Nelson Mandela Metropolitan University

for tomorrow

‘Greening’ NMMU:

Perceptions of staff and students

Full report

Mr R. Lillah & Dr S. Viviers

Department of Business Management

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EXECUTIVE SUMMARY

Climate change is one of the greatest challenges the world has ever faced, and will affect NMMU and all it's stakeholders in the future through a combination of associated physical, regulatory, economic and market related risks. The issue of climate change has never been higher on the agenda then now. Locally, the South African Government has released a long-term mitigation strategy and is planning to release a white paper on climate change during 2010, with a full regulatory, fiscal and legislative climate change policy by 2012. South Africa has recently committed to the Copenhagen Accord and has set an internal emissions reduction target to reduce the country's current emissions baseline by 34 percent by 2020 and 42 percent by 2025 (Mundy 2009). At international level, governments are defining their levels of reduction and the Intergovernmental Panel on Climate Change (IPCC) continues to launch new reports outlining deterioration in climatic conditions.

A rise of 2^{o}C in global temperatures, the point considered to be the threshold for catastrophic climate change which will expose millions of people to drought, hunger and flooding, is now considered "very unlikely to be avoided" (IPCC 4th Assessment Report 2007). Coupled with the physical impact of climate change is the additional financial driver of ever increasing energy and water costs, waste costs through landfill tax charges and the increasing cost of fuel.

To minimise NMMU's exposure to climate change related risks, the University should be proactive and develop a comprehensive environmental management system that comprises a detailed climate change strategy and carbon management plan. Moreover, NMMU has the opportunity to support a sustainable society by incorporating environmental principles into their qualifications and conducting 'green' research. In the process students will develop the knowledge, skills and values that society needs for real progress towards a low carbon economy of the future.

In light of the above, the researchers set out to:

- determine the perceptions of a representative sample of staff and students on environmental management at NMMU, incentives for 'going green', 'green' education and research at NMMU and 'green' practices whilst on campus.
- investigate significant differences in the perceptions of NMMU students on these topics based on gender, the faculty in which the student is registered, level of study (undergraduate or postgraduate), campus where the student is studying and whether the student is living off campus or in a University residence / student village.
- determine significant differences in the perceptions of NMMU staff on these topics based on gender, age, level of education, job description (administrative or academic) and the campus where the staff member is working.
- investigate significant differences in the perceptions of staff and students on environmental management at NMMU, incentives for 'going green', 'green' education and research at NMMU and 'green' practices whilst on campus.
- To provide recommendations to the NMMU Council on the process and the framework whereby NMMU can 'go green'.

A total of 326 students and 252 staff members participated in an online survey in August 2009. The main conclusions of the study are as follows:

- Staff and students perceived the conservation of the natural environment as very important and clearly recognised their impact on the natural environment. Staff showed more respect for animal life and attached more value to maintaining animal biodiversity on campus than students did.
- Both groups wanted NMMU to become a leader in environmental management among South African universities.
- More staff members were convinced that 'greening' initiatives would save the University money, while more students were actively encouraging their peers to engage in 'green' activities.
- The vast majority of staff and students were willing to engage in 'green' initiatives on campus. Many expressed their frustration about the lack of such initiatives, especially with regard to recycling and energy management.
- Both groups indicated that they would be motivated to become 'greener' in their outlook and activities if incentives were offered. Suggestions for incentives mainly centred on money, awards and competitions. Students were significantly more motivated by incentives for 'going green' than staff which raises some moral concerns.
- With regard to 'green education', staff and students viewed topics such as 'green' design and construction, environmental law, ecological ethics and 'green' IT as the most valuable to be incorporated into existing modules and to be developed into dedicated modules, particularly at undergraduate level. Compared to students, academics viewed the incorporation of topics dealing with environmental reporting (accounting), environmental economics and ecological ethics into existing modules as more valuable.
- Academics considered 'green' research to be conducted at NMMU of greater importance, while students were more willing to conduct research on environmental management topics, particularly if funding was offered to do so.
- At the time of the survey both groups tried to conserve water whilst on campus and some attempts at recycling were made. Staff members participated in more 'green' actions whilst on campus than students by for example printing on scrap paper and switching off lights and computers.
- Several concerns about poor energy management practices amongst students staying in University residences / student villages came to light in this research.

In terms of **'green' education** at NMMU the following recommendations are made:

- A link should be placed on the 'carbon footprint webpage' of the NMMU intranet outlining the details of environmentally-orientated modules that are currently offered at the University. The existence of these modules suggests that a great deal of expertise is already available within NMMU and that better communication and collaboration are needed to create awareness of 'green' issues. Information sharing will also lead to improved interdisciplinary teaching and learning.
- Academics should integrate the following topics into existing modules (as far time and credit values allow): 'green' design and construction, environmental law, ecological ethics, 'green' IT, environmental journalism, environmental economics and environmental reporting (accounting).
- An investigation should be undertaken into developing dedicated modules on the following four environmental management topics: 'green' design and construction, ecological ethics, environmental law and 'green' IT. This should best be done at programme level to avoid duplication.
- An investigation should be undertaken into developing a specialised undergraduate qualification in environmental management. Given that a number of modules dealing with environmental management are already offered at NMMU, close cooperation at faculty

level is required. Particular attention should also be given to the needs of private practice as well as competitive qualifications offered at other South African universities.
- Responsibility should be assigned to a particular academic or support department within NMMU to develop workshops and training sessions on various 'green' topics. This department should also be responsible for inviting knowledgeable guest speakers in the field of environmental management.

Regarding **'green' research** at NMMU, the following recommendations are made:
- A link should be placed on the 'carbon footprint webpage' of the NMMU intranet, highlighting details of 'green' research projects undertaken at the University. This 'database' will showcase interesting projects and allow for information sharing across faculties and campuses.
- A link should also be placed on the 'carbon footprint webpage' of the NMMU intranet containing details of research grants and bursaries in the area of environmental management.
- The development of a 'green' researcher of the year award should be discussed at the faculty and NMMU Research, Technology and Innovation (RTI) committees.

As NMMU funds are increasingly being allocated to research projects that are in line with faculty and NMMU 'research themes', researchers are encouraged to familiarise themselves with these themes when applying for funding internally.

With regard to **'green' engagement** with stakeholders it is recommended that NMMU staff investigate opportunities to conduct research and present 'green' awareness campaigns in communities surrounding NMMU campuses.

To be an effective change agent, NMMU has to get its own house (i.e. **internal operations**) in order first. To do so it is recommended that NMMU develop a comprehensive environmental management system (EMS). The EMS, which requires top management's full commitment, should consist of a climate change strategy and carbon management plan. The purpose of a climate change strategy will be to guide managers in formulating an effective response to the challenges posed by climate change and to align the University with Government's objectives to reduce South Africa's greenhouse gas emissions significantly within the next decade. Developing a tailored climate change strategy in conjunction with specialist consultants will allow NMMU to:
- Assess and manage the physical risk of climate change to NMMU.
- Develop academic/private/government partnerships that help demonstrate NMMU's environmental commitment.
- Develop and articulate a clear position and objectives related to climate change.
- Respond to changing staff, student and stakeholder attitudes and demand patterns, higher or fluctuating prices of inputs such as energy and water as well as actions by other local universities.
- Respond to changing stakeholder and community priorities in relation to climate change, by developing stakeholders' understanding of climate change and the impact thereof. This would serve the public good and allow NMMU to place its climate change initiatives in a favourable light.
- Generate revenue by exploring opportunities to grow revenue streams through 'green' qualifications, modules and short courses, whilst offering 'green'-related products/services to public and private enterprises.

- Create new opportunities for sponsorships and academic/private partnering through 'green'-related research and consulting.
- Improving market opportunity by building capacity to succeed in a low carbon economy, firstly by attracting students, and thereafter preparing them appropriately through 'green'-orientated module content.

Creating a tailor-made carbon management plan will provide a framework that NMMU can apply to maximise environmental outcomes and drive business benefit in relation to energy and greenhouse management as well as waste reduction. NMMU's carbon management plan could be applied to decision making processes having regard to the specific economic, technological and social considerations of each situation. Other benefits of developing a carbon management plan will include:

- Managing the University's carbon emissions footprint.
- Implementing energy efficiency and emission reduction opportunities.
- Reducing input costs by driving energy, water and efficient materials consumption.
- Reducing business risk by reducing exposure to increasing energy costs, possible future carbon prices and future regulation.
- Developing greenhouse gas indicators to measure and track performance over time.
- Developing systems to capture greenhouse gas data.
- Setting targets to drive improvement in indicators to ensure continual improvement.
- Preparing for impending carbon related legislation.
- Displaying environmental leadership and enhancing the Universities reputation.
- Generating revenue through the development of carbon projects within NMMU's asset portfolio or on NMMU property.

In developing the university-wide environmental management system, attention should be given to recommendations of Fabricius and Du Preez (2009) as well as the recommendations of staff and students who participated in this survey.

Finally, responsibility should be assigned to a particular academic or support department within NMMU to develop a 'green' employee of the year award and facilitate 'green' competitions between faculties, departments and residences. This department should also be responsible for creating greater awareness of 'green' initiatives, infrastructure and programmes at the University.

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1 BACKGROUND TO THE RESEARCH

In this section more details will be provided on the climate change challenge, the business implications of climate change, the rationale for NMMU to 'go green' as well as 'green' initiatives that have already been undertaken by NMMU staff and students.

1.1 The climate change challenge

Climate change is the greatest challenge humanity has ever faced. The scientific consensus, reflected by recent reports from the Intergovernmental Panel on Climate Change (IPCC) is that the earth's climate is warming and that greenhouse gas emissions from human activity are responsible for most of the increase in global average temperature (IPCC 4th Assessment Report 2007).

In its latest assessment report (2007) that the IPCC specifically notes that:

- The present atmospheric CO_2 concentration of 379 parts per million (ppm) is about 35 percent higher than pre-industrial levels (280 ppm) and greatly exceeds the natural range over the last 650 000 years.
- This increase in atmospheric CO_2 concentration since pre-industrial times is primarily due to changes in human fossil fuel and land usage.
- Global average surface temperature has increased by 0.74ºC over the last 100 years, and the rate of temperature increase in the Arctic is almost twice the global average.
- All but one of the last 12 years has fallen among the 12 warmest years in recorded history.
- Global average surface temperature is projected to increase with 1.1ºC to 6.4ºC from 1980 to 2099.
- Sea level rose 0.17 meters during the 20th century and could rise by 0.59m by end of this century.

The impact of this increase in global surface temperature can be observed in increases in extreme weather conditions, altered precipitation patterns, sea level rise, reduced snow cover and shrinking sea ice. These consequences can in turn threaten the survival of millions of plant and animal species, threaten food and water security and create an increased potential for conflict due to resource scarcity. However, the IPCC only published peer-reviewed science up until June 2006 in its assessments. In the years since then, a significant body of new peer-reviewed science has been published that shows the assumptions made within the 2007 IPCC report are conservative. Some new key findings are:

- Ocean acidification severely threatens marine ecosystems and fisheries and may render most regions "chemically inhospitable to coral reefs" by 2050 (UNESCO 2008).
- New estimates of average global sea level rise by 2100 are significantly larger than in the 2007 IPCC report, with recent studies that include the ice contribution to future sea level rise showing an increase of 0.5 to 2.0 meters (Pfeffer, Harper & O'Neel 2008:321; Rahmstorf 2007:368).
- Antarctic ice shelves are collapsing more rapidly than expected (Ice Bridge Supporting Wilkins Ice Shelf Collapses 2009).
- Arctic sea ice is melting more rapidly than projected, with recent studies indicating that the Arctic will probably be free of summer ice sometime between 2030 and 2080 (Boé, Hall & Qu 2009:341; Wang & Overland 2009).
- The impact of climate change may persist for more than 1 000 years, even after human-induced emissions of CO_2 stop completely, indicating that warmer temperatures and

changes in precipitation caused by CO_2 emissions from human activity are largely irreversible (Eby, Zickfeld, Montenegro, Archer, Meissner & Weaver 2009:2501; Matthews & Caldeira 2008).

