or projects that are designed to sustain biodiversity and conservation. What I would think would be the major contribution is that we have assisted to empower knowledge brokering in South Africa (P22, pers. comm., 04 February 2008).

The institute has a Memorandum of Understanding with Rhodes University which has seen it supporting and being supported by the university in different ways. Members of SAIAB teach some of the courses in the DIFS and provide supervision to students while the institute get its students from the university. Other benefits from the university were said to be in form of the training and education of their staff as much as staff at the university, the internet and infrastructure (buildings). Their financial support comes from national government, various national and international bodies, private sector and public sector bodies (ibid.).

Factors influencing selection of projects

The research projects the institute is involved in are said to be first and foremost in the area of aquatic biodiversity and are meant to advance understanding of the processes of biodiversity and to "contribute to the conservation and well-being of biodiversity within the framework of human interests" (P22, pers. comm., 04 February 2008). The projects were also said to be very much about sustainability of the natural environment and biodiversity and this was apparent in the institute's mission.

To be an interactive hub focussed on serving the nation through generating, disseminating and applying knowledge to understanding and solving problems on

the conservation and wise use of African fishes and aquatic biodiversity (SAIAB, 2007).

According to the 2006-7 Annual Highlights Report, the majority of projects in SAIAB “are directed primarily towards answering conservation and management orientated problems” (SAIAB, 2007, p. 6). At the same time, some of the issues that emerged from the interview are that the institute has an aim of sustaining the information and values of their fish collection and, through their education programmes, a framework of increasing human understanding and involvement with the environment (P22, pers. comm., 04 February 2008).

It was agreed that there were economic spin-offs from some of the research they do, but this was said not to be one of their motives.

Within the sustainability paradigm one accepts, for example in fisheries and fishing activities that some of the research will have an economic benefit, but that is not our motive around this. ... the institute is primarily focussed around non-economic issues, non-direct economic issues, in other words we are not into research whose primary aim is for economic benefits. The primary aim is sustainability of the environment and sustainability of bio-diversity (P22, pers. comm., 04 February 2008).

Examples of sustainability oriented projects in the institute

One of the projects the institute has been involved in is the Lesotho Highlands Water Scheme in which, it was said, they trained and empowered a team of people to fulfil a function in particular dams in Lesotho. Another one is the Four Corners Project (involving four countries; Zimbabwe, Botswana, Namibia and Zambia) in which the institute assessed the aquatic biodiversity of the upper Zambezi system and encouraged all involved countries to help manage the aquatic resources in the upper Zambezi area. The Okavango Project in Botswana (1982-1992) was about fish and fisheries development in the Okavango for the benefit of local people. The Fishes of the Western Indian Ocean Project will allow nations of the Western Indian Ocean to tap into that biodiversity for tourism enrichment and utilisation by the people along the sea board of the Western Indian Ocean. Benefit of these projects to the local Grahamstown community was however said to be minimal as most of them were at national or international levels (P22, pers. comm., 04 February 2008).

Factors influencing the focus of research in SAIAB

Prevailing international debates/agendas were said to be influential to the institute's research activities.

We are greatly influenced by prevailing international and national imperatives in research, for example, the World Summit on Sustainable Development. A lot of their thinking and the paradigms that have come out of ... the Convention on Biodiversity in 1992, have been influential in the way we conduct and do, and the nature of the research that we do. Certainly we feel that sustainability is an important area and that we are not here in the short-term, or the solutions that we provide society with, the knowledge that we provide society with, should allow them to manage the environment and its biodiversity in the long-term, not short term solutions (P22, pers. comm., 04 February 2008).

This influence was however not a sudden agenda but is said to have taken place over time through the growth of the thought and the paradigm (ibid.).

Partnerships and collaborations

As mentioned before, the institute collaborates with the DIFS at Rhodes University in teaching and supervising students. At the same time, they have a partnership type of relationship with other national and international organisations, other museums, other universities and other states and science councils like the Council for Scientific and Industrial Research (CSIR). It was indicated during the interview that through these collaborations, they are advancing the sustainable development agenda (P22, pers. comm., 04 February 2008). This is in addition to the sustainability oriented projects in the institute mentioned earlier.

Challenges

Among the major challenges in advancing the sustainability agenda that were highlighted during the interview is the fact that sustainability concepts could not be forced on people.

... you can't impose concepts of sustainability on people or on nations. It's got to be something that the people and nations themselves must wish and require, it must be a willing partnership, a free and open association. If it's a force it's temporary and it's short-term, it will never be sustainable (P22, pers. comm., 04 February 2008).

The other challenge mentioned was the issue of capacity within projects in terms of human resources, skills, physical resources and financial resources to sustain and ensure continuity of the projects.

... we can't just go and deliver a good and then pull out, you actually have to sustain your effort at different levels over a long period of time (P22, pers. comm., 04 February 2008).

Sustainability as a concept was also said to be a difficult concept especially in the African continent.

Africa is a continent where ... sustainability is a difficult concept. There is too much short-term thinking, you know people think ... you come in, you do your project you achieve your result and then you just walk away from it and there is no provision for sustainability (P22, pers. comm., 04 February 2008).

According to the interview sustainability issues therefore have to be brought into the whole project from the beginning of the project and not later as a tag-on (ibid.).

Ways of improving mainstreaming sustainability issues

To improve mainstreaming sustainability issues into university activities, it was argued that sustainability had to be encouraged so that it becomes a way of thinking or the prevailing paradigm for the whole process to be sustainable.

... sustainability is a paradigm, it's a way of thinking and doing, ... it got to become part of your existence. ... the paradigm of continuity, of sustainability of something must become embedded in your thinking at all times, only then will it be a success. ... it's got to become the prevailing paradigm, sustainability must be built in to everything you do from the beginning ..., and when it becomes second nature you can stop worrying, ... it will be sustainable (P22, pers. comm., 04 February 2008).

Approach to sustainable development issues

The way the institute approaches sustainable development was that people were to be taken as part of the environment and not to be singled out as being more important than the ecological environment.

... if we just focus on people and not the environment you would find that, because it's an unholistic approach, that something would not work. When you see people as part of the system and not separate from the system, is when you start getting the solutions, ... healthy people are dependent on a healthy environment, and a healthy environment is dependent on healthy population and communities, ... where the people side is in bad shape, for example overcrowding, bad health system and so forth, you have got to work on those issues as a priority if you want to sustain the environment. You can't expect people under those circumstances to respect the environment. However, if you start ... saying, healthy people depend upon a healthy environment and you link them in an ecological way, you start to get the right solutions to the problem. ... you must see people as part of the environment and all as part of the solution (P22, pers. comm., 04 February 2008).

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CASE RECORD 16: INSTITUTE OF SOCIAL AND ECONOMIC RESEARCH

Integration of sustainability issues

The Institute of Social and Economic Research (ISER) "seeks to produce reputable research that makes a positive contribution to the quality of life of South Africans, particularly those living in the Eastern Cape" (Rhodes University, 2007, p. 33). Its broad research areas include critical development issues in the Eastern Cape; quality of life research; bio-cultural diversity and conservation; and the municipal services project (see table 1 below) (ISER, 2006).

Table 1. ISER research programmes

Research programme	Environmental and sustainability issues addressed
Quality of life research	Contemporary issues of global concern, social indicators and social attitudes, community responses to HIV/AIDS and related communicable diseases, and poverty
Bio-cultural diversity and conservation	Use of natural resources, land use and environmental-cultural practices with a strong emphasis on livelihoods
The municipal services project	Restructuring of municipal services and the commercialisation of health care in South and Southern Africa
Regional social and economic research	Policy and critical development issues in the Eastern Cape province and Makana Municipality
Political traditions of the Eastern Cape	Preservation of oral tradition and heritage awareness among other issues

(Table constructed with data from ISER, 2005; 2006; and 2007).

The institute in addition has a CODESRIA-funded (CODESRIA - Council for the Development of Social Science Research in Africa) Southern Africa in Africa Research Initiative (SAARI) and South Africa-Netherlands Research Programme on Alternatives in Development (SANPAD) and National Research Foundation (NRF) thematic projects which have enabled its members to be involved in other sustainability related research initiatives. One of the members of the institute is involved in local environmental assessments (ISER, 2006). From 2005 to 2006, the institute's research programmes included the Programme for the Empowerment of People, Land and the Environment (PEOPLE) in which it was involved in research in

sustainable development, biodiversity, cultural heritage and poverty alleviation, indigenous medicinal plants, HIV/AIDS and the tourism industry (ISER, 2005).

The institute was described as “the hub within Rhodes University for intensive research in the Eastern Cape and Makana Municipality” (Rhodes University, 2007, p. 33). There is therefore a great deal of involvement with community owing to the nature of the projects the institute is involved in.

Embedded within the institute’s research agendas are sustainable development issues.