- Unmitigated CO_2 emissions will likely generate greater warming than previously estimated, with a temperature of 5-7^{o}C by 2100 if countries remain on their current emissions paths (World Energy Outlook 2008; Romm 2008).

The majority of the new scientific insights highlighted above are based entirely or partially on *direct* observations of climate change. In summary, observed climate change is proceeding at a more rapid pace than anticipated by previous estimates or model projections. Leading scientists worldwide call for an immediate and dramatic reduction in emissions by 2020 in order to limit the effects of climate change. A rise of 2^{o}C in global temperatures, the point considered to be the threshold for catastrophic climate change which will expose millions to drought, hunger and flooding, is now "very unlikely to be avoided" (IPCC 4th Assessment Report 2007).

Direct implications for South Africa include temperature rises above the global average; a 30 percent drying over the central and western parts of the country, greatly affecting agriculture and water security, an increase in flooding in the eastern part of the country, sea level rise affecting coastal cities and ports and an increase in storms.

1.2 Business implications of climate change

According to a 2008 KPMG study on how climate change will affect businesses, it was concluded that there was an almost universal 'under perception' of risk regarding climate change (How climate changes your business 2008). The business implications of climate change refer to the physical, regulatory, reputational and market risk drivers that will result as a consequence of the changing climate. Organisations will need to respond to these through a series of mitigation and adaptation responses that will require specific internal capabilities surrounding management and disclosure.

According to the Stern Review (2006) on the economics of climate change, the "consequences of ignoring climate change will be very much bigger than the consequences of ignoring risks in the financial system." Responding to climate change will not only facilitate risk mitigation associated with energy and carbon, but will create opportunities for cost savings, new product/service development, carbon project development and enhanced reputational value.

Businesses can respond to climate change challenges by designing and implementing an environmental management system (EMS). An EMS can be defined as a formalised, co-ordinated process or structure which assists organisations in addressing their environmental effects by way of policy development and implementation, allocation of responsibilities and resources, and the continual improvement of practices and performance based on monitoring and evaluation (Spellerberg, Buchan & Englefield 2004). The steps / components of an EMS consist of environmental policy development, environmental planning activities, implementation and operation of the system, checking and correction actions and finally a management review (Al Sharif 2009; Price 2005; Noeke 2000; Krut & Gleckman 1998; Sadgrove 1997).

There are numerous benefits associated with implementing an EMS. Sadgrove (1997:123) for example states that an EMS not only reduces an organisation's environmental risk (e.g. by reducing the risk of uncontrolled emissions), but also illustrates its compliance with relevant legislation. The effective implementation of an EMS also contributes to continuous improvement, cost reduction efforts and demonstrates an organisation's environmental integrity to its external stakeholders (Rowland-Jones, Pryde & Cresser 2005). The implementation of an EMS can thus go a long way in satisfying customers' requirements and improve the organisation's public image (Sammalisto & Arvidsson 2005). Darnall, Jolley and Handfield (2006) reiterate some of these benefits by stating that "organisations that adopt EMSs, regardless of their form, can benefit from improving their regulatory compliance, which in turn can enhance their corporate image and increase profits."

With regard to employee commitment, Millet (2005) and Noeke (2000) found that the implementation of an EMS generally has a positive effect. According to Millet (2005) staff members are often the initiators of environmental practices, and having their voices heard boosts morale and productivity. Millet (2005) argues that employees feel they are part of the organisation and that they have a hand in what happens to it.

1.3 Rationale for NMMU to 'go green'

The importance of climate change performance is expected to rise further and extend to an increasing number of sectors. What is relevant to NMMU is that it is positioned to establish a competitive advantage for students relative to their peers in the low carbon economy of the future. NMMU has the opportunity to support a sustainable society by incorporating sustainability principles and climate change into its qualifications, thereby enabling students to develop the knowledge, skills and values that society will need for real progress towards sustainability; by generating and transferring related knowledge through its research.

In recent years there has been an increasing trend internationally for universities to 'go green'. Harvard, Yale, Princeton and Stanford all have well established and successful 'greening' initiatives (Princeton Review Green Rating Guide for Colleges 2009). For example, the Harvard Green Campus Initiative began in 2000 with a one-year grant, and has grown into a $1.1 million business saving Harvard more than $5 million and more than 18 000 tons of greenhouse gas emissions a year (Harvard Green Campus 2009). Locally, the University of Cape Town became the first South African university to develop a 'green' policy framework in 2009 to drive its climate change response (UCT Green Campus 2009). Rhodes University also has quite a comprehensive environmental policy (Personal communication Hazel 2009).

Prospective students are increasingly looking to attend universities that have environmental sustainability strategies in place, with modules geared towards the low carbon economy of the future. In a 2009 Princeton Review of 12 715 college students, 68 percent of the students surveyed admitted that their final decision on a college might very well be influenced by the overall *environmental score* of the university.

Spellerberg *et al.* (2004) further highlight a number of operational and compliance benefits unique to the implementation of EMSs at higher education institutions. The most important benefits are that an EMS can assist decision makers to set and meet environmental objectives, facilitate co-ordination within the institution, assist with compliance at national and international level and improve continuity in environmental management if changes in key

staff occur. In addition to environmental performance and compliance improvements, most of the Swedish universities participating in a study by Sammalisto and Arvidsson (2005) reported that the implementation of an EMS at their universities led to improvements in management efficiency, operational efficiency (such as energy and water consumption, material usage and waste reduction) and reduced liability.

Noeke (2000) also claims that certified EMS provide complete transparency at universities in that responsibilities are clearly communicated throughout the organisation. Improved transparency will reduce the risk of penalties and punishments and foster good relations with authorities and other stakeholders. Finally, Arvidsson (2004) states that environmental programmes entrenched in a university's EMS can serve as an important marketing tool.

Research by Arvidsson (2004) conducted among 25 Swedish universities revealed a number of driving forces behind the implementation of EMSs at universities. These included employee commitment (11), student commitment (6), governmental directives (6), management commitment (5) and legislation (5).[1]

As will be shown in this report, NMMU staff and students are already committed to the idea of NMMU 'going green', but many are frustrated by the lack of 'green' initiatives on campus. This is evident from some of the *verbatim* responses shown below:

"It's not that hard. Lets stop talking...and actually start doing!"

"A proper recycling programme at Saasveld is long overdue. Further, a lack of monkey proof bins is shocking, as they are vital to ensure that animals don't become a problem and may stay `wild`; in the same way rubbish is prevented from being blown out of the bin by strong winds and strewn all over campus. Also electricity saving practices are not in place and too often I find all computers switched on in an empty computer lab. It is important we don't just talk about 'green practice'!"

"Thumbs UP for this great idea, should've been done a long time ago. All students and NMMU staff should take responsibility for creating and maintaining a green campus, and earth. HEAL THE WORLD!!!!!! MAKE IT A BETTER PLACE, FOR YOU AND FOR ME AND THE ENTIRE HUMAN RACE AND ALL OTHER ORGANISMS DEPENDANT ON OUR ECO-SYSTEM."

"Not enough effort is being made, period."

"It is GREAT that the NMMU is finally beginning to think about greening - we have a lot to catch up on!"

These and other positive comments by NMMU staff and students should serve as a powerful driver for NMMU's top management to consider the design and implementation of an EMS.

Increased environmental legislation in future will also necessitate a more coherent response from NMMU (Personal communication, Newton 2010).

Top management needs to realise that NMMU is facing the impact of a changing climate and the effect thereof on the national and international economy. The University is thus exposed, just as every other organisation and company, to the physical, regulatory, reputational and

[1] The numbers in brackets indicate the number of universities that reported the specific driving force.

market related risks that accompany a warming world. Developing an EMS which consists of a comprehensive climate change strategy and carbon management plan will however allow NMMU to minimise its exposure to these risks. The EMS will also drive positive environmental outcomes, generate business value and align internal practices with international best practice.

To be an effective change agent, NMMU has to get its own house in order first (Thomas 2009:25; Cortese 2003:15). Mahatma Gandhi said it best: "be the change that you want to see in the world".

1.4 'Green' initiatives at NMMU

In recent years NMMU staff and students have increasingly become aware of the need to 'go green' as well as the benefits associated with doing so. This is evident from a growing number of efforts by staff to improve environmental management across campuses and faculties.

1.4.1 Establishing a private nature reserve

One of the first initiatives at 'greening' the University was declaring the erstwhile UPE (now Summerstrand South campus) a private nature reserve in 1983. Internationally recognised environmentalist and researcher, Prof Graham Kerley was instrumental in this regard. In 1995, the Grysbok Environmental Education Trail on the Summerstrand South campus was designed to act as an environmental education and recreational resource for the University and the broader community. More details on this trail are available on the NMMU website.

1.4.2 'Green' education

A review of the 2009 faculty prospectuses revealed that 20 modules containing the word 'environmental' in the title were offered at NMMU in 2009. These are indicated in Table 1.

Table 1: NMMU modules containing the word 'environmental' in the title

Faculty	Modules
Science	Environmental planning I (GEN1110) Environmental pollution – Waste and water II (GWW2110) Environmental pollution – Air and noise III (GAN3110) Society and environment (GEN212) Environmental resource management (GEN313) Human environmental interaction (GEN401) Environmental impact studies (GEN402) Environmental management (BOT440) Environmental management III (FEM3110) (George campus) Environmental studies (GEN312) Environmental management (MEA5120)
Engineering, the built environment and information technology	Environmental management for engineers (Theory) (CEEM4A1/2) Environmental engineering 4 (EEN4112) Environmental management (KEM510) Building science (Environmental services 1A) (KES111)
Business and economic sciences	Health, safety and environmental management (EHS201) Environmental economics (ECO400)
Law	Environmental law (JJN441)
Arts	Social and environmental issues (SSS201)
Education	Health and environment (PFSH203)

As could be expected, most of these modules were offered in the faculty of Science. A review of these syllabi (which are all contained in Appendix A) suggests that there is a great deal of expertise available at NMMU.

1.4.3 'Green' research

In 1996, Fullard, Gilbert, Lahav and O'Brien conducted research on the attitudes and opinions of students and staff toward the campus environment of erstwhile UPE. This research focussed on the built as well as the natural environment and used a questionnaire to obtain necessary data. More than 90 percent of respondents in this 1996 study suggested that UPE should embark on an environmental awareness campaign and make use of recycling bins. As will be shown in this report, the same problems persist 14 years later.

In 2009, Marketing and Corporate Relations launched a 'carbon footprint webpage' on the NMMU intranet. The website provides visitors with a platform to air their views on environmental issues and also provides staff and students with meaningful information on becoming more environmentally conscious. It also attempts to educate visitors on climate change and to inform them on what NMMU is doing to address this issue. In 2009, a discussion document developed by Profs Fabricius and Du Preez entitled "Towards integrated sustainable energy management at NMMU" was also circulated to staff via the 'carbon footprint webpage'. This paper highlighted the importance of energy management on campus to enable NMMU to meet its responsibility and commitment to reducing CO_2 emissions, increase energy efficiency, energy conservation and increased renewable energy supply. This document also included a number of recommendations to improve energy management at NMMU.

In terms of 'green' research undertaken by students, NMMU can be quite proud of Muedanyi Ramantswana, a third year forestry student, who in 2009 won a chance to attend an international forestry symposium for his paper focusing on the effects of climate change on forestry. The paper also contained innovative strategies to reduce the damage caused by the changing climate.