<i>... about everything we do is about sustainability ... we are doing a book at the moment on the Eastern Cape and about 4 or 5 of the chapters cover issues around sustainability (P21, pers. comm., 24 January 2008).</i>
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<i>A lot of the work that we do here has a broad sustainability directive but it's not explicit in our proposals or in anything (P6. pers. comm., 22 November 2007).</i>
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Examples of sustainability issues the institute is involved in were outlined as social justice, quality of life, electricity shortages in the country and use of indigenous plants. Some of the sustainability issues they deal with are said to be controversial and multi-dimensional as they are at the interface of ecological, economic and social dimensions of sustainable development. A good example given is the establishment of an aluminium smelter in Coega which was said to have potential to create 800 jobs but at the same time would consume a huge amount of electricity and generate environmental pollution (P21, pers. comm., 24 January 2008).

An analysis of the 2007 research outputs revealed a focus on the following environmental and sustainability areas:

- social context change in South Africa,
 - quality of life issues,
 - diseases (including HIV/AIDS and tuberculosis),
 - municipal services,
 - use-value of non timber forest products,
 - wild plants,
 - indigenous forest resource use,
 - importance of natural resources in urban households,
 - medicinal plant use and trade,
 - traditional knowledge and the environment,
 - poverty, and
 - bio-cultural diversity conservation.
- (RU Research Report, 2007)

How the institute focused on sustainability issues

It was established from the interview that the question of sustainable development is the one which started the institute and it is a big question in all the institute’s projects. It was also expressed that people had to increasingly think about the environment and probably change the way they live, which means a major shift in society (P21, pers. comm., 24 January 2008). At the same time, integration of sustainability issues was said to be taking place in a progressive way and needed to be part of everything that people do.

I think it's really just a sort of progressive approach that we take when we undertake research. ... sustainability is difficult to understand. It needs to be driven by people. It needs to be part of a progressive approach. It needs to be part of everything, your lifestyle, your work etc. (p6. pers. comm., 22 November 2007).

Approach to sustainable development issues

The institute places people first in sustainable development issues but also recognises a multi-dimensional approach. It came out from the interviews that they are more informed by the needs of the people and environmental justice.

I think for us the environmental question isn't just about birds, bees, trees and the quality of water whatever, it's about people, it's first and foremost about people. We in fact even had a programme called People and Livelihoods as one of our research clusters. We don't use that label any more but a lot of the work we do is related to the livelihoods of people because that comes first. ... a lot of the ecology debates are about whether the environment comes before people, but we say we can't do the one without the other if you want to defend the environment you have to defend the lives of people, you have to put the social justice issues first (P21, pers. comm., 24 January 2008).

... sustainability issues are also quite cross-cutting, they are sort of quite broad, they are not only relating to environmental sustainability they relate to sort of how are people's life sustained through the practices that local government take or through Rhodes University (P6, pers. comm., 22 November 2007).

The sentiment expressed during one interview was that the Coega development (which will be a huge electricity consumer) was not right for the poor Eastern Cape region which is already suffering inadequate electricity supply. The same was expressed in terms making the Eastern Cape a centre for a Bio-fuel Project.

... so they will use up land, ... grow crops and then use the crops to extract stuff that will help them make fuel, ... they use that to make more fuel to make more cars and then more pollution, meanwhile, that land could have been used to make food for people ... food prices have gone up, all over the world food is, the price of food goes up why? Because farmers are moving away from food to bio-fuels. More people will starve but the cars will have fuel (P21, pers. comm., 24 January 2008).

In the light of social justice and putting people first, commodification of water was also criticised where companies buy the rights to sell water, making it more of a commodity than a human right.

We are trying to use the water issue to bring about a kind of consciousness of the environment, social justice, putting people at the centre P21, pers. comm., 24 January 2008).

Strong arguments were put across against attaching monetary value to environmental resources, for example making people pay for air pollution. This was said to be beneficial to the rich but at the same time infringing the rights of the poor.

... it's a strange idea that we should put a money value on nature, I think its not the right approach because powerful people with a lot of money will simply buy the right to pollute, even if it costs them a lot of money they will buy the right to pollute. ... why are they polluting in the first place, why aren't they putting up clean technology, why aren't they moving away from fossil fuels? (P21, pers. comm., 24 January 2008).

Other departments at the university were said to have very narrow approaches and often blame the poor for environmental problems. This was termed "environmental racism". Examples given include the Institute for Water Research and the Fisheries

Department which were said to have a more ecological approach which is not much influenced by social justice issues (ibid.).

Partnerships and collaborations

The ISER works in collaboration with other departments and units from a variety of disciplines at Rhodes University. Examples given include Economics, Geography, Environmental Education and Environmental Science. They work with the Faculty of Pharmacy in the community around issues of administration of HIV/AIDS medication (ibid.). They also collaborate with history, politics and management departments in the work that they do for local government (P6, pers. comm., 22 November 2007). From outside the university, they have partnerships with local farmers (Masifunde Project) and Umthathi, a non-governmental organisation around food gardens in the township. They also work with government departments like Water Affairs and Agriculture (P21, pers. comm., 24 January 2008). Collaboration was said to be important in improving the quality of research projects owing to different backgrounds among researchers thus making the end product better informed (P6, pers. comm., 22 November 2007).

The ISER is also coordinating the Makana Research Group (MRG) which involves several Rhodes University departments and institutes in which they work with the Makana Municipality through research activities that are meant to inform the Local Economic Development Strategy (P6, pers. comm., 22 November 2007). The main objectives of the MRG are “to facilitate and strengthen research engagements between Rhodes University and the Makana Municipality, encourage collaboration between departments and researchers at Rhodes, and establish a resource centre and archive at the ISER to house research conducted in the Makana Municipality” (Policy and governance, n.d.). The key local economic development areas of focus include mining, agriculture, tourism and small, medium and micro enterprises (SMMEs). The focus was said to be more on social and economic development. The MRG also wants to look at how to support post-graduate students in terms of drawing them into research. MRG members are from various departments at Rhodes University and are grouped in different clusters including health, water and land (P6, pers. comm., 22 November 2007). The various research clusters are tasked with developing a research agenda that inform the municipality, make proposals and at the same time, negotiate funding.

Current research clusters that were identified from completed, ongoing and future research are outlined in Table 2. Also explained in the table are the environmental and sustainability aspects which fall under each of the clusters.

Table 2. Research clusters in the Makana Research Group

Research cluster	Environmental and sustainability focus
Health	Diseases (e.g. HIV/AIDS, hypertension, tuberculosis), lifestyle, stigma and care for the sick.
Water and the environment	Alien invasive plants and water provision.
Land	Agriculture, municipal commonages, game farming, traditional land use and farm working conditions.
Politics	Governance and democracy issues.
Economic/baseline	Energy in small, medium and micro enterprises, municipal solid waste disposal, social and economic impacts of festivals and conferences, youth development, integrated development planning, tourism-based development, and poverty alleviation.
Education	Change in education.
Culture	Identity, job creation and neighbourhood development.
Other	Food gardening.

(Table constructed with data from an unpublished and undated Makana Research Group list of clusters obtained from ISER in 2007).

Encouraging people to take up sustainability issues

The sentiment expressed in terms of ways of encouraging people to pick sustainable development issues in their activities was that it was a difficult exercise as the university is not in a position to dictate to staff members what positions to take, especially concerning their interactions with the outside world. As a result people take very different positions. An example that was highlighted was that of the Coega development in which staff members had different views. While others believed it was bad for the Eastern Cape, there were some in support of it and involved in the development as members of the advisory board (P21, pers. comm., 24 January 2008).

Other sustainability practices in the institute

The institute puts aside paper in separate boxes for recycling. Staff members switch off lights when they are not in use. It was also established through the interview that most staff members have a deep consciousness through being involved in environmental or sustainability issues. Some use bicycles and not cars in the interest of the environment (ibid.).

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CASE RECORD 17: INSTITUTIONAL PLANNING

Commitment to sustainable development at Rhodes University

According to the interview, Rhodes University initially focussed on academic greening of the curriculum before it took on a broader understanding of environmental issues. The opinion given during the interview was that the university is not yet there as it hasn't developed any form of Environmental Management System. The university is however a signatory of the Talloires Declaration and participates in the organisation and hosting of the Environmental Management for Sustainable Universities (EMSU), a series of international conferences (P14 pers. comm., 07 December 2007).

From documents, it was established that the university became a signatory of the Talloires Declaration when it joined the ULSF in 1998, but it has stopped paying the annual membership fee in the early 2000's due to costs. The university however, as indicated above, participates in the EMSU which developed out of the ULSF (Rhodes University Policy relating to environmental sustainability, n.d.).

In addition, the university was also said to be supporting environmental issues at national level and in departmental disciplines. Support was also said to be given to the same departments in their community engagement. At the same time, some departments were said to be engaging with sustainability issues more than others and this was illustrated using the Education Department, which, according to the interview, was producing more publications in the area than humanities. The Education Department was said to have a much broader approach to sustainability issues than other departments (P14 pers. comm., 07 December 2007).

The university has an Environmental Committee (EC) which is responsible for environmental issues. In senate, reporting from the Environmental Committee is a regular agenda item. The committee is responsible for setting up task teams to drive particular projects. An example given was that of the task team for the Botanical Gardens Project in Grahamstown.

... the Botanical Gardens is the greening side but there is education in it, it's a community engagement activity, it's a schooling activity, it's a research activity, so we are giving it a three tier structure (P14 pers. comm., 07 December 2007).

This is however said to be using the university's old and narrow approach to environmental issues.

... the concept of environmental issues started off as the concept of the environmental protection, and the whole concept was to protect the environment ... prevent people to enter (ibid.).

Presently social issues are said to be forming part of environmental issue and an example cited was that of HIV/AIDS. It is one area in which the university has established a task team which reports to senate and council, and is part of both research and the curriculum. The university has an HIV/AIDS Policy in which it commits itself to the creation of support structures, engaging actively with prevention programmes in the fight against HIV and AIDS, heightening general awareness, and facilitating teaching and research additions to the curriculum aimed at creating

greater understanding of the disease. Among the various objectives, the university defined one of its educational objectives as to:

... implement and promote a sustained educational programme through the provision of current and accurate information in such a way that every student and staff member has access to education about HIV and AIDS and to promote similar programmes to the broader community (Rhodes University institutional HIV and AIDS Policy, 2006), p. 5).

The built environment is also being infused with sustainability in the institute's thinking and it was said to be the responsibility of the Estates Division to ensure that the buildings at the university are environmentally friendly. These issues are said to be addressed in various ways including forums (P14 pers. comm., 07 December 2007).

How to promote mainstreaming activities at the university

The university was said to be considering establishing a cross-disciplinary Masters' Programme in 2010 in the area of integrated social development with a strong focus on sustainability issues. It is going to be hosted in the Faculty of Humanities. There were also talks about introducing a compulsory course for all first years in Citizenship and Ethics aimed at promoting social cohesion. The course was said to be in a position to promote appreciation of cultural diversity and at the same time, sustainability issues.

The major challenge was however said to be that of changing people's ways of thinking from the conservation perspective to starting to see interrelationships.

... now we need to acknowledge we live in the environment and we need to say how does the environment and the human being co-exist. That change in mindset is the challenge that all universities have. ... you need to build in environmental issues in Economics you need to build in environmental issues in the Department of Sociology, you need to build in environmental issues in the Department of Fisheries, you need to do environmental issues not just in the Department of Environmental Science or the Faculty of Education, and we need to involve many people. ... to include environmental issues in literature (P14 pers. comm., 07 December 2007).

It was acknowledged during the interview that while this was a difficult process, the university had the capacity to do it and hence it was getting to be done slowly and may be achieved with time. The skills were said to be there at the university but what was needed was a task team to do that work. The interview also revealed that it was important for people to "get out of the box to look at themselves in a different light" as there is a tendency for pointing fingers without critically looking at themselves (ibid.).

There is need for much more self-reflection at the individual level, much more self-reflection on what they are doing and how they are doing it. ... but how do you instil self evaluation? (P14 pers. comm., 07 December 2007).

One of the challenges put forward was that of defining the concept of sustainable development itself as there were different views with some people still caught up in the narrow conservation approach. At the same time, it was mentioned during the interview that Rhodes University was far removed from the realities of life.

... the environment in which we find ourselves could be so far away from realities. That's the challenge for us. I think that is the challenge for Rhodes University as a whole when we talk about self-sustainability. Because of the distance, the comfort that you walk from here to your residence ... you don't need to fight the robots; you don't need to fight the traffic jams. You forget about real life situations that one experience in the bigger environments (P14 pers. comm., 07 December 2007).

This was said to present problems when it comes to defining the concept of sustainable development as it depends on the environment where the debate is situated. Different challenges will emerge in different environments (ibid.).

References

Rhodes University Policy relating to environmental sustainability (n.d.). Retrieved 18 September 2008 from: <http://www.ru.ac.za/environment/policy>.
Rhodes University institutional HIV and AIDS Policy (2006). Retrieved December 31, 2008 from, <http://www.ru.ac.za/documents/Hiv-aids/AIDS%20policy.pdf>.

CASE RECORD 18: HUMAN RESOURCES

Hiring decisions

It was established that at Rhodes University, staff hiring decisions depend on the ability of people and their contributions in their particular disciplines and not contributions to sustainability independent of these. The criteria were given as basically the three functions of higher education, that is, teaching research and community engagement, independent of sustainable development issues (P10, pers. comm., 4 December 2007). The interview revealed that sustainable development has not been recognised as a strategic priority at the university, and at the same time, the university's Environmental Policy and Community Engagement Policy do not dwell on sustainable development issues. It was also not a significant aspect in staff development (ibid.).

Section 4.2.1.2 of the Rhodes University recruitment and selection policy and procedures for academic posts focuses on equity considerations. While it is stated in the policy that the university "will always attempt to select candidates who will make the best contribution to the goals of the University ..."; the university however "recognizes that special steps have to be taken to provide equal opportunities for all". Among the practical steps that were suggested is section 4.2.1.2.1 which partly reads: "actively search for individuals from designated groups and record in writing, the steps which were taken", and section 4.2.1.2.4; "providing substantial scholarships for Master and PhD studies for students from designated groups who show an interest in an academic career as well as seeking postdoctoral Fellowships for such students in excellent international institutions" (Rhodes University recruitment and selection policy and procedures: Academic posts, n.d.). This also shows concern for equity issues.

According to the interview, Rhodes University is concerned with its position in the community. Sixty percent of the GDP of Grahamstown comes through employment and staff and the students living in the town.

We are concerned about the growth of the university and the impact on the infrastructure of the town. Are we going to be able to have enough water, electricity for the growth of the university? So there are discussions about that relationship, from an environmental point of view (P10, pers. comm., 4 December 2007).

This shows that while all staff members are not directly encouraged to engage with sustainable development issues, these are embedded in the operations.

It was established through the interview that it is possible to highlight the importance of sustainable development among staff especially as these issues were increasingly becoming important. At the same time, the Rhodes community is a community of people who can “appreciate ... the arguments and the necessity around these sorts of things” and who would “subscribe” to their importance and “who could intellectually understand it”. The Environmental Committee was seen as having an important role in the process (ibid.).

Implementing sustainability

Steps for implementing sustainability at the university were outlined as follows:

1. what are we trying to achieve – goal definition, benchmarks, strategies,
2. what are we going to do if we are found wanting in certain areas,
3. how are we going to actually develop a culture that is going to support that (this was explained as infusion through all aspects of how you do your business),
4. how are we going to develop people to be able to do those things(education is very important),
5. how are we going to develop the skills in students, and
6. what activities are we going to be involved in within the community?

The role of the Human Resources Division in all this would only be in terms of how the university recruits, promotes and develop staff members, making sure that the issues get infused through the people side of the business. The Research Office will then be responsible for infusion into research programmes, etc. (P10, pers. comm., 4 December 2007).

For this to be driven strategically there will be a need to:

1. start with the top management,
2. educate people about it,
3. look at what its implications are throughout the institution,
4. consider how it would infuse the curriculum, the hiring and promotions decisions,
5. take a systematic approach to say “we believe it is important, we believe that this is what our future is about, we believe that our own effectiveness, our own livelihood and sustainability is about this concept”
6. consider what it means on a practical level, and how it can be infused in everything done by the university
7. be vigilant in following it through, and
8. have people who can champion it (P10, pers. comm., 4 December 2007).

Challenges

The dying away of environmental societies at the university was attributed to lack of leadership building rather than an indication of a lack of interest in that area. (This was said to be ironic given the RU motto: *Where leaders learn*). This argument was

supported by highlighting the fact that students at the institution were environmentally aware and come from backgrounds in which survival no longer takes precedence over the environment. Emphasised during the interview was the leadership role of institutions of higher education (ibid.).

The other challenge highlighted was little understanding of the sustainable development concept.

I really don't know enough about this concept; I have a layman's understanding about it I suppose. A lot of my responses have been prefaced on that I don't understand this concept adequately. Rhodes needs to do a lot about it (P10, pers. comm., 4 December 2007).

Reference

Rhodes University recruitment and selection policy and procedures: Academic posts (n.d.). Retrieved 18 September 2008 from:
<http://oldwww.ru.ac.za/intranet/policies/Recruitment&Selection%20PolicyandProceduresAcademicStaff.doc>.

CASE RECORD 19: RESEARCH MANAGEMENT DIVISION

It was established through an interview that Rhodes University does not have a clearly defined Research Policy in which sustainability issues are reflected although they form part of meetings and discussions.

... although sustainability issues are something that we talk about a lot in terms of our meetings and our discussions, it's not reflected in any policy documents at the moment (P13, pers. comm., 5 December 2007).

However, this is in terms of sustainability of the practice of research rather than as a way of influencing staff members to mainstream sustainable development issues in their research activities. In allocating research funding, focus is on young and needy researchers and also research outputs in terms of established researchers (P13, pers. comm., 5 December 2007). A sustainable development focus was thus not part of the criteria.