Internationally recognised research is being conducted by researchers in the Science faculty. Areas include the restoration of spekboomveld by Prof Richard Cowling and his colleagues and the opportunity this presents to local farmers to enter the international carbon market; the rehabilitation of degraded soil in the former Ciskei region; and the application of natural fibre-based materials for use in eco-friendly aircrafts (in collaboration with Airbus). Excellent research is also being conducted by the Centre for Energy Research (CER) in the fields of photovoltaics (PV), energy storage and materials characterisation and energy forecasting and modelling.

1.4.4 'Green' events

Another good example of a 'green' initiative undertaken by NMMU staff members includes calculating and offsetting the carbon footprint created by a conference hosted by the Department of Business Management in 2009. This initiative called for close cooperation between the conference organisers and Cleaner Climate, a carbon solutions firm (for more details see http://www.cleanerclimate.com). More details on the carbon offsetting project are contained in Appendix B.

In 2009, Dr Anton de Wit of the Geosciences Department at NMMU assisted in extending the SJM Flex Award for Excellence in Environmental Management (initially only available to companies with an ISO14001 accredited EMS) to smaller companies without such a certification. Smaller companies' efforts in 'greening' their processes can now also be monitored and rewarded.

1.4.5 'Green' buildings

The construction of a 'green' library on Missionvale campus is a praiseworthy initiative. When completed, this library will be one of the first buildings in South Africa to use new environmentally friendly technology such as a lighting system that makes use of sensors to control lighting levels inside the building. The new library will also be equipped with carbon dioxide sensors in the ventilation system to ensure energy efficiency. For more details on these projects see the documentation attached in Appendix C.

As indicated in Appendix C, the Summerstrand South campus library is also being upgraded to make it a more environmentally friendly building. The ventilation and lighting of this library building is reported to be 35 years old. As with the new library building at the Missionvale campus, the Summerstrand South campus library will be fitted with groundbreaking lighting and ventilation technology costing R27 million. 'Green' building efforts also extend to the construction of a 'green' Business School on Second Avenue campus.

1.4.6 'Green' activities

A number of 'greening' activities have also been undertaken at the Oceana Residence in 2009. Students have been educated about environmental issues by means of informative talks as well as emails and posters. Custodial and security staff members have also been encouraged to switch off lights where possible. One staff member mentioned that "*it has been a fun exercise for everyone*".

In 2009, members of the NMMU Staff Association also contributed to a 'greener' campus by planting trees alongside the new link road between the Summerstradn North and South campusses.

1.4.7 Creating a 'green' focus group

A step in the right direction, as far as environmental management at NMMU is concerned, related to the launch of the South East African Climate Consortium (SEACC). NMMU is one of the founding members of SEACC that aims to provide an academic component of a nexus between academia, government and business to deal with issues of climate change, mitigation and adaption. SEACC will officially be launched on the 9th of March 2010 at Rhodes University (another founding member of the organisation). Thereafter, on the 10th of March 2010, a conference will be hosted at NMMU which will bring together various stakeholders from academia, business and government to discuss possible contributions SEACC can make (Details on SEACC are contained in Appendix D).

In light of developing Vision 2020, several references were made to sustainability in the strategic plan of George campus. This document mentions the George campus' commitment to the natural environment through the integration of sustainability principles into academic

programmes, curricula, student development, campus infrastructure as well as community engagement. This campus' vision also includes the creation of a Sustainability Research Unit and the planning and development of infrastructure to minimise the ecological impact or footprint. Furthermore, a 'Blueprint for a Sustainable Campus' has been initiated and will be developed over the next six to eight months, and funding proposals have been compiled and submitted. The 'Sustainable Campus Initiative' is aimed to form part of undergraduate curricula and research projects on campus, and aspires to be an integral part of the campus' marketing identity and strategy.

The importance of and philosophy behind 'going green' was further discussed at a 'Tuesday seminar' held in 2009. This seminar was arranged by Prof. Bert Olivier and Dr. Andrea Hurst from the Department of Journalism, Media and Philosophy and Mr. Anton Botha from the Department of Industrial and Organisational Psychology.

In summary, although these 'greening' efforts are praiseworthy in their own right, a more systematic approach to environmental management in education, research, engagement and the internal operations of the NMMU is required.

2 OBJECTIVES OF THIS RESEARCH

In light of the above, the researchers set out to:

- determine the perceptions of a representative sample of staff and students on environmental management at NMMU, incentives for 'going green', 'green' education and research at NMMU and 'green' practices whilst on campus.
- investigate significant differences in the perceptions of NMMU students on these topics based on gender, the faculty in which the student is registered, level of study (undergraduate vs postgraduate), campus where the student is studying and whether the student is living off campus or in a University residence / student village.
- determine significant differences in the perceptions of NMMU staff on these topics based on gender, age, highest level of education, job description (administrative vs academic) and campus where the staff member is working.
- investigate significant differences in the perceptions of staff and students on environmental management at NMMU, incentives for 'going green', 'green' education and research at NMMU and 'green' practices whilst on campus.
- To provide recommendations to the NMMU Council on the process and the framework whereby NMMU can 'go green'.

3 RESEARCH DESIGN AND METHODOLOGY

Two survey questionnaires (one for students and one for staff) were developed based on an extensive literature review as well as personal interviews which were conducted with stakeholders at Rhodes University and NMMU. Rhodes University already has a well established EMS and is one of five South African universities that have signed the Talloires Declaration. The other universities are the University of Cape Town, the University of KwaZulu-Natal, the University of the Western Cape and the University of Witwatersrand (University Leaders for a Sustainable Future 2008). The Talloires Declaration is a ten-point action plan for incorporating sustainability and environmental literacy in teaching, research, operations and outreach at colleges and universities across the globe (Price 2005). Signatories are specifically encouraged to combine efforts in sustainable education (Wright 2002; Shriberg & Tallent 2010).

Ethics approval for this study was obtained from the RTI committee of the Faculty of Business and Economic Sciences. The questionnaires were then placed on the NMMU intranet on the 20th of August 2009 for completion by students and staff across all campuses. Statistics were calculated by Dr Jacques Pietersen of the Unit for Statistical Consultation in January 2010.

4 SAMPLE DESCRIPTION

In total 326 students and 252 staff members participated in the study. Tables 2 and 3 provide more details on the biographical descriptors of the two samples.

Table 2: Sample description – students

	Frequency (N)	Percentage (%)
Gender		
Male	147	45.9
Female	179	54.1
Total	**326**	**100.0**
Age		
18 – 21 years	176	54.0
22 – 30 years	129	39.6
31 – 40 years	18	5.5
Older than 40 years	3	0.9
Total	**326**	**100.0**
Faculty		
Arts	51	15.6
Business and Economic Sciences	99	30.4
Education	13	4.0
Engineering, the Built Environment and Information Technology	52	16.0
Health Sciences	29	8.9
Law	10	3.1
Science	72	22.1
Total	**326**	**100.0**
Level of study		
Undergraduate	259	79.4
Postgraduate	67	20.6
Total	**326**	**100.0**
Campus where the student is studying		
Summerstrand South	200	61.3
Summerstrand North	58	17.8
Missionvale	14	4.3
Second Avenue	25	7.7
Bird Street	0	0.0
George	29	8.9
Total	**326**	**100.0**
Residence		
Students staying in a University residence / student village	76	23.3
Students staying off campus	250	76.7
Total	**326**	**100.0**

As shown in Table 2, slightly more than half or the students participating in the survey (54.1%) were female. Most of the students that responded to the survey (54.0%) were between 18 and 21 years of age.

The majority of students were either registered in the faculty of Business and Economic Sciences (30.4%) or the faculty of Science (22.1%). The large response from students registered in the Business and Economic Sciences faculty is not surprising considering that the majority of students enrolled at NMMU (29.5%) are registered in this faculty (NMMU Student Profile 2009). It should however be noted that less than six percent of the total NMMU student population is registered in the Sciences faculty (NMMU Student Profile 2009). The relatively large number of student response from the Science faculty can however be attributed to their inherent interest in all issues relating to the natural environment.

Table 3: Sample description – staff

	Frequency (N)	Percentage (%)
Gender		
Male	106	42.1
Female	146	57.9
Total	**252**	**100.0**
Age		
18 – 21 years	1	0.4
22 – 30 years	40	15.9
31 – 40 years	60	23.8
Older than 40 years	151	59.9
Total	**252**	**100.0**
Highest level of education		
Matric/Grade 12	28	11.1
National diploma	37	14.7
Degree	28	11.1
Postgraduate degree	159	63.1
Total	**252**	**100.0**
Job description		
Academic	126	50.00
Administrative	126	50.00
Total	**252**	**100.00**
Faculty (Only relevant to academics)		
Arts	20	15.9
Business and Economic Sciences	26	20.6
Education	9	7.1
Engineering, the Built Environment and Information Technology	15	11.9
Health Sciences	15	11.9
Law	2	1.6
Science	39	31.0
Total	**126**	**100.0**

Table 3 (cont.): Sample description – staff

Campus where the staff member is working		
	Frequency (N)	**Percentage (%)**
Summerstrand South	136	54.0
Summerstrand North	67	26.6
Missionvale	18	7.1
Second Avenue	11	4.4
Bird Street	7	2.8
George	13	5.2
Total	**252**	**100.0**

As indicated in Table 3, more female staff members participated in the survey (57.9%) and the majority of respondents (59.9%) were older than forty years. There was an equal split between academic and administrative staff which included, amongst others, staff from the various faculty offices, library, technical services, marketing and corporate relations and horticultural services. The majority of academics who responded to the survey were employed in either the Science or Business and Economic Sciences faculties. More than half of the respondents worked at the Summerstrand South campus (54.0%) and most held a postgraduate degree (63.1%). Data from the NMMU Staffing Profile (2009) suggest that this sample is a fairly good representation of the staff population at NMMU in that most staff employed at the University in 2009 were females and based at the Summerstrand South campus.

The preceding section provided a description of the student and staff samples surveyed in this research. The section to follow will explore the perceptions of NMMU students on various topics pertaining to 'greening' the University.

5. PERCEPTIONS OF NMMU STUDENTS ON 'GREENING' THE UNIVERSITY

5.1 Environmental management at NMMU

In this section students' perceptions were gauged on environmental management at NMMU. Questions were phrased on a 5-point Lickert scale with (1) representing strongly disagree and (5) representing strongly agree. For the purpose of this research *environmental management* was defined as "…the actions of individuals, businesses and governments to protect the quality and continuity of life through the conservation of natural resources and the prevention of pollution".

Tables 4 and 5 summarise the most significant findings in this regard. Statements are ranked from the highest to the lowest mean score[2].