Sustainable development issues were said to be sometimes emphasised by research funders, for example, the South Africa-Netherlands Research Programme on Alternatives in Development (SANPAD) in the social sciences. The Department of Science and Technology which is the main research funding agency was said to be emphasising research in five regional and national challenges which it identified as critical areas of national well-being. Among them are energy, climate change and poverty which are critical environmental and sustainability challenges facing South Africa. It was believed that university researchers (including those at Rhodes University) would be influenced to align their researches with the defined issues for them to get funding thereby positively contributing to sustainability in the process.

Partnerships in sustainable development were said to exist between the university and various stakeholders, an example being the Institute for Social and Economic Research (ISER) and the local municipality (P13, pers. comm., 5 December 2007).

Other examples include the National Research Foundation (NRF). SAIAB is a national facility of the NRF and is involved in research in the area of aquatic biodiversity. The Water Research Commission (WRC) has also been involved in funding projects at the university on stakeholder participation in catchment management (Research and innovation relating to environmental sustainability, n.d.).

Reference

Research and innovation relating to environmental sustainability (n.d.) Retrieved 18 September 2008 from: <http://www.ru.ac.za/environment/research>.

CASE RECORD 20: COMMUNITY ENGAGEMENT DIVISION

Rhodes University has always been interacting with the community, through the Centre for Social Development (CSD)²⁶. Initially there was no comprehensive information of its community initiatives hence in 2003 the Rhodes University Community Development Committee (now Community Engagement Committee) was established. This facilitated improving the university-community relationship further (Rhodes University, 2005). The responsibilities of the committee were to enhance, initiate, coordinate and give visibility to community initiatives at Rhodes University (Community Engagement Committee Minutes). At the time of the interview, the Community Engagement Manager, appointed in 2005 and supported by Rhodes University but working under the Centre for Social Development, was responsible for centrally coordinating Rhodes University community engagement initiatives.

In 2004, there was growing pressure from local and international donors, government/department of education and from within Rhodes itself for the university to be involved in community development initiatives. At the same time, the university did not want to be perceived as an 'ivory tower' isolated from the social problems (e.g. poverty and unemployment) in its surroundings especially since it is said to be the largest organisation within Grahamstown with resources to make the most change through educational interventions (Community Engagement Committee Minutes). This led to a variety of initiatives including enhancing capacity, auditing and reporting initiatives, policy development among others.

In 2004, the Rhodes Community website was launched. The same year, an audit of Rhodes University community initiatives was initiated. A task team was put in place to develop the Rhodes University community engagement vision and mission statement. In 2005, the Rhodes University community engagement audit was posted on the community website. The Community Engagement Policy was also approved the same year and a Community Engagement Manager and administrative assistant were appointed to coordinate community engagement initiatives (Community Engagement Committee Minutes).

²⁶ The CSD is a non-governmental organisation which was commissioned by RU to lead its community engagement and was responsible for centrally coordinating Rhodes University community engagement initiatives. The CSD however did not have enough staff capacity to place all the student volunteers from Rhodes University and to cater for international students who were required to gain such an experience as part of their educational programmes, hence the establishment of the Community Engagement Committee.

In 2006, the goal for a university/community partnership between Rhodes University and formerly disadvantaged black schools (Makana Schools Partnership) was defined by the Vice Chancellor. His five year vision is a partnership of excellence between the university, Makana government and a broad ranging capacity building relationship with seven high schools in Grahamstown East, which is a formerly disadvantaged black area still characterised by poverty and high unemployment rates.

The university has since introduced the Vice Chancellor's Awards for community engagement and service learning. 2007 saw the appointment of a Community Engagement Director who is now spearheading the Makana Schools Partnership and has been involved in several workshops in 2008 to that effect. The aim of the partnership as defined in the minutes of the workshops is to facilitate progress with students who matriculate through direct access with Rhodes University or through the Extended Studies Unit which was established by the university to assist students from disadvantaged backgrounds.

The extended studies programmes strive to assist students from educationally disadvantaged backgrounds. This is done through alternative access for students who would not automatically qualify for direct admission. A limited number of students who show potential to succeed are selected and are exposed to a carefully designed supportive learning environment which enhances their ability to succeed at Rhodes University. This purpose supports the RU Mission Statement with regards to transformation and equity (Extended Studies Unit, n.d.).

Issues raised through the workshops which the university is setting to tackle include insufficient teaching aids especially in Geography and science subjects, low morale among teachers because of high learners to teacher ratio and low morale among learners among other things (Minutes of Makana Schools Partnership workshops).

The Community Engagement Director is also exploring establishing a credit bearing service learning programme in teaching departments at Rhodes University as a way of extending community engagement initiatives. This would see students placed in communities where they provide expertise but at the same time learning from those contexts.

Sustainability issues are embedded in Rhodes University's Community Engagement mission statement. According to the mission statement,

It [Rhodes University] expresses its commitment to community service by working actively to improve the quality of life of individuals in Grahamstown and Eastern Cape communities, adding value through the sharing of its knowledge resources (Rhodes University, 2005, p. i).

From the interview, it was established that community engagement work at Rhodes University is initiated within the university in different departments, institutes or units. The university is involved in various community development initiatives through sharing knowledge resources and by way of skills transfer. The nature of community engagement work varies from "policy formulation, research and advocacy" to "practical interventions with immediate benefits" (Rhodes University, 2005, p2). Activities are said to be initiated by staff members, some in conjunction with the Rhodes University Community Engagement Division under the CSD or through the Vice Chancellor's office. However, community engagement projects at Rhodes University are not run by the CSD and the reasons given were that there are

numerous activities going on and at the same time, it would limit the scope and the variety of initiatives. The role of the CSD was therefore given as to facilitate good community engagement, to provide resources, advise, mentor or network the people involved and encourage staff members and students to get involved (P9, pers. comm., 19 November 2007).

The interview also established that coordinating community engagement centrally was advantageous in that it promotes better communication, quality, monitoring and evaluation, and it helps do away with issues of duplication of effort as involved people are informed about each other. It also makes the whole process an institutional initiative instead of having independent projects (ibid.).

The Community Engagement Division therefore does not necessarily emphasise or encourage departments and individuals involved in community engagement work to undertake projects that address sustainable development issues as theirs is only a facilitator's role. The exception is on two areas which they are trying to promote, i.e. one to support Makana Municipality in its social and economic agendas and the other, to intervene and to support education in Grahamstown particularly with a focus on Grahamstown East schools. Other than that the community engagement at Rhodes University is said to be based on a principle of volition where departments decide where they can apply their resources in the community. Departments that have a discipline that can be applied to development or sustainable development issues will then produce projects that have to do with development and sustainable development issues, for example Environmental Education, Environmental Science, Geography and the Institute for Water Research (P9, pers. comm., 19 November 2007).

Staff members at Rhodes University are encouraged to take community engagement on board as a way of enhancing their teaching and learning processes while at the same time benefiting the community. From the interview, there was a belief that community engagement at Rhodes University will eventually engross sustainable development issues.

<i>I think that this university's conceptualisation of community engagement will eventually grow and expand to involve issues such as sustainable development, umm particularly I think in terms of the environment (P9, pers. comm., 19 November 2007).</i>
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The interview established that from 2008, the Community Engagement Division will be evaluating community engagement at the university where there will be mandatory reporting annually by all involved in community engagement initiatives and the developmental or non-developmental nature of the project is going to be one of the indicators (P9, pers. comm., 19 November 2007).

References

Rhodes University (2005). Community Engagement Review 2005/6. Grahamstown.
Extended Studies Unit (n.d.). Retrieved December 312 from,
<http://oldwww.ru.ac.za/academic/departments/exstudies/>.
Minutes of Makana Schools Partnership workshops.
Community Engagement Committee Minutes.

CASE RECORD 21: ENVIRONMENTAL COMMITTEE

Through an interview with a member of the Environmental Committee it was established that Rhodes University's Environmental Committee (formerly Environmental Programmes Committee) was reconstituted towards the end of 2006. According to the interview (P. 5 pers. comm., 21 November 2007), the Environmental Committee in 2007 had four working groups responsible for the following activities:

- Environmental Management System on campus - developing an EMS for Rhodes University.
- Communications Working Group - communicating environmental information to the Rhodes community.
- Off-campus Links - responsible for off-campus activities, for example the Botanical Gardens Project
- National-International Links - responsible for national and international projects and activities for example Environmental Management for Sustainable Universities (EMSU).

In 2008 however the structure of the Environmental Committee changed and it now has only has three working groups as follows:

- (iv) Environmental Communications,
- (v) Regional, National & International Links, and
- (vi) Environmental Awards.

The Environmental Management Systems Working Group was dropped as the convenor who had the required expertise is no longer a member of the committee in 2008 and it was felt that no-one else in the committee has the necessary expertise to continue with this working group. It will be reconstituted when practically feasible. The Off-campus Links and the National-International Links Working Groups have been combined into one, that is, the Regional, National and International Links.

The working groups are supposed to put into practice the Environmental Committee decisions.

... those working groups are meant to spearhead decisions but essentially the idea behind it is that it shouldn't just be the Environmental Committee that is dealing with environmental stuff, that's why it needs to kind of go into all areas of campus so that everybody is taking responsibility (P. 5 pers. comm., 21 November 2007).

Therefore, besides direct involvement with initiating environmental projects, the Environmental Committee coordinates environmental initiatives by other divisions/departments at the university and makes recommendations for senate approval (Minutes of the Environmental Committee).

According to the interview, the university has recently employed an Environmental Officer who works with all the working groups to assist with decision making and with the implementation of those decisions, mainly because members of the committee are also involved with their normal duties at the university leaving them very little time to carry out the committee duties. From August 2007, the Environmental Officer was

brought in by the Environmental Committee on a temporary, part-time basis for one day a week. From January 2008 this was extended to 16 hours (two days) per week. The Environmental Officer is working on a document which tries to keep track of all the different waste recycling facilities on campus and off-campus (ibid.). Work on the document commenced on a voluntary basis in 2004 before the Environmental Officer position was created at the university.

The Environmental Committee is responsible for implementation, monitoring, and review of the university's Environmental Policy (1998) (Rhodes University Environmental Policy, 1998). According to the policy document, the university aims to:

... pursue a policy of environmental best practice to assist in creating an environmentally sustainable future and in establishing Rhodes University as a centre of excellence in environmental studies and practice (Rhodes University Environmental Policy, 1998).

Among the specific objectives of the policy are the promotion of inclusion of environmental issues in the curricula, promotion of environmental research, optimisation of management of waste, efficient use of resources, formation of partnerships with university stakeholders, encouraging student participation and involvement of management in environmental issues (ibid.). According to the Minutes of the Environmental Committee, the policy underwent a review process and was approved in 2007.

The Regional, National and International Links Working Group is the arm of the Environmental Committee which reaches out to the community. Through the Environmental Committee, Rhodes University among other players, has been involved in launching and coordinating the Botanical Gardens Project. Besides preservation of Botanical Gardens, social upliftment and poverty relief were indicated to be "key components of the project" (Rhodes University, 2005, p. 5). In 2004, the National Biodiversity Institute released R2,9million as part of the Botanical Gardens Project, for a training project of local people as a job creation initiative (Minutes of the Environmental Committee).

The interview established that communication of information by the Environmental Committee is done through the university's events list (events@lists.ru.ac.za) for the announcement of Rhodes University functions and events. There was confidence that the environmental website which was going to be launched would make a difference in communicating environmental information. Rhodos, a Rhodes community newspaper was also being used to disseminate environmental information. Events like DVD showing, guest lectures, and workshops were the other means of communication being considered by the Environmental Committee and have already been implemented to some extent, e.g. public showing of the DVD *The End of Suburbia: Oil depletion and the Collapse of the American Dream*, 8 October 07 (P. 5 pers. comm., 21 November 2007). This information was triangulated through attending one of the video shows entitled *Inside the Poison Trade* during which it was noted that attendance was low considering the size of the university community, with an audience of not more than 75 individuals. The video show was followed by a talk about Acid Mine Drainage and water quality by the Director of the Environmental Biotechnology Research Unit.

In terms of the influence of the global sustainable development agenda, the opinion given during the interview was that people were getting more and more involved in environmental and sustainability issues as awareness of these issues increased.

So it's almost like they are responding because there is a watchdog looking over their shoulders (P. 5 pers. comm., 21 November 2007).

To promote a university-wide approach in taking up environmental and sustainability issues, the interview established that the Environmental Committee's role would be that of initiating ideas. The Environmental Committee was planning to run workshops with staff and students and had previously tried to get a slot in the orientation week but failed as the organiser told them that it was an event that focussed primarily on social concerns – it may be assumed she did not feel that the links to environmental concerns were of sufficient importance in this particular case (ibid.). Since the beginning of 2008, the Environmental Committee has been running environmental activities including lectures and videos.

It was suggested during the interview that there was need to have some kind of guidelines for those who are willing to focus on sustainability issues on their own. The challenge in the whole process was said to be guarding against being prescriptive and overwhelming the interested individuals and also recognising time constraints given other departmental priorities. The other opinion expressed was that people tend to buy in when they have a say in decision-making (P. 5 pers. comm., 21 November 2007).

Future plans which positively enhance engagement of the university with sustainable development issues were said to be affected by the fact that the Environmental Officer's post was temporary. However suggestions made include a broader engagement with the municipality and the community

One of the things that keeps popping up in this town is very high unemployment rates and if we can kind of marry projects so that we are generating employment at the same time, I think that would also help give projects momentum, ... things like recycling or vermi-composting, biotechnology projects, ... there are ... many brilliant ideas being generated at the academic level, but you kind of don't see it filtering out into the community (P. 5 pers. comm., 21 November 2007).

Filtering of projects into the community was said to bring about a broader approach where the university will not be seen to be operating in isolation.

Challenges

1. The Environmental Officer's position is temporary and is on a part-time basis thus limiting environmental and sustainability work that can be initiated. At the same time, planning for the future becomes difficult as the post is on contract basis (ibid.).

... it's a very part time and very temporary thing. It's one day a week and the post has just been reoffered to me for another six months until June next year for two days a week. So just bear that in mind that those are the time constraints (P5, pers. comm., 21 November 2007).

The Environmental Committee has for some time been pushing for a permanent post, e.g. according to the Environmental Committee minutes (March 1, 2007) a "Job Profile describing the key responsibility areas of the

Safety Officer was circulated to members of the committee for information. The committee NOTED that the Safety Officer, when appointed, would be an ex officio member of the committee". The post was due to be advertised in the media at some stage in 2008.

2. Student initiatives tend to be short-lived as they die down when the group that initiate them move away. Before the Green Revolutions and Social Solutions environmental society, there was GAIA which just died away. From the interview, it was suggested that if such groups had a patron, it may give them continuity with time even when the original members move away. It was also mentioned that the Environmental Portfolio in the Student Representative Council could add weight to student environmental groups through collaborative work (P. 5 pers. comm., 21 November 2007). According to the interview, judging from the efforts and activities of the Green Revolutions and Social Solutions environmental society in 2008, the society seems to have established a fairly strong membership and could therefore last longer. The society has a high level of commitment as shown through the way in which it has reached out to liaise with community environmental groups (e.g. Kowie Catchment Campaign) and shown willingness to work with Rhodes University groups like the Environmental Committee, the Student Representative Council and the Department of Environmental Science (ibid.).

References

Rhodes University Environmental Policy, (1998).
Rhodes University (2005). Community Engagement Review 2005/6. Grahamstown. Minutes of the Environmental Committee.

CASE RECORD 22: ESTATES DIVISION

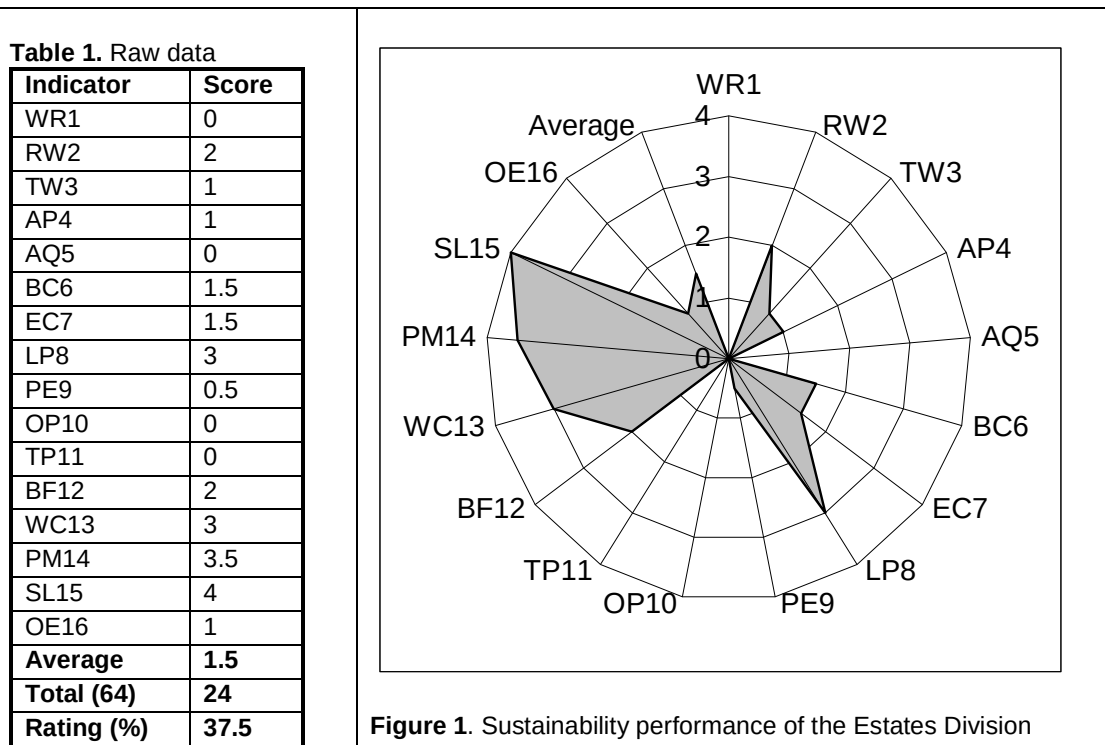
Results of the sustainability assessment

Part B of the USAT was used to assess sustainability in the Estates Division. The table below outlines USAT Part B codes and their descriptions.