[2] The following categorisation was used to the rank mean scores

- Mean scores ranging from 1.0 – 1.8: Very low importance
- Mean scores ranging from 1.8 – 2.6: Low importance
- Mean scores ranging from 2.6 – 3.4: Neutral
- Mean scores ranging from 3.4 – 4.2: High importance
- Mean scores ranging from 4.2 – 5.0: Very high importance

Table 4: Environmental management at NMMU – student perceptions

Statements	Valid N	Mean	Std.Dev.	% Agreed	% Strongly Agreed
Q2_14: I respect all plant life on the campus where I study.	321	4.5	0.7	24.9	64.0
Q2_1: The protection of the natural environment on the NMMU campus where I study is important to me.	325	4.4	0.8	22.4	65.4
Q2_5: It is important to me that NMMU becomes a leader in the field of good environmental management among organisations in South Africa.	325	4.4	0.7	24.9	63.8
Q2_4: It is important to me that NMMU becomes a leader in the field of good environmental management among South African universities.	324	4.4	0.8	23.4	63.9
Q2_15: I respect all animal life on the campus where I study.	325	4.3	0.9	23.6	60.9
Q2_12: It is important to me that NMMU maintains plant biodiversity on the campus where I study. (For the purpose of this study biodiversity referred to the number and variety of organisms found within a specified geographic region)	325	4.2	1.0	25.8	53.8
Q2_13: It is important to me that NMMU maintains animal biodiversity on the campus where I study.	323	4.1	1.0	25.3	50.1
Q2_2: I have an impact on the natural environment on the NMMU campus where I study.	326	3.9	1.1	27.6	41.2
Q2_8: Engaging in 'green' initiatives at the University will not be too much effort for me.	325	3.8	1.0	34.7	32.6
Q2_10: I am interested in joining a student society/programme that is involved in protecting the natural environment.	321	3.7	1.2	24.9	37.3
Q2_11: I promote good environmental management principles among my fellow students.	321	3.6	1.0	32.0	26.4
Q2_7: 'Greening' NMMU will save the University money.	322	3.6	1.1	22.6	29.1
Q2_6: 'Greening' NMMU will not be too expensive.	324	3.5	1.0	26.2	20.9
Q2_3: I have become more aware of my impact on the natural environment on the NMMU campus where I study within the past 12 months.	325	3.3	1.2	19.6	23.6

From Table 4 it can be deduced that the conservation of the natural environment at the various NMMU campuses is very important to students as many of the statements in this section of the questionnaire had 'high' mean scores (in excess of 3.4). The majority of students indicated that they respect plant life (89.3%) and animal life (84.6%) on the NMMU campus where they study. Their positive attitude to the natural environment is reaffirmed by their responses to statements dealing with the protection of the natural environment and maintaining plant and animal biodiversity on campus (Q2_1, Q2_12 and Q2_13 - all of which had 'high' mean scores in excess of 3.4). With regard to these three statements 88.0 percent, 79.7 percent and 75.5 percent of students either 'agreed' or 'strongly agreed' implying that protecting the natural environment and maintaining animal and plant biodiversity on campus are important to them.

It is also very important to students that NMMU becomes a leader in the field of environmental management, not only among South African universities, but also among local organisations. Very high percentages of students (88.3% and 87.4% respectively) 'agreed' or 'strongly agreed' with these two statements (Q2_5 and Q2_4).

Students clearly recognised that they have an impact on the natural environment of the NMMU campus where they are studying (Q2_2). Slightly more than two thirds of students (68.9%) 'agreed' or 'strongly agreed' with this statement. Furthermore, 67.4 percent of students felt that participating in 'green' initiatives would not be too much effort for them. A similar result (62.3% of students indicating 'agree' or 'strongly agree') was observed in terms of Q2_10, which enquired about students' interest in being involved in a student society / programme geared toward conserving the natural environment. An interesting finding is that more than half of the students participating in this survey (58.6%) actively promoted environmental management principles among their peers (Q2_11 had a mean score of 3.698).

These are very positive findings and indicate that NMMU students are aware of their impact on the natural environment, willing to work towards reducing their footprint and also motivating their fellow students to do the same.

In terms of the students' perceptions on the financial impact of 'greening' the NMMU, statistics show that 51.86 percent thought that 'greening' initiatives will save the University money. Almost half of the students (47.2%) thought that it would not be too expensive for the University to implement environmentally friendly initiatives.

Of the 14 questions contained in Table 4, all but one (Q2_3) had a 'high' mean score above 3.4 indicating that students generally viewed environmental management at NMMU as an important issue.

Table 5 shows that very few of the students who responded to the survey (only 8.6%) were involved in programmes geared towards conservation of the natural environment on campus in 2009.

Table 5: Student participation in 'green' programmes at NMMU in 2009

Q2_9: I am currently involved in programmes at NMMU to conserve the natural environment.	**Frequency (N)**	**Percentage (%)**
Yes	28	8.6
No	298	91.4
Total	**326**	**100.0**

When students were asked to provide their views on 'greening' NMMU (in another section of the questionnaire), many indicated their willingness to participate in 'greening' initiatives should such opportunities become available.

5.2 Incentives for 'going green'

In this section the perceptions of NMMU students were gauged regarding incentives that would motivate them to become more environmentally sensitive in their daily activities. Table 6 summarises the most important findings in this regard.

Table 6: Incentives for 'going green' – student perceptions

Statements	Valid N	Mean	Std.Dev.	% Agreed	% Strongly Agreed
Q3_1: I would be more willing to engage in 'greening' actions at the University if incentives were offered.	324	3.8	1.1	29.0	37.3
Q3_5: Incentives like competitions between residences or faculties for 'green' status would encourage me to become 'greener' in my daily activities.	321	3.8	1.1	28.9	37.3
Q3_4: A 'green' award for any initiative to protect the natural environment on campus will motivate me to become 'greener' in my daily activities.	322	3.6	1.1	28.2	29.8
Q3_3: A 'green' researcher of the year award will serve as incentive for me to become more environmentally sensitive.	324	3.5	1.2	28.	26.8
Q3_2: A 'green' student of the year award will serve as incentive for me to become more environmentally sensitive.	324	3.5	1.2	25.6	29.9

As all the statements in Table 6 had 'high' mean scores above 3.4, it is clear that the suggested incentives could play a pivotal role in motivating students to become more environmentally friendly whilst on campus. Two thirds of students in this sample (66.4%) either 'agreed' or 'strongly agreed' with statement Q3_1 (I would be more willing to engage in 'greening' actions at the University if incentives were offered). Incentives such as competitions between residences or faculties for 'green' status were seen as particularly important in encouraging students to become 'greener' in their daily activities. The majority of students (55.56%) furthermore indicated that a recognition-based award such as a "'Green' student of the year award" would motivate them to become more environmentally sensitive.

An open-ended question was also posed in this section of the questionnaire requesting students to provide examples of incentives they felt would motivate them to become 'greener' individuals. Table 7 presents a summary of the suggestions made by 166 NMMU students (this represents 51 percent of students or one in every two students participating in the survey). The high response rate to this question is an indication of the interest that students have in 'greening' the University.

Table 7: Incentives that would motivate students to 'go green'

Type of incentive	Frequency (N)	Percentage (%)
Money / Prizes / Competitions	98	59.0
Awareness campaigns	25	15.1
Providing recycling infrastructure on campus	17	10.2
Total	**166**	**100.0**

Almost 60 percent of students completing this open-ended question indicated that competitions, prizes or money will motivate them to become more environmentally sensitive in their daily activities. Other popular suggestions were competitions for 'green' status among residences and faculties. Prizes that were suggested included money, bursaries, NMMU merchandise (such as T-shirts), vouchers that can be used at the cafeteria or to purchase books as well as certificates that can be included as part of their CVs.

The most prevalent incentives that were mentioned by students all related to money, suggesting that this is seen as a major driver for change. Some *verbatim* quotes from the students regarding incentives for 'going green' are indicated below.

> *"Cash prizes for the best residences that promote being greener"*
>
> *"Bring recycle goods to a point in exchange for cash"*
>
> *"Subsidising of fees, prize money"*
>
> *"Free education for the year"*
>
> *"Cash prizes, discounted Student fees, free food vouchers to use on campus or gym contacts at varsity"*

The fact that so many students suggested one or other form of monetary compensation for changing their behaviour raises a moral dilemma. Although it could be argued that students are always cash strapped and in search of means to supplement their income, it could also be argued that true behavioural change should come from a mindset shift and not as a result of financial incentives being offered.

In dealing with this moral dilemma, the researchers suggest that staff, and academics in particular, turn to the principles advocated by virtue ethicists. The Greek philosopher Aristotle was the first to debate the importance of virtues such as honesty, fairness, truthfulness and benevolence in motivating individuals to 'do good'. Virtue ethicists argue that individuals' actions should be based on "the pleasure of knowing that one is doing good and therefore living a good life" (Rossouw 2005:56). This can only be done through the cultivation of virtues. In the context of this study, academics are thus encouraged to instil and develop virtues such as respect for the natural environment in their students. This does not imply that no financial incentives should be offered. The researchers are merely suggesting that more should be done to cultivate 'green' virtues and a sense of moral obligation among NMMU students.

Environmentally literate and contentious students also have the potential to exert substantial influence in the corporate and civil spheres where they operate.

5.3 'Green' education at NMMU

This section of the questionnaire was aimed at obtaining the perceptions of students on 'greening' education at NMMU. Tables 8, 9 and 10 provide summaries of the most important findings on this topic.

Table 8: Enrolment in modules that included environmental management topics in 2009

Q4_1: I am currently enrolled for a module at NMMU that include(s) environmental management concepts (e.g. environmental economics, ecological ethics, green construction etc.).	**Frequency (N)**	**Percentage (%)**
Yes	62	19.0
No	264	81.0
Total	**326**	**100.0**

Of the 326 students who participated in the survey, less than a fifth (19%) were enrolled for at least one module that included environmental management topics in 2009. Students were asked to provide the codes of these modules (which are summarised in Table 8). As could be expected most of these modules were offered in the Science faculty.

Table 9: NMMU modules that included environmental management topics in 2009 – student responses

Modules	Number of student respondents enrolled for the module (N)	Percentage (%)
Environmental Health[(a)] / Environmental Science[(b)] / Environmental Geography[(c)] / Environmental Management[(c)] / Environmental Pollution[(d)] / Environmental Engineering[(d)] /	16	25.8
Botany / Zoology / Biology	10	16.1
Nature Conservation[(e)]	9	14.5
Business Management / Tourism	8	12.9
Architecture / Design	7	11.3
Building Science	6	9.7
Agricultural Management[(e)] / Forestry[(e)]	3	4.8
Communication Studies	1	1.6
Human Movement Science	1	1.6
Life Orientation	1	1.6
Total	**62**	**100.0**

(a) This is a full qualification (National Diploma: Environmental Health). Details on this qualification as well as the core syllabi of environmental pollution II and III as well as environmental planning I are presented in Appendix A.
(b) This is a full qualification (BSc: Environmental Sciences). Details on this qualification as well as the core syllabi of Society and environment as well as Environmental resource management are presented in Appendix A.
(c) This is a full qualification (BSc Hons: Environmental Geography) and consists of modules such as environmental impact studies as well as human environment interaction.
(d) The syllabus of this module is attached in Appendix A.
(e) A full range of qualifications, from National Diploma to DTech, is offered in Nature Conservation, Agricultural Management and Forestry at the George campus.

Recall from Table 1, that 20 modules were offered at NMMU in 2009 which had the word 'environment' as part of the title. It is encouraging to note that 'green' teaching and learning at NMMU is however not only restricted to these modules and that 'green' principles are also addressed in modules such as Business Management, Tourism, Human Movement Sciences and Life Orientation. The perceived value to students of incorporating selected environmental management topics into existing NMMU modules are indicated in Table 10.

Table 10: The perceived value of environmental management topics to be integrated into EXISTING modules – student perceptions

Statements	Valid N	Mean	Std. Dev.	% Valuable	% Extremely Valuable
Q4_9: It will be valuable if a topic such as 'green' design and construction can be incorporated into an EXISTING module.	316	3.9	1.1	23.4	43.3
Q4_8: It will be valuable if a topic such as environmental law can be incorporated into an EXISTING module.	316	3.9	1.1	28.1	38.6
Q4_7: It will be valuable if a topic such as 'Green' IT can be incorporated into an EXISTING module. ('Green' IT involves purchasing energy efficient IT equipment, reducing the amount of energy consumption in data centres, and on networks and servers, buying hardware that is made from environmentally friendly components and properly disposing of hardware)	323	3.8	1.2	24.4	40.8
Q4_6: It will be valuable if a topic such as ecological ethics can be incorporated into an EXISTING module.	322	3.7	1.1	25.7	34.
Q4_3: It will be valuable if a topic such as environmental journalism can be incorporated into an EXISTING module.	324	3.6	1.2	27.1	30.5
Q4_5: It will be valuable if a topic such as environmental economics can be incorporated into an EXISTING module.	318	3.6	1.2	26.4	30.1
Q4_4: It will be valuable if a topic such as environmental reporting (accounting) can be incorporated into an EXISTING module.	323	3.5	1.2	26.0	26.6

Table 11: The perceived value of environmental management topics to be offered as DEDICATED modules at NMMU – student perceptions

Statements	Valid N	Mean	Std. Dev.	% Valuable	% Extremely Valuable
Q4_16: It will be valuable if NMMU could offer a DEDICATED module in 'green' design and construction.	315	3.8	1.2	26.0	40.3
Q4_15: It will be valuable if NMMU could offer a DEDICATED module in environmental law.	308	3.6	1.3	21.7	36.0
Q4_13: It will be valuable if NMMU could offer a DEDICATED module in ecological ethics.	313	3.6	1.2	23.6	33.2
Q4_14: It will be valuable if NMMU could offer a DEDICATED module in 'Green' IT.	315	3.6	1.3	24.1	32.7
Q4_10: It will be valuable if NMMU could offer a DEDICATED module in environmental journalism.	311	3.6	1.2	24.1	30.
Q4_12: It will be valuable if NMMU could offer a DEDICATED module in environmental economics.	315	3.5	1.3	22.2	29.5
Q4_11: It will be valuable if NMMU could offer a DEDICATED module in environmental reporting (accounting).	314	3.4	1.2	21.6	25.1

Students felt that integrating all of the suggested 'green' topics into existing modules would be valuable (all statements had 'high' mean scores in excess of 3.4). Questions were also posed to students to determine the perceived value of developing dedicated modules on selected environmental management topics. A summary of their perception in this regard is shown in Table 11.

As in the case of Table 10, all the mean scores of statements in Table 11 were in excess of 3.4 indicating that students viewed the development of dedicated modules on all of the selected environmental management topics as valuable. Topics dealing with 'green' design and construction and environmental law were seen as the most valuable in both cases followed by 'Green' IT and ecological ethics.

The rankings of the other 'green' topics are shown in Table 12. Note that some of these topics are already integrated into existing NMMU modules (see Appendix A for examples of modules).

Table 12: Rankings of the perceived value of environmental management topics – student perceptions

Environmental management topics to be integrated into EXISTING modules	Environmental management topics to be developed into DEDICATED modules
1. 'Green' design and construction	1. 'Green' design and construction
2. Environmental law	2. Environmental law
3. 'Green' IT	3. Ecological ethics
4. Ecological ethics	4. 'Green' IT
5. Environmental journalism	5. Environmental journalism
6. Environmental economics	6. Environmental economics
7. Environmental reporting (accounting)	7. Environmental reporting (accounting)

Mr Riyaadh Lillah (one of the authors of this report) is also conducting further research on the topic of 'green' education at NMMU for his MCom dissertation. The study will focus on developing an environmental literacy module for business graduates. It will aim to better serve the needs of industry by equipping possible employees, in the form of business scholars, to meet the challenges of climate change in the workplace. Business schools have for long been viewed as fuelling the negative impacts of climate change by not addressing this issue in their curricula.

Students' perceptions on other pertinent issues relating to 'green' education at NMMU are indicated in Table 13.

Table 13: Other pertinent issues relating to 'green' education at NMMU – student perceptions

Statements	Valid N	Mean	Std. Dev.	% Agree	% Strongly agree
Q4_22: It is important that the Government makes financing available to NMMU for the development of environmental management modules.	316	4.0	1.1	23.4	47.1
Q4_23: It is important that the Government makes financing available to NMMU for the development of a full qualification in environmental management.	317	3.9	1.2	22.4	44.7
Q4_18: It will be valuable for NMMU to develop a specialised undergraduate qualification (degree/diploma) in environmental management that will address various elements of this topic (legal, financial, reporting, ISO accreditation etc.)	316	3.9	1.2	24.6	39.5
Q4_19: It will be valuable for NMMU to incorporate environmental management modules in POSTGRADUATE qualifications e.g. the MBA program.	318	3.8	1.2	24.8	28.6
Q4_17: A module in environmental management should be compulsory for all UNDERGRADUATE students at NMMU.	315	3.1	1.5	12.0	30.1
Q4_20: Lecturers at NMMU should include environmental management topics in all modules offered at UNDERGRADUATE level.	312	3.1	1.4	17.6	22.7
Q4_21: Lecturers at NMMU should include environmental management topics in all modules offered at POSTGRADUATE level.	317	3.2	1.4	18.9	23.0

The majority of students 'agreed' or 'strongly agreed' that the integration of environmental management topics into existing modules, particularly at undergraduate level will be valuable. Almost two thirds (64.2%) of students thought developing an entire qualification in environmental management would be 'valuable' or 'extremely valuable'. Students also felt strongly about the Government's role in funding the development of dedicated environmental management modules and even a full qualification in environmental management. Such a qualification could lead to new career opportunities for NMMU graduates and a niche market for NMMU as there are not many similar qualifications available at tertiary education institutions in South Africa (Personal communication Wright 2009).

Students were neutral (mean scores 2.6 – 3.4) on whether a module in environmental management should be compulsory at undergraduate level and whether environmental topics should be incorporated into all modules irrespective of whether the module is offered at postgraduate or undergraduate level.

5.4 'Green' research at NMMU

This section of the questionnaire dealt with the views of students regarding 'green' research at NMMU. Tables 14 and 15 summarise the most significant findings on this important topic.

Table 14: 'Green' research undertaken by NMMU students in the past 12 months

Q5_1: I have done research about an environmental management topic in an NMMU module(s) in the past 12 months.	**Frequency (N)**	**Percentage (%)**
Yes	76	23.3
No	250	76.7
Total	**326**	**100.0**

Table 14 indicates that less than a quarter of NMMU students (only 23.3%) have done research on an environmental management topic in the 12 months up to August 2009. This finding should however be read in conjunction with students' views expressed in Table 15.

Table 15: 'Green' research at NMMU – student perceptions

Statements	**Valid N**	**Mean**	**Std.Dev.**	**% Agree**	**% Strongly Agreed**
Q5_5: It is important to me that 'green' research is conducted at NMMU.	320	4.0	1.0	26.5	47.1
Q5_4: I would do research about environmental management if the opportunity was there to do so.	318	3.4	1.2	27.9	23.2
Q5_3: I would do research about environmental management if funding was available to do so.	320	3.4	1.3	25.6	24.0
Q5_2: I am interested in doing research about environmental management topics.	321	3.3	1.3	23.9	21.8

Table 15 clearly shows that NMMU students place a high value on 'green' research being conducted at NMMU and would be willing to conduct 'green' research if opportunities were available to do so. Almost 74 percent of the respondents 'agreed' or 'strongly agreed' to the statement "It is important to me that 'green' research is conducted at NMMU." Neutral scores (2.6 – 3.4) were however observed with regard to Q5_3 and Q5_2. It is positive that students would be willing to do 'green' research however it should be noted that this does not mean that students will necessarily do this research. Incentives might thus be necessary to stimulate greater interest among students to conduct research on environmental management topics in their respective fields.

5.5 'Green' practices at NMMU

The following section will shed light on the extent to which students performed certain 'green' practices whilst on campus at the time of the survey (August 2009). All students were requested to complete this section of the questionnaire.

In Table 16 the statements with the highest mean scores are those pertaining to water usage on campus (Q6_5 and Q6_6). Almost ninety percent (86.7%) of students closed taps properly after using them and 80.1 percent only opened taps minimally when using them. Students' behaviour with regard to water usage could be attributed to the awareness created by local municipalities (in Nelson Mandela Bay and George) of a looming water crisis and the implementation of strict water restrictions.

Table 16: 'Green' practices of NMMU students

Statements	Valid N	Mean	Std.Dev.	% Frequently	% Always
Q6_5: While on campus, do you close taps properly after using them?	315	4.7	0.8	6.3	86.6
Q6_6: While on campus, do you open taps only minimally when using them?	317	4.3	1.0	21.4	58.9
Q6_3: While on campus, do you keep doors closed between air conditioned and non-conditioned spaces?	315	3.9	1.2	24.3	46.0
Q6_13: While on campus, do you re-use the reverse side of previously used paper for scrap paper and drafts?	315	3.8	1.4	24.6	40.9
Q6_4: While on campus, do you turn off lights where possible?	319	3.6	1.4	18.0	37.6
Q6_8: While on campus, do you dispose hazardous waste properly (If you have access to any hazardous materials like chemicals)?	298	3.5	1.5	12.8	38.9
Q6_2: While on campus, do you optimise the use of sunlight to reduce the use of electricity?	320	3.3	1.4	15.9	29.0
Q6_7: While on campus, do you recycle paper in the bins provided on campus?	319	3.3	1.5	18.1	31.0
Q6_1: While on campus, do you switch off your computer when you are done using it?	320	2.8	1.7	9.6	29.6
Q6_9: While on campus, do you print and copy documents on both sides of a page?	317	2.5	1.5	11.6	14.8

Table 17: 'Green' practices of students staying in NMMU residences / student villages

Statements	Valid N	Mean	Std. Dev.	% Frequently	% Always
Q7_1: While at the residence / student village, do you leave the tap open while brushing your teeth?	73	4.0	1.4	8.22	60.3
Q7_2: While at the residence / student village, do you unplug electronic appliances you have in your room when you are not using them?	73	2.2	1.2	10.96	5.5
Q7_4: While at the residence / student village, do you make use of natural light to reduce energy use?	69	1.8	1.1	2.90	4.4
Q7_3: While at the residence / student village, do you switch off the lights in your room when you leave the room?	72	1.7	1.0	2.78	2.8

Table 16 also shows that NMMU students took the natural environment into consideration in their daily activities at the time of the survey by keeping doors closed between conditioned and non-conditioned areas, turning off lights where possible and re-using used paper. A large percentage of students (70.2%) ticked 'frequently' or 'always' in response to Q6_3 (While on campus, do you keep doors closed between air conditioned and non-conditioned spaces?). When asked if they re-use used paper (Q6_13), almost 65.7 percent responded that they did it 'frequently' or 'always'. Furthermore, 56.1 percent of the student indicated that they 'frequently' or 'always' turn off lights where possible (Q6_4). The only other statement that had a 'high' mean score in excess of 3.4 was Q6_8 which reveals that just more than 50 percent of the students in this sample 'frequently' or 'always' disposed hazardous waste in a proper manner.

The final section of the student survey assessed the extent to which students who live in University residences / student villages performed certain activities to conserve the natural environment. As indicated in sample description (Table 1), only 23.3 percent of students participating in this survey lived in NMMU residences / student villages. Table 17 summarises the most important findings in this regard.

From Table 17 it can be deduced that students staying in University residences / student villages try to conserve water by not leaving water running while they brush their teeth. Close to 70 percent (68.5%) of residence students 'always' or 'frequently' closed taps when brushing teeth.

However, it is apparent from Table 17 that students staying in University residences / student villages do not care much about conserving energy by switching off lights or making use of natural light. It is alarming to note that very few students staying in University residences / student villages 'frequently' or 'always' switched off lights when leaving their rooms. The energy wastage of this group of students is a major concern and more awareness, maybe in the form of energy saving competitions between residences, is needed to address this problem.

5.6 Open-ended comments by students on 'greening' NMMU

Students were given an opportunity to voice their opinions regarding the 'greening' of NMMU and to suggest 'green' practices that they would like to see be implemented at NMMU. Almost a third of students participating in this survey responded to the challenge (N = 106). The following summary presents general patterns that were observed. All responses are included in Appendix E.