Code	Description
WR1	Waste reduction practices
W2	Recycling of solid waste (including paper, plastic, metal, etc.)
TW3	Source reduction of toxic materials and radioactive waste
AP4	CO ₂ and air pollution reduction practices (including alternative fuel use, renewable energy sources, emission control devices, etc.)
AQ5	Indoor air quality standards and practices
BC6	Building construction and renovation based on ecological design principles
EC7	Energy conservation practices (in offices, laboratories, libraries, classrooms and dormitories)
LP8	Local food purchasing programme
PE9	Purchasing from environmentally and socially responsible companies (including buying and using 100% post consumer chlorine free paper)
OP10	Organic food purchasing programme
TP11	Transportation programme (including bicycle/ pedestrian friendly systems, car pools, bus pass programmes, electric/natural gas campus vehicles)
BF12	Use of bio-fuel

WC13	Water conservation practices (including efficient shower heads and irrigation systems)
PM14	Integrated Pest Management practices (including reduction of pesticides to control weeds)
SL15	Sustainable landscaping (emphasizing native plants, biodiversity, minimizing lawn, etc.)
OE16	Integration of operations into the educational and scholarly activities of the university
	Others (please specify):

The assessment revealed areas of strengths and areas that need attention. Although Rhodes University is not involved in some of the practices which are said to be emphasised by institutions moving towards sustainability internationally, there are several practices in place which show commitment to sustainable development. These include water conservation practices, integrated pest management practices, sustainable landscaping and local food purchasing. All these scored between 3 and 4. Other practices including recycling of waste, toxic waste reduction at source, sustainable building construction and renovation, energy conservation, etc. scored between 0.5 and 2. Only 4 practices out of a total of 16 were non-existent (scored 0) at the university, that is, waste reduction, air quality monitoring, organic food purchasing and a sustainable transportation programme. The total score was 24 out of 64 (37.5%) and the average score was 1.5 (Table 1 and Figure 1).



Sustainability practices on campus

Recycling and re-use of waste

Observations made established the presence of facilities at the university to staff and students re-using or recycling solid wastes. Paper recycling bins are located in

offices and at strategic points around campus. Some offices on campus have one-sided paper boxes next to printers and photocopiers to promote re-use. Recycled materials include paper and card, plastics, glass and bottles, used printer cartridges, cans among others (Rhodes University – Grahamstown/iRhini (South Africa) Recycling and Waste Disposal Activities, 2008). The university uses approximately 4000 reams of paper a year (RU-Gtn Recycling and Waste, n.d.). Volumes of recycled paper have been increasing over the years (P4, pers. comm., 20 November 2007). Kitchen and garden waste is used for composting in collaborative work between the university and the community. The university also collaborates with a local business, Makana Meadery, in a project in which they convert used cooking oil (from university kitchens) into bio-diesel, now used to run Rhodes University lawnmowers and other diesel-powered units (Rhodes University – Grahamstown/iRhini (South Africa) Recycling and Waste Disposal Activities, 2008).

Toxic materials and radioactive waste

According to the interview, the university spends around R40 000 per year on disposal of toxic wastes. Toxic solvents are sent for storage in the Chemistry Department in clearly marked 20 litre plastic drums. Other poisons, such as pesticides and herbicides and used torch and car batteries are also sent for disposal through the Chemistry Department. Used fluorescent lights (bulbs and tubes) go to electrical services where they are crushed before disposal (Rhodes University – Grahamstown/iRhini (South Africa) Recycling and Waste Disposal Activities, 2008). The toxic wastes, it was established, are then collected by Psychem Consultants, a contracting company. There were few apparent practices in terms of reduction of toxic and radioactive waste at source, for example, in the Chemistry Department in which departmental members have been looking at ways of reducing the toxic load and the size of samples used in their laboratories.

Air pollution reduction

It was established that the university does not have any indoor air quality standards and that the practice has so far been that, if there is a complaint about stagnancy of air in an office or lecture theatre, air conditioning is amplified to improve air flow. In addition, there is use of battery powered vehicles (two at the time of the interview) on campus (P4, pers. comm., 20 November 2007). Field observations revealed the existence of mechanisms to reduce escape of toxic materials into the atmosphere in the Chemistry Department.

Building construction and renovation based on ecological design principles

While the university had not adopted green building design, according to the interview, sustainability issues were increasingly being considered in decisions like renovation or construction of new buildings, for example considerations for installing a water tank to capture rain water in a new library building which is due to be constructed and building designs which eliminate the need for air conditioners. While the university's project steering committee did not have any operating procedures to give the architects, according to the interview, they sensitise them in terms of environmental and sustainability issues they want considered (P4, pers. comm., 20 November 2007).

Energy conservation practices

No power conservation practices were said to be in place but the interview established that plans were under way at the university to monitor consumption. The university has so far been replacing incandescent light bulbs with fluorescent ones to reduce power consumption. It has also set its boilers to take advantage of off peak

power when possible. Numerous boilers have been insulated to reduce heat loss and save power. Heaters in residences are being adjusted to reduce the power usage per room.

The university is currently working on a plan to monitor power consumption ... and the Information Technology Department together with Estates Division are busy working on a system that will control power use but that is specifically heating, ..., with the heaters and the boilers, its not general power consumption of lights (P4, pers. comm., 20 November 2007).

Purchasing programme

According to the interview, the university has no policy on local or organic food purchasing. However, it was established that a lot of the food (the bulk) was bought locally from within the Eastern Cape Province even though some comes from national suppliers. The university uses chlorine paper and does not emphasise purchasing from environmentally responsible companies. Departments like Information Technology were said to be pressurising some of their suppliers to take their waste back (P4, pers. comm., 20 November 2007).

Transportation programme

Rhodes University is more of a pedestrian campus but the interview established that the practice at the university has been establishment of more car parks. According to the interview, there has been in recent years, the creation of more cycle and motor-cycle bays and the establishment of peripheral parking areas, for example, the Barratt car park which is off campus. However, there is no active programme to reduce use of cars on campus.

... the bigger plan is that the whole inner core would be a pedestrianised area, with no cars parking there, or if they do, they will be premium parking ... if you do not have the premium right to park in the inner core, ... you park in the periphery or you walk. The idea is to try and encourage people who live within a certain walking distance that they rather walk than bring their car (P4, pers. comm., 20 November 2007).

While at the time of the interview there was no bus programme on campus, there had been discussions about running it for students (ibid.).

Use of bio-fuel

The bio-fuel project was said to be one of the successful projects at Rhodes University. The university is using bio-fuel to power its lawnmowers and some of its vehicles, and there were plans to expand the project (P4, pers. comm., 20 November 2007).

Water conservation practices

According to the interview, the university did install water conservation showerheads in residences but these were being removed by students. There is also increasing use of dual flush toilets at the university.

... we are specifying dual flush in new residences to reduce water consumption (P4, pers. comm., 20 November 2007)

Regarding irrigation, the practice at the university is to stop irrigating the rest of the areas (except for key areas) for specified periods of time, which saves water, fuel, labour etc.

... we have tried to reduce the amount of water we use and currently all our systems are off except for key areas and the sports fields, so we are not irrigating. It has the double benefit that if we don't irrigate, we don't have to mow, if we don't mow we save about 30-35 litres of fuel a day. So there is both a financial and a carbon benefit, so by not mowing, we are saving labour, we are saving the wear and tear, we are saving the fuel, we are saving water as well obviously (P4, pers. comm., 20 November 2007).

The interview established that when the university's lawns are cut, they are not shaved down to the traditional South African 12-18mm length. They are left at about 50-75mm which keeps the ground moist hence reducing evapo-transpiration and thus the need to irrigate more often. The establishment of the water tank in the new library building will be another sustainable water management practice. At the same time, it was said to be a safety mechanism in case of a fire starting (P4, pers. comm., 20 November 2007).

Integrated Pest Management practices

In terms of vegetation management on campus there was no use of pesticides. Contact spraying of non-systemic herbicides was being practised but these were said to be the most friendly the university can get but with emphasis on pulling the weeds. Spraying was said to be done only about 2-3 times per year. The university was also not using fertilisers within its grounds (except for the cricket table), but instead, uses a Rhodes produced *mycorrhiza* which is a soil beneficator (P4, pers. comm., 20 November 2007).

Sustainable landscaping

According to the interview, the university was emphasising indigenous plants and all new plants were 100% indigenous. Use of a considerable amount of compost as a base and mulching were mentioned as some of the practices in landscaping. There is use of Geographic Information Systems (GIS) as a planning tool to facilitate landscaping activities (P4, pers. comm., 20 November 2007).

Integration of operations into the educational and scholarly activities of the university

Rhodes University environmental and sustainability operations feature in some of its educational and scholarly activities especially research. Several student researchers focussed on operations and other environmental and sustainability practices at the university and good examples are the projects done by third year Environmental Science students in 2007. They looked at various environmental management issues on campus, for example, water management, toxic wastes, application and communication of the university's Environmental Policy. One of the staff members from the Estates Division was also involved in some of the teaching programmes with the objective of raising awareness (P4, pers. comm., 20 November 2007).

Other initiatives

The interview revealed several other initiatives which show commitment to tackling environmental and sustainability issues at the university. One is the appointment of an Environmental Officer (on a part-time basis), who is responsible for environmental issues on campus. Plans were under way to launch an environmental website which is hoped to improve communication of environmental issues. Students contributed by initiating the establishment of an environmental society and they now have an Environmental Portfolio in their Student Representative Council. A number of

awareness events were also in place for 2008 including walking tours and a visit by an international guest (ibid.).

Factors influencing sustainability

According to the interview, what triggered off sustainability practices at the university initially was “pure economics” (P4, pers. comm., 20 November 2007). The university used to have a power management system in which, if they reached a peak consumption of energy over the saving maximum early in the year, for the remaining months they would have to pay 75% of that maximum even if consumption fall below that. There was therefore power shedding at the institution as a means of keeping within the saving maximum. However, “if you adopt good environmental practice, it has an economic benefit in the long run” (ibid.).

The other factor mentioned is the establishment of the Environmental Policy in 1997. The existence of the policy influenced people to begin thinking of ways of implementing it. This is said to be coupled by the belief in environmental responsibility by the Rhodes University community.

... we believe in being environmentally responsible and I think at the end of the day that what's driving us (P4, pers. comm., 20 November 2007).

Challenges

The challenges of implementing sustainability practices that were identified through the interview are summarised in the following statements:

I think that whilst there has been a willingness to explore environmental best practice and sustainability in our projects, the implementation has been a challenge because there is a number of issues; changing values, financial implications in some of them, so yes, as much as we can, we are applying sustainability values, but those values change with time as the issues change... what is an issue for us, or was an issue for us say in 2000, might not be the same issue in 2007. ... Peter Downey of London University said sustainability is not a point in time, it's a progression. (P4, pers. comm., 20 November 2007).

Sustainability was said to be difficult to justify economically. A good example of an initiative that was being affected by its financial implication, mentioned during the interview, was the use of solar energy. The challenge was therefore given as how to strike a balance between good practice and delivering a service.

... you ask the question, what's the best way to reduce the impact ... it's not necessarily going for the greenest option but what is the best option given the criteria, with the available resources and the available technology in this region (P4, pers. comm., 20 November 2007).

Awareness raising and promotion of responsible behaviour

So far communication of environmental and sustainability information is said to have been through the university's mailing lists. Sometimes use was also made of the Rhodes University Community Newsletter *Rhodos*. Student environmental awareness campaigns are also said to have been instrumental, for example, the where-is-a-way awareness campaign which was held during the 2006 World Environmental Day.

... we collected waste around campus, dumped it on the library car park and the students then separated the waste into different categories. I had to do an assessment of what is the waste to be thrown away; bid; create an awareness that look what we are throwing away and that's to answer the question where-is-a-way, ... where do we throw it away (P4, pers. comm., 20 November 2007).

comm., 20 November 2007).

Another student environmental awareness campaign was planned to run in 2008 and there is an intention to host a number of events each term of the year which brings awareness beyond recycling or the physical campus. On-campus research undertakings by students (like the 2007 third year Environmental Science students) were also said to help in promoting awareness; as well as challenge the university's practices, which consequently makes it better in delivery (ibid.).

Members of the Environmental Committee help raise awareness in their faculties and within senate.

In terms of teaching, the Rhodes University Environmental Committee has a number of academics in it ... those people within their faculties, will attempt to raise awareness as much as possible. And also as they are our senate representatives, there should be an awareness raising within senate (P4, pers. comm., 20 November 2007).

According to the interview, the environmental website was considered to be something that will play a significant role in communicating environmental issues. There were also thoughts about using short message service (SMSs) in addition to all the other available means in communicating environmental information at the university (P4, pers. comm., 20 November 2007).

Improving sustainability practices at the university

Ways of improving environmental and sustainability practices mentioned during the interview include:

1. Efficient power monitoring and power shedding. This came out of the students' surveys.
2. Use of motion sensors in buildings to sense when there is no movement and switch off the power.
3. Research on alternative lighting systems.
4. Implementing Environmental Management Systems more effectively to effect, not only awareness but cost reduction
5. Adopting green building design as a basis for Rhodes University design criteria rather than designing a building first and then seeing how environmentally friendly it can be made - being upfront right from the designing itself.
6. Being more proactive and entrenching the Environmental Policy in organisational goals and missions, from the physical campus planning point of view as well as from a strategic planning point of view; "we take cognisance of the environment at the first level rather than somewhere in the process".
7. Rewarding departments by giving them an element of their funding based on their sustainability footprint, that is considering "how much energy do they use, how much waste do they release, how much environmental research are they doing, Environmental Education programmes" they offer.
8. Facilitate educational programmes to enhance information flow to people.
9. Committing resources to the establishment of a waste-water recycling project and use the recycled water for irrigation purposes.
10. Committing resources to and converting university vehicles into bio-diesel, and to support the bio-diesel initiative in Grahamstown (P4, pers. comm., 20 November 2007).

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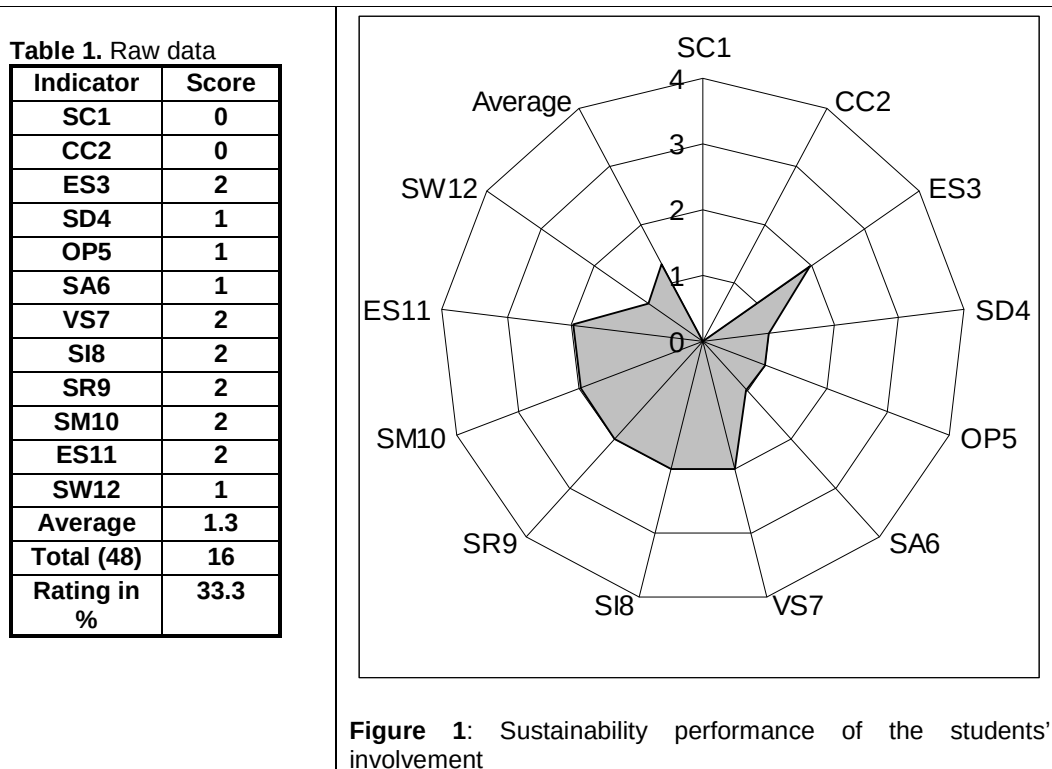
CASE RECORD 23. STUDENTS' INVOLVEMENT

Results of the sustainability assessment

Part C of the USAT was employed in assessing students' involvement in sustainability initiatives at Rhodes University. Below is an outline of Part C indicator codes and their description.