- Most students were of the view that 'greening' NMMU was a "great idea" and that more should be done as soon as possible to implement an EMS. The following are some of the *verbatim* suggestions that the students had:

> *"I think it's a great idea that you are introducing NMMU to the greenness"*
>
> *"I really think this topic is important because it is a good thought to reserve our scarce resources".*
>
> *"I really do not think enough is done on this matter"*
>
> *"This will really benefit our campus"*

"Greening is a noble idea that I think if implemented nicely will help make aware the need to conserve both our surroundings and our resources"

"This research is overly important as it raises an awareness of things were previously not given attention most by the staff and students. eg sparing use of water and electricity."

"Thumbs UP for this great idea, should've been done a long time ago."

"Not enough effort is being made, period. but i am glad 2 see some initiative"

"Thank u for the survey, looking forward 2 greener & more sustainable times."

- Students also called on NMMU to become an exemplary institution that can lead the way to conserve and protect the natural environment. They further suggested that NMMU be innovative in doing so e.g. by harnessing wind power to generate electricity.
- Several students requested more awareness campaigns to educate them about environmental issues and more opportunities to participate in 'green' activities, especially recycling.
- Students commented widely on the inefficient use of water and electricity on campus citing that irrigation systems are wasteful and that lights are left on when not needed. As noted by the students most water wastage occurs because "cement gets watered instead of plants" and watering takes place at the hottest times of day when most of the water evaporated quickly.
- In addition students called for more investment in 'greening' the NMMU, especially in the area of research.
- Furthermore, students requested the establishment of a 'green' student society. The following are some *verbatim* quotes of what students had to say on this issue:

"University societies are a good way of introducing `greening` activities such as - waste clean up sessions.

They create awareness about better ways of disposing the different kinds of waste. It would also be great if there was a green society of sorts- which touched on all the aspects of greening- legal etc. could show documentaries etc. i.e.: (collective) living examples of greener practises."

"Having the option to join an NMMU 'green team' and have that on a CV will be most useful for job hunting."

"I am unable to partake in any organisation that encourages 'greening' at NMMU."

"I could even form an environmental society to promote green living & make it become NMMU tradition with the years."

- Some negative responses were observed regarding the implementation of a compulsory environmental management module for all students. It should however be noted that these students were in the minority and their objection should be viewed in light of wide-spread support for more 'green' education at NMMU (refer to Section 5.3 for more details in this regard).

The following section summarises the general patterns that were observed regarding students' opinions when asked to indicate any other practices they felt were necessary for NMMU to become a 'greener' University:

- The majority of students who gave their opinions on this question called for awareness campaigns and more student involvement in 'green' initiatives. Many stated that training sessions or seminars could be effective in raising awareness. Some also suggested the use of nature walks on the Summerstrand South campus as a possible mechanism for raising awareness.

> *"There should be more awareness campaigns for 'green' living"*
>
> *"I feel like there is no awareness especially to students to make any effort to carry out the green practices. NMMU should make campaigns for raising the awareness on going green and make this a green university"*
>
> *"Commemorate the national days that encourage greening e.g. World Environment Day."*
>
> *"I think students should be sensitised about the actual environmental issues at NMMU. For instance, short and concise workshops could be organised to advise students how to go green in their everyday day lives. The trick about preserving and conserving the environment lies much in the education one gets concerning the protection of the environment. Maybe if a few teaches could tip off students on how to make re-use of their previously used papers/scraps/drafts, it would be a good start."*
>
> *"Inform students of what can be done to keep the campuses and where they live green"*

- The second most prolific suggestion pertained to establishing an effective and widely publicised recycling program on campus. Students requested that recycling bins be placed strategically to reduce the effort of recycling.
- Students indicated that better energy management systems should be employed and even suggested harnessing of alternative energy sources. Furthermore, some students called for responsibility to be assigned to individuals, so-called 'energy managers', to switch off lights and equipment in unoccupied areas.
- A small group of students also requested the promotion of car pools or the establishment of housing near campus so as to reduce carbon emissions associated with travelling to and from campus.
- In terms of water usage, many students again raised their concerns about inefficient irrigation. Some also suggested that 'low-flow' toilets and motion sensitive taps be installed on campus and in the residences.

5.7 Summary of NMMU students' perceptions on 'greening' the University

It is clear from the statistics that NMMU students are aware of and have a concern for the impact they are having on the natural environment on campus. Students will be willing to participate in initiatives / programmes to 'green' the University if opportunities and incentives were made available. Although very few students were enrolled for modules that included environmental management principles in 2009, students were of the opinion that integrating selected environmental management topics into existing modules and developing dedicated modules on 'green' topics will be valuable, especially at undergraduate level.

Students placed a high value on 'green' research and showed their willingness to conduct research on environmental management topics if opportunities were made available. Results pertaining to 'green' practices at NMMU indicate that students took the protection of the natural environment into consideration when going about their daily activities whilst on campus, although this is not entirely true for students living in the University residences /

student villages. Although they try to conserve water, they do very little to reduce energy consumption.

In the following section details will be provided on significant differences that exist in the perceptions of students based on gender, the faculty in which the student is registered, level of study (undergraduate vs. postgraduate), campus where the student is studying and whether the student is living off campus or in a University residence / student village.

6 SIGNIFICANT DIFFERENCES IN STUDENTS' PERCEPTIONS

Statistical significance was measured at the five percent confidence level. Statistical significance cannot tell how important (in practice) the differences are. To get a feel for the importance from a practical point of view, use was made of effect size indices. Table 18 gives three effect size indices and their interpretation.

Table 18: **Guidelines used to interpret measures of practical significance**

	Small	**Moderate**	**Large**
Cohen's *d*	$0.2 < d < 0.5$	$\mathbf{0.5 < d < 0.8}$	$\mathbf{d > 0.8}$
Eta-squared η^2	$0 < \eta^2 < .09$	$\mathbf{.09 < \eta^2 < .25}$	$\mathbf{\eta^2 > .25}$
Cramér's *V*			
df = 1*	$.10 < V < .30$	$\mathbf{.30 < V < .50}$	$\mathbf{V > .50}$
df = 2*	$.07 < V < .21$	$\mathbf{.21 < V < .35}$	$\mathbf{V > .35}$
df ≥ 3*	$.06 < V < .17$	$\mathbf{.17 < V < .29}$	$\mathbf{V > .29}$

6.1 Gender

To test whether gender influences student's 'green' perceptions and actions the following null hypotheses were formulated:
$H_{0,1}$: There is no difference in male and female students with regard to their perceptions of:
$H_{0,1.1}$: Environmental management at NMMU
$H_{0,1.2}$: Incentives for 'going green'
$H_{0,1.3}$: 'Green' education at NMMU
$H_{0,1.4}$: 'Green' research at NMMU
$H_{0,1.5}$: 'Green' practices at NMMU

6.1.1 *Environmental management at NMMU*

Only one significant difference in the perceptions of male and female students with regard to environmental management at NMMU was observed. This related to Q2_3 (I have become more aware of my impact on the natural environment on the NMMU campus where I study within the past 12 months). A t-test revealed that female students had a higher mean score than male students (3.5 vs 3.2 respectively, $p = 0.027$). This difference can be seen as having small practical significance based on the effect size index (Cohen's $d = 0.25$).

This finding is in line with research by Özden (2008:40) on the environmental awareness and attitudes of student teachers at the Adiyaman University in Turkey. This research shows that female students had more positive attitudes towards four dimensions of environmental attitude, namely awareness of environmental issues, awareness of individual responsibility, general attitudes towards environmental problems and general attitudes towards environmental solutions.

Lee (2009:87) likewise found that female adolescents scored significantly higher in environmental attitude, environmental concern, perceived seriousness of environmental problems, perceived environmental responsibility, peer influence, green purchasing behaviour than male adolescents in Hong Kong.

As a significant difference exists in the perceptions of male and female students with regard to environmental management at NMMU, $H_{0,1.1}$ can be rejected.

6.1.2 Incentives for 'going green'

A significant difference in the perceptions of male and female student was also noted in terms of Q3_3 (A 'green' researcher of the year award will serve as incentive for me to become more environmentally sensitive). A t-test showed that male students had a higher mean score than female students (3.8 vs 3.4 respectively, $p = 0.009$). Although this difference is small from a practical significance point of view (Cohen's $d = 0.03$), it might be explained by the inherent competitive nature of men. According to Schulze and Steyn (2003:154) men generally place more importance on accomplishments and prestige, especially among their peers.

As a significant difference exists in the perceptions of male and female students with regard to incentives for 'going green', $H_{0,1.2}$ can be rejected.

6.1.3 'Green' education at NMMU

Only one significant difference was observed in the perceptions of male and female students regarding 'green' education at NMMU. This related to Q4_9 (It will be valuable if a topic such as 'green' design and construction can be incorporated into an existing NMMU module). Based on the results of a t-test, male students viewed incorporating 'green' design and construction topics into an existing NMMU module as more valuable than female students (mean scores of 4.1 vs. 3.8 respective, $p = 0.045$). The practical significance of this finding is however small (Cohen's $d = 0.23$).

As a significant difference exists in the perceptions of male and female students with regard to 'green' education at NMMU, $H_{0,1.3}$ can be rejected.

6.1.4 'Green' research at NMMU

No statistically significant differences were observed in the perceptions of male and female students on 'green' research at NMMU, as such $H_{0,1.4}$ cannot be rejected.

6.1.5 'Green' practices at NMMU

No statistically significant differences were observed in the 'green' practices undertaken by male and female students whilst on campus. Consequently $H_{0,1.5}$ cannot be rejected.

6.2 Faculty

To test whether the faculty in which a student is registered influences his/her 'green' perceptions and actions the following null hypotheses were formulated:
$H_{0,2}$: The faculty in which a student is registered is unrelated to his/her perceptions of:
$H_{0,2.1}$: Environmental management at NMMU
$H_{0,2.2}$: Incentives for 'going green'
$H_{0,2.3}$: 'Green' education at NMMU
$H_{0,2.4}$: 'Green' research at NMMU
$H_{0,2.5}$: 'Green' practices at NMMU

6.2.1 Environmental management at NMMU

An Analysis of Variance (ANOVA) revealed four significant differences in the perceptions of students registered in different faculties (Table 19).

Based on the nature of the data, Tukey HSD tests were used to identify significant differences between groups.

Although a significant difference was noted in the perceptions of students registered in different faculties in relation to Q2_1 (The protection of the natural environment on the NMMU campus where I study is important to me), the *post hoc* test was not powerful enough to indicate pair wise differences at the five percent level.

Significant differences were observed in the perceptions of students registered in the Science faculty and those registered in the Business and Economic Sciences faculty with regard to the following statements (notice that in each case Science students had a higher mean score than Business and Economic Sciences students):

- Q2_12: It is important to me that NMMU maintains plant biodiversity on the campus where I study (mean scores of 4.5 and 4.0 for Science and Business and Economic Science students respectively, *post hoc* test $p = 0.013$).
- Q2_13: It is important to me that NMMU maintains animal biodiversity on the campus where I study (mean scores of 4.4 and 3.8 for Science and Business and Economic Science students respectively, *post hoc* test $p = 0.011$).
- Q2_15: I respect all animal life on the campus where I study (mean scores of 4.6 and 4.2 for Science and Business and Economic Science students respectively, *post hoc* test $p = 0.034$).

Practical significance in all three cases was however 'small'.

As a number of significant differences exist in the perceptions of students registered in different faculties on environmental management at NMMU, $H_{0,2.1}$ can be rejected.

6.2.2 Incentives for 'going green'

One statistically significant difference in the perceptions of students registered in different faculties on incentives for 'going green' is indicated in Table 20. The Tukey HSD test was however not powerful enough to indicate pair wise significant differences between groups at the five percent level.