Code	Activities and opportunities
SC1	Student Environmental Centre
CC2	Career counselling focused on work opportunities related to environment and sustainability
ES3	Environmental societies or other Student Group(s) with an environmental or sustainability focus
SD4	Sustainability practices in residences or dormitories by students (e.g. recycling)
OP5	Orientation program(s) on sustainability for students
SA6	Student environmental and sustainability awareness programmes
VS7	Voluntary community service by students related to sustainability issues and concerns
SI8	Involvement of student groups across campus in sustainability initiatives
SR9	SRC involvement in environmental and sustainability initiatives
SM10	Student collaboration with management in the area of environmental and sustainability
ES11	Environmental and sustainability activities initiated by students themselves (independent of departments, lecturers, management etc.)
SW12	Students' willingness to take responsibility in the environmental and sustainability area
	Others (please specify):

The sustainability assessment revealed that Rhodes University has a variety of environmental and sustainability activities meant for students and in a range of cases, initiated by the students themselves. These are operating at different levels as is reflected in the rating of the activities. Among the selected key activities (defined by the USAT) that institutions moving towards sustainability can get involved in, only two were absent. These include a student environmental centre (SC1) and career counselling on work opportunities related to environment and sustainability (CC2). Both therefore scored 0. Performance was a bit low for some of the activities including sustainability practices in residences, orientation programmes and awareness programmes. However, some like community service, Student Representative Council involvement etc. scored 2. The total score was 16 out of 48 (33.3%) and the average score was 1.3 (Table 1 and Figure 1).



Students' initiatives

The students at Rhodes University formed an environmental society called Green Revolutions and Social Solutions (GRASS). The society has over 400 members and is said to be "an indication that Rhodes students are willing to take part and recognise the depth for environmental issues at Rhodes" (P26, pers. comm., 08 April 2008). At the same time, they now have an Environmental Portfolio in the Student Representative Council. GRASS was said to be an initiative by a group of students together with the Student Representative Council Environmental Officer/Councillor (P2, pers. comm., 16 November 2007). Activities by the society are both on and off-campus and are generally around issues of conservation, awareness and sustainability.

We are very much based on campus-wide as well as in community projects with regards to environmental awareness, sustainable living, a bit of conservation comes in, but I think awareness is one of the major goals they are working with as well as conservation and sustainability (P26, pers. comm., 08 April 2008).

Awareness

At the time of the interview, a single awareness campaign had been held around issues of electricity load shedding.

We have had an electricity awareness thing where as the Student Representative Council we were trying to put forward how electricity and load shedding will be affecting the students, but more important to put a background to it, how our electricity is generated, and a bit of a look on how wasteful and so on, touching on global warming (P26, pers. comm., 08 April 2008).

According to the interview, this was not as successful as was intended and the reason given was that it was held closer to the orientation week and there was not much time on the part of the Environmental Officer to organise it.

The Student Representative Council in collaboration with GRASS and Rhodes Organisation for Animal Rights (ROAR) were organising activities to promote awareness during the Environmental Week to be held from 12-16 May.

... we will be addressing issues of sustainability, global warming and other environmental issues. ... that will be a large environmental campaign that will be run for a week long period; lectures, movies; something happening every day. There will be a picnic in the Botanical Gardens, to get some students out there ... to get more close, in touch with nature because sometimes we get stuck in our rooms with our computers and so forth and we forget that there is a world out there (P26, pers. comm., 08 April 2008).

These events took place during the Environmental Week and two of them were observed for the purpose of this study. These are lectures entitled 'Vegetarians do not eat children' and 'Corporate Social Responsibility'. Some of the lectures (not observed) addressed the relationship between people and the environment and that between people and animals etc. (Rhodes University Student News, 2008a). From observations made during some of the lectures, the discussions were centred on raising environmental awareness and explored issues of sustainability at the same time. However they were not well attended and both sessions that were observed had a turnout of less than 30 people.

Community Involvement

Some of the projects students were working on show a high level of community involvement in the area of sustainability. One good example given during the interview is the Adopt a Tree Project where the students are given young succulent indigenous plants to look after for six months before planting them in the community in bare areas. The plants were said to be good for stopping erosion and for carbon sequestration and eventually grow into large plants (P26, pers. comm., 08 April 2008).

Other events which, according to the interview, are planned for implementation in 2008 include the Rhodes Water Week. This was not going to run concurrently with the International Water Week because the dates were not conducive due to other students' commitments. It was mentioned during the interview that this was going to be in collaboration with the Working for Water Programme²⁷ and possibly the Centre for Social Development's Galela Amanzi Project²⁸.

²⁷ The Working for Water (WfW) programme is administered through the Department of Water Affairs and Forestry. It was launched to spearhead the fight against invasive alien plants and works in partnership with local communities, to whom it provides jobs, and private companies, government and other organisations (Department of Water Affairs and Forestry, 2008).

²⁸ Galela Amanzi seeks to promote the responsible use of water, as well as to make water available to Community Centres and schools that do not have consistent safe running water. The project will do this by raising money to buy water tanks that will collect rainwater for the community (Rhodes University Student News, 2008b).

... the Galela Amanzi Centre for Social Development project ... is aiming to buy water tanks for the community, specifically for a number of schools which have started projects of gardens in the past. It has been realised that these gardens are not sustainable because there is no running water or taps nearby the schools. We are working on getting them some water taps, or tanks or both, so they can have clean water there to use ... this is at high school and primary school level (P26, pers. comm., 08 April 2008).

In addition, the interview revealed that an Arbor Day celebration for students was being planned for 2008 environmental activities by students. This was planned to take place outside the university in the community and there was a possibility for a planting campaign. The aim was for students to plant about 50 trees hopefully larger than the succulent plants and more robust indigenous trees in some of the areas in the location which are barren and treeless. The focus will be outside campus as it was felt that Rhodes University has a very green campus with no need for planting extra trees. This, according to the interview, will also be done in partnership with the Centre for Social Development (P26, pers. comm., 08 April 2008).

Students are also challenged to make use of their skills in the community through the Rhodes University Student Volunteer Programme coordinated by the Centre for Social Development. The programme co-ordinator identifies the needs of Community Based Organisations and Non-Governmental Organisations, translate these into volunteer skills requirements and then match students to the community projects. Students (volunteers) receive specialised training before they are placed (Rhodes University, 2005).

There are other community involvements by students through the Halls of Residence, the Oppidans and other societies and clubs, which have sustainability issues embedded within them. The nature of involvement vary from educational projects for the disadvantaged through various departments at Rhodes University to involvement in fundraising efforts in collaboration with the Centre for Social Development in which they collect and distribute food and clothing donations (Rhodes University 2007).

Support for student initiatives

It was established from the interview that the Student Representative Council Environmental Office receives institutional support in terms of funding for environmental initiatives through the Student Representative Council and the Environmental Committee. What was needed was more students' support to assist in running the projects.

Well I do need more student support which is in the way of GRASS, students societies, ... environmentally aware and active students who I can draw upon, to help me, because ultimately this is not a one man's show, it's a university's so the more students get involved the better (P26, pers. comm., 08 April 2008).

How to promote a systems approach

It was mentioned during the interview that Rhodes University was moving towards a systems approach being driven most by the combined effort of the reconstituted dynamic Environmental Committee, the SRC Environmental Councillor and the student's environmental society (GRASS). A bottom-up approach was suggested as the means to improve students' involvement and hence awareness; which in turn may lead to more students demanding environmental and sustainability issues in the curriculum.

We are also working on getting that student involvement on a higher level because ultimately if we get more students demanding it, then the curriculum is going to change. So from my perspective, I believe that the grassroots approach will be very useful, perhaps working together with the top-down approach through teaching goals like MESA or strategic papers and so forth, but in conjunction with getting awareness from the students and the students wanting more involvement ... because ultimately education is no longer institutionalised, it's a service and if the students ask for something and it's something which is valid as environmental sustainability is, then there is a much greater likelihood of holistic systems being put in place, whereby all departments have at least some degree of environmental sustainability issues involved inside the curriculum (P26, pers. comm., 08 April 2008).

The other view expressed in another interview in terms of picking sustainability issues in the curriculum was to focus on the Commerce Department as it was the one dealing with issues of material development.

I am not sure about other departments, but in commerce, if you look at the WSSD which was held in South Africa in 2002, ... that looked at development and looked at ... how do you ensure that that development is sustainable, environmentally sound, and environmentally friendly? And which faculty deals with issues of material development? It is the Commerce Faculty. I really think there is scope within the Commerce Faculty (P2, pers. comm., 16 November 2007).

It was also mentioned that there was need for fully implementing the university's Environmental Policy. The policy was said to be a good policy, but being partially implemented owing to certain difficulties including financial (P26, pers. comm., 08 April 2008).

Challenges

One of the challenges mentioned in the Adopt a Tree Project was that, while they wanted to use bigger trees, this was not possible as they are difficult for students to look after because many of them live in residences and have no place to properly care for them.

One other problem mentioned in one of the interviews is continuity of students' environmental societies. Initiators of such societies are said to generally have a following of people around them, hence when they leave, the whole group leaves leading to the dying off of the initiative. It was suggested that there was need for a facilitator with a portfolio, like the Environmental Officer (P4, pers. comm., 20 November 2007). However, the Environmental Officer is not full-time which in itself presents challenges in terms of continuity and the amount of work that can be handled.

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