Table 19: Significant differences in students' perceptions of environmental management at NMMU based on faculty

	Faculty – mean scores							ANOVA p-value	Eta-squared[(a)]
Statements	**Arts**	**Bus. & Econ. Sciences**	**Education**	**Engineering, the Built Environment and IT**	**Health Sciences**	**Law**	**Science**		
Q2_1: The protection of the natural environment on the NMMU campus where I study is important to me.	4.5	4.3	4.8	4.4	4.6	4.8	4.7	0.037	0.04
Q2_12: It is important to me that NMMU maintains plant biodiversity on the campus where I study.	4.4	4.0	4.2	4.2	4.1	4.6	4.5	0.028	0.04
Q2_13: It is important to me that NMMU maintains animal biodiversity on the campus where I study.	4.1	3.8	4.2	4.3	4.1	4.4	4.4	0.032	0.04
Q2_15: I respect all animal life on the campus where I study.	4.5	4.2	3.8	4.4	4.4	4.4	4.6	0.030	0.04

(a) Practical significance was 'small' for all the statements

Table 20: Significant differences in students' perceptions of incentives for 'going green' based on faculty

Statement	Faculty – mean scores							ANOVA p-value	Eta-squared[(a)]
	Arts	**Bus. & Econ. Sciences**	**Education**	**Engineering, the Built Environment and IT**	**Health Sciences**	**Law**	**Science**		
Q3_2: A 'green' student of the year award will serve as incentive for me to become more environmentally sensitive.	3.33	3.5	4.3	3.9	3.5	4.0	3.3	0.016	0.05

(a) Practical significance for this statement was 'small'

Table 21: Significant differences in students' perceptions of 'green' education at NMMU based on faculty

	Faculty – mean scores							ANOVA p-value	Eta-squared[(a)]
Statements	**Arts**	**Bus. & Econ. Sciences**	**Education**	**Engineering, the Built Environment and IT**	**Health Sciences**	**Law**	**Science**		
Q4_3: It will be valuable if a topic such as environmental journalism can be incorporated into an EXISTING module.	3.6	3.5	3.5	3.5	3.7	4.3	4.1	0.027	0.04
Q4_4: It will be valuable if a topic such as environmental reporting (accounting) can be incorporated into an EXISTING module.	3.4	3.4	3.3	3.4	3.5	3.7	4.0	0.045	0.04
Q4_5: It will be valuable if a topic such as environmental economics can be incorporated into an EXISTING module.	3.6	3.6	3.5	3.4	3.4	3.6	4.1	0.011	0.05
Q4_8: It will be valuable if a topic such as environmental law can be incorporated into an EXISTING module.	4.0	3.9	3.8	3.6	3.7	4.9	4.2	0.005	0.06
Q4_9: It will be valuable if a topic such as 'green' design and construction can be incorporated into an EXISTING module.	3.9	3.7	3.7	4.0	3.8	4.5	4.4	0.005	0.06

(a) Practical significance was 'small' for all the statements

As a significant difference exists in the perceptions of students registered in different faculties on incentives for 'going green', $H_{0,2.2}$ can be rejected.

6.2.3 'Green' education at NMMU

As indicated in Table 21, five significant differences exist in the perceptions of students registered in different faculties on 'green' education at NMMU.
With regard to statement, Q4_3 (the perceived value of environmental journalism), the Tukey HSD test shows that a significant difference exists in the perceptions of students registered in the Science faculty and those registered in the Business and Economic Sciences faculty. Science students viewed integrating environmental journalism topics into an existing module as more valuable than students registered in the Business and Economic Sciences faculty (means scores of 4.1 vs. 3.5 respectively; *post hoc* test p = 0.030).

In terms of statement Q4_4 (the perceived value of environmental reporting), the *post hoc* test was not powerful enough to reveal pair wise significant differences between faculties at the five percent level.

With regard to statement Q4_5 (the perceived value of environmental economics), significant differences exist in the perceptions of students registered in the Science faculty and those registered in the Business and Economic Sciences faculty (*post hoc* test p = 0.0469), between Science students and those registered in the Engineering, Built Environment and IT faculty (*post hoc* test p = 0.011) as well as Science students and those registered in the Health Sciences faculty (*post hoc* test p = 0.045). In all three cases Science students were the most in favour of incorporating environmental economics topics into existing modules (mean scores are indicated in Table 19).

A fourth significant difference was noted in terms of Q4_8 (the perceived value of environmental law). More specifically in the perceptions of students registered in the Science faculty and those registered in the Health Sciences faculty (*post hoc* test p = 0.040). As indicated in Table 19, Science students were more in favour of incorporating environmental law topics into existing modules than Health Sciences students. Another significant difference exists in the perceptions of Law and Health Sciences students for this statement (*post hoc* test p = 0.007). As could be expected, Law students were more in favour of integrating environmental law topics into existing modules than Science students. Another significant difference was observed between Law students and students registered in the Engineering, Built Environment and IT faculty (*post hoc* test p = 0.048). Here too Law students attached the most value to incorporating environmental law topics into existing modules.

In terms of Q4_9 (the perceived value of 'green' design and construction), the *post hoc* test revealed a significant difference in the perceptions of students registered in the Science and Business and Economic Sciences faculties (p = 0.001). As in previous questions dealing with 'green' education at NMMU, Science students attached the most value to incorporating 'green' topics into existing modules, 'green' design and construction topics in this case.

It is encouraging to note that students registered in the Science faculty are interested in topics outside of their immediate field of study. The relatively low level of interest expressed by students in the Business and Economic Sciences faculty in environmental management topics might be explained by the fact that South Africa is a developing economy. As such topics

addressed in commerce modules are more likely to centre on issues such as job creation, entrepreneurship and poverty alleviation than on environmental management topics. It is however recommended that Business and Economic Sciences students be shown that "what is good for the natural environment can also be good for the bottom line of a business". Several studies have shown that the implementation of a sound EMS, can result in numerous benefits for both internal and external stakeholders (Darnall et al. 2006; Millet 2005:5; Rowland-Jones et al. 2005; Sadgrove 1997:123).

As several significant differences were observed in the perceptions of students registered in different faculties on 'green' education at NMMU, $H_{0,2.3}$ can be rejected.

6.2.4 'Green' research at NMMU

As illustrated in Table 22, three significant differences exist in the perceptions of students registered in different faculties on 'green' research at NMMU.

Based on Tukey HSD tests, Science students were much more interested in doing research about environmental management topics than students registered in the Business and Economic Sciences faculty (*post hoc* test $p = 0.000$). Compared to Business and Economic Science students, Science students were also more likely to undertake 'green' research should funding be available to do so (*post hoc* test $p = 0.031$). Science students furthermore found it more important that 'green' research is conducted at NMMU (*post hoc* test $p = 0.011$) compared to students registered in the Business and Economic Sciences faculty. This finding is not surprising as Science students are exposed to elements of the natural environment almost on a daily basis. Thus, their choice of research topic will logically involve an environmental aspect.

Given the existence of significant differences in the perceptions of students from different faculties on 'green' research at NMMU, $H_{0,2.4}$, can be rejected.

Table 22: Significant difference in students' perceptions of 'green' research at NMMU based on faculty

	Faculty – mean scores							ANOVA p-value	Eta-squared[(a)]
Statements	**Arts**	**Bus. & Econ. Sciences**	**Education**	**Engineering, the Built Environment and IT**	**Health Sciences**	**Law**	**Science**		
Q5_2: I am interested in doing research about environmental management topics.	3.5	3.0	3.4	3.2	3.1	3.6	3.8	0.003	0.06
Q5_3: I would do research about environmental management if funding was available to do so.	3.4	3.1	3.8	3.3	3.3	4.1	3.7	0.029	0.04
Q5_5: It is important to me that 'green' research is conducted at NMMU.	4.1	3.8	4.5	4.2	4.0	4.7	4.3	0.008	0.05

(a) Practical significance was 'small' for all three statements

Table 23: Significant differences in 'green' practices of students based on faculty

	Faculty – mean scores							ANOVA p-value	Eta-squared[(a)]
Statements	**Arts**	**Bus. & Econ. Sciences**	**Education**	**Engineering, the Built Environment and IT**	**Health Sciences**	**Law**	**Science**		
Q6_3: While on campus, do you keep doors closed between air conditioned and non-conditioned spaces?	3.5	3.8	4.8	4.2	3.7	3.7	4.2	0.004	0.06
Q6_4: While on campus, do you turn off lights where possible?	3.3	3.3	3.8	3.5	3.6	3.2	4.1	0.016	0.05

(a) Practical significance was 'small' for both statements

6.2.5 'Green' practices at NMMU

In terms of 'green' practices undertaken by students whilst on campus, two significant differences were observed between students from different faculties. These actions are highlighted in Table 23.

In terms of statement Q6_3 (While on campus, do you keep doors closed between air conditioned and non-conditioned spaces?), significant differences were noted in the perceptions of students registered in the Arts and Education faculties (*post hoc* test p = 0.035) and between the Arts and Science faculties (*post hoc* test p = 0.040). In both cases students in the Arts faculty were less likely to engage in this simple, yet effective 'green' action. This might be due to a lack of exposure to 'green' issues in their modules.

On the question whether students turn off lights where possible whilst on campus (Q6_4), a significant difference exists in the perceptions of students registered in the Arts and Science faculties (*post hoc* test p = 0.037). As in the previous question, Arts students seem to be less concerned about switching off lights than their counterparts in the Science faculty. Students in the Arts faculty could be sensitised about 'green' issues through competitions such as environmental art exhibitions or by incorporating topics such as environmental drama or poetry into existing modules (as is currently done at Rhodes University). They should also be alerted to the fact that apparently small actions such as turning off lights, can result in big savings for the University. The same applies to students registered in the Business and Economic Sciences faculty i.e. they too are less likely to turn off lights compared to Science students (*post hoc* test p = 0.008).

Given significant differences in the 'green' practices undertaken by students registered in different faculties, $H_{0,2.5}$, can be rejected.

From the evidence presented above, it is clear that Science students are more concerned about conserving the natural environment on campus than their peers who are registered in other faculties. However, in all instances where statistical significance was detected, the practical importance of these differences, as suggested by the effect size index (Eta-squared), was small.

6.3 Level of study (Undergraduate vs. postgraduate)

To test whether a student's level of study influences his/her 'green' perceptions and actions the following null hypotheses were formulated:
$H_{0,3}$: There is no difference in the perceptions of undergraduate and postgraduate students with regard to:
$H_{0,3.1}$: Environmental management at NMMU
$H_{0,3.2}$: Incentives for 'going green'
$H_{0,3.3}$: 'Green' education at NMMU
$H_{0,3.4}$: 'Green' research at NMMU
$H_{0,3.5}$: 'Green' practices at NMMU

6.3.1 Environmental management at NMMU

Only one significant difference exists in the perceptions of undergraduate and postgraduate students with regard to environmental management at NMMU. Undergraduate students seem to be more concerned about promoting sound environmental management principles among fellow students (Q2_11) than postgraduate students (mean scores of 3.8 vs. 3.4 respectively, $p = 0.024$). This might be due to the fact that the NMMU student population mostly consists of undergraduate students (86.5%) and the same applies to the sample used in this research (79.5%). Effect size was also 'small' in this case (Cohen's $d = 0.31$).

This finding contradicts research by Özden (2008:42) who shows that student teachers in the last year of an instructional programme had more positive attitudes towards towards four dimensions of environmental attitude, namely awareness of environmental issues, awareness of individual responsibility, general attitudes towards environmental problems and general attitudes towards environmental solutions. It can be deduced from Özden's (2008:42) study that postgraduate students (students who have been studying for a longer period of time) would have had a greater concern for the natural environment.

As a significant difference is observed in the perceptions of undergraduate and postgraduate students in terms of environmental management at NMMU, $H_{0,3.1}$ can be rejected.

6.3.2 Incentives for 'going green'

As no significant differences were found in the perceptions of undergraduate and postgraduate students regarding incentives for 'going green', $H_{0,3.2}$ cannot be rejected.

6.3.3 'Green' education at NMMU

As no significant differences exist in the perceptions of undergraduate and postgraduate students on 'green' education at NMMU, $H_{0,3.3}$ cannot be rejected.

6.3.4 'Green' research at NMMU

$H_{0,3.4}$ cannot be rejected as no significant differences were found in the perceptions of undergraduate and postgraduate students on 'green' research at NMMU.

6.3.5 'Green' practices at NMMU

As no significant differences were found between the 'green' actions of undergraduate and postgraduate students whilst on campus $H_{0,3.5}$ cannot be rejected.

6.4 Campus

To test whether the campus where a student is studying influences his/her 'green' perceptions and actions the following null hypotheses were formulated:
$H_{0,4}$: The campus where a student is studying is unrelated to his/her perceptions of:
$H_{0,4.1}$: Environmental management at NMMU
$H_{0,4.2}$: Incentives for 'going green'
$H_{0,4.3}$: 'Green' education at NMMU
$H_{0,4.4}$: 'Green' research at NMMU

$H_{0,4.5}$: 'Green' practices at NMMU

6.4.1 Environmental management at NMMU

Students studying at the Summerstrand South campus had the most respect for plant life on their campus. This might be because the Summerstrand South campus is situated in a private nature reserve and houses departments such as Botany and Zoology. A statistically significant difference (*post hoc* test p = 0.019) was also noted in the perceptions of students studying at Second Avenue and Summerstrand North campuses on this question (Q2_14, mean scores indicated in Table 24). North Campus students had more respect for plant life on their campus compare to students studying at Second Avenue campus. This might be because of North campus' close proximity to the Summerstrand South campus nature reserve and could reflect a spill-over effect. Sit means

Table 24: Significant differences in students' perceptions of environmental management at NMMU based on campus

	Campus – mean scores					ANOVA p-value	Eta-squared[(a)]
Statement	**South**	**North**	**Missionvale**	**Second Avenue**	**George**		
Q2_14: I respect all plant life on the campus where I study.	4.5	4.7	4.1	4.1	4.5	0.014	0.04

(a) Practical significance for this statement was 'small'

Because a significant difference exists in the perceptions of students studying at the Second Avenue and Summerstrand North campuses on this topic, $H_{0,4.1}$ can be rejected.

6.4.2 Incentives for 'going green'

Table 25: Significant differences in students' perceptions of incentives for 'going green' based on campus

	Campus – mean scores					ANOVA p-value	Eta-squared[(a)]
Statement	**South**	**North**	**Missionvale**	**Second Avenue**	**George**		
Q3_2: A 'green' student of the year award will serve as incentive for me to become more environmentally sensitive.	3.5	3.9	3.6	3.8	3.2	0.045	0.03

(a) Practical significance for this statement was 'small'

As shown in Table 25, only one significant difference exists in the perceptions of students studying at different campuses on incentives for 'going green' on campus. Unfortunately, the *post hoc* test was not powerful enough to provide a pair wise significant distinction between groups at the five percent confidence level. As a significant difference does however exist, $H_{0,4.2}$ can be rejected.

6.4.3 'Green' education at NMMU

Table 26 sheds light on significant differences in the perceptions of students studying at different NMMU campuses on 'green' education.

With regard to Q4_5 (the perceived value of environmental economics), a significant difference is noted in the perceptions of students studying on the Summerstrand South and Second Avenue campuses (*post hoc* test p = 0.018). Students on the Second Avenue campus attached less value to incorporating environmental economics into existing modules compared to students studying on the Summerstrand South campus. This could be attributed to that fact that programmes offered at 2nd Avenue campus have a strong career orientation. There has also not been a history of interdisciplinary research and teaching on 2nd Avenue as compared to Summerstrand South campus.

With regard to the perceived value of ecological ethics (Q4_6), three significant differences were noted in the perceptions of students studying at different campuses. More specifically between students studying at Second Avenue campus and Summerstrand South campus (*post hoc* test p = 0.000), Summerstrand North campus (*post hoc* test p = 0.009) and George campus (*post hoc* test p = 0.024). In all three cases students studying at Second Avenue campus attached less value to integrating ecological ethics into existing modules compared to their counterparts studying at the three other campuses.

In terms of Q4_8 (the perceived value of environmental law), the perceptions of students studying at the Second Avenue campus were once again significantly different from those studying at the Summerstrand South campus (*post hoc* test p = 0.010). Second Avenue campus students were less interested in learning about environmental law topics than students enrolled at the Summerstrand South campus. Exactly the same situation prevails with regard the perceived value of 'green' design and construction (Q4_16) (*post hoc* test p = 0.012) i.e. students studying at the Second Avenue campus were much less in favour of a dedicated module in 'green' design and construction as compared to students from the Summerstrand South campus (where departments such as architecture as well as building and quantity surveying are housed).

With regard to statement Q4_17 (A module in environmental management should be compulsory for all undergraduate students at NMMU), three significant differences were revealed by the *post hoc* test. The first is a significant difference between students studying at the Missionvale and Summerstrand North campuses (p = 0.008). North campus students were more in favour of a compulsory module in environmental management at undergraduate level. Once again this might be because of the close proximity of the Summerstrand North campus to Summerstrand South campus which is situated in a private nature reserve. Students studying at the George campus saw more value in a dedicated module in environmental management at undergraduate level. George campus students were significantly more in favour of a dedicated module in environmental management compared to students studying at Missionvale campus (*post hoc* test p = 0.001) and Second Avenue campus (*post hoc* test p = 0.027). This might be because George campus is renowned for its natural vegetation and surroundings and offers modules in Game Range Management, Agricultural Management and Forestry.

Table 26: Significant differences of students' perceptions of 'green' education at NMMU based on campus

	Campus – mean scores					ANOVA p-value	Eta-squared[(a)]
Statement	**South**	**North**	**Missionvale**	**Second Avenue**	**George**		
Q4_5: It will be valuable if a topic such as environmental economics can be incorporated into an EXISTING module.	3.7	3.6	3.7	3.0	3.8	0.047	0.03
Q4_6: It will be valuable if a topic such as ecological ethics can be incorporated into an EXISTING module.	3.9	3.7	3.9	2.8	3.8	0.001	0.05
Q4_8: It will be valuable if a topic such as environmental law can be incorporated into an EXISTING module.	4.1	3.8	3.4	3.3	3.8	0.005	0.05
Q4_9: It will be valuable if a topic such as 'green' design and construction can be incorporated into an EXISTING module.	4.1	4.0	3.6	3.1	4.1	0.001	0.06
Q4_16: It will be valuable if NMMU could offer a DEDICATED module in 'green' design and construction.	3.9	3.9	3.5	3.1	3.9	0.025	0.04
Q4_17: A module in environmental management should be compulsory for all UNDERGRADUATE students at NMMU.	3.1	3.5	2.1	2.7	3.9	0.001	0.06
Q4_18: It will be valuable for NMMU to develop a specialised UNDERGRADUATE qualification (degree/diploma) in environmental management that will address various elements of this topic (legal, financial, reporting, ISO accreditation etc.)	4.0	3.9	3.7	3.2	3.7	0.032	0.03
Q4_20: Lecturers at NMMU should include environmental management topics in all modules offered at undergraduate level.	3.1	3.4	2.9	2.5	3.6	0.025	0.04

(a) Practical significance was 'small' for all of the statements

As previously found, students studying at the Summerstrand South campus were more in favour of a specialised undergraduate qualification in environmental management (Q4_18) than their counterparts at Second Avenue campus (*post hoc* test p = 0.015).

The ANOVA for Q4_20 revealed two significant differences in the perceptions of students regarding the inclusion of environmental management topics in all modules offered at undergraduate level. In both cases students studying at the Second Avenue campus were less interested in learning about environmental management than students studying at the Summerstrand North campus (*post hoc* test p = 0.046) and the George campus (*post hoc* test p = 0.046). As mentioned before, the greater interest shown by North campus students might be attributed to the campus' location near the Summerstrand South campus reserve. George campus' syllabi might also include more topics pertaining to the natural environment which might explain students' curiosity.

As several significant differences exist in the perceptions of students studying at different campuses on 'green' education at NMMU, $H_{0,4.3}$ can be rejected.

6.4.4 'Green' research at NMMU

As no significant differences exist in the perceptions of students studying at different campuses on 'green' research at NMMU, $H_{0,4.4}$ cannot be rejected.

6.4.5 'Green' practices at NMMU

$H_{0,4.5}$ cannot be rejected as no significant differences exist in the 'green' practices of students studying at different campuses.

6.5 Students staying off campus vs. residence students

To test whether there are any differences in the 'green' perceptions and actions of students staying off campus and those staying in University residences / student villages the following null hypotheses were formulated:
$H_{0,5}$: There is no difference between students staying off campus and students staying in the University residences / student villages with regard to their perceptions of:
$H_{0,5.1}$: Environmental management at NMMU
$H_{0,5.2}$: Incentives for 'going green'
$H_{0,5.3}$: 'Green' education at NMMU
$H_{0,5.4}$: 'Green' research at NMMU
$H_{0,5.5}$: 'Green' practices at NMMU

Quite a number of significant differences exist in the behaviour of students staying off campus and those staying in University residences / student villages exist. These are shown in Table 27.

Table 27: Significant differences in the 'green' practices of students living off campus vs those living in University residences / student villages

	Statements	Mean - Off campus	Mean - University res.	t-value	df	p	Cohen's $d^{(a)}$
Environmental management at NMMU	Q2_5: It is important to me that NMMU becomes a leader in the field of good environmental management among organisations in South Africa.	4.5	4.3	2.2	323	0.027	0.29
	Q2_8: Engaging in 'green' initiatives at the University will not be too much effort for me.	4.0	3.6	2.4	323	0.019	0.31
	Q2_15: I respect all animal life on the campus where I study.	4.5	4.0	4.1	323	0.000	0.54
'Green' education at NMMU	Q4_3: It will be valuable if a topic such as environmental journalism can be incorporated into an EXISTING module.	3.8	3.4	2.7	322	0.008	0.35
	Q4_4: It will be valuable if a topic such as environmental reporting (accounting) can be incorporated into an EXISTING module.	3.6	3.2	2.7	321	0.008	0.35
	Q4_5: It will be valuable if a topic such as environmental economics can be incorporated into an EXISTING module.	3.8	3.3	2.9	316	0.004	0.38
	Q4_7: It will be valuable if a topic such as 'Green' IT can be incorporated into an EXISTING module.	4.0	3.4	3.6	321	0.000	0.48
	Q4_9: It will be valuable if a topic such as 'green' design and construction can be incorporated into an EXISTING module.	4.0	3.7	2.2	314	0.031	0.29
	Q4_10: It will be valuable if NMMU could offer a DEDICATED module in environmental journalism.	3.7	3.2	3.0	309	0.003	0.40
	Q4_11: It will be valuable if NMMU could offer a DEDICATED module in environmental reporting (accounting).	3.5	3.1	2.6	312	0.010	0.35
	Q4_12: It will be valuable if NMMU could offer a DEDICATED module in environmental economics.	3.6	3.2	2.6	313	0.011	0.35
	Q4_13: It will be valuable if NMMU could offer a DEDICATED module in ecological ethics.	3.7	3.4	2.2	311	0.028	0.30
	Q4_14: It will be valuable if NMMU could offer a DEDICATED module in 'Green' IT.	3.7	3.4	2.2	313	0.030	0.29
	Q4_15: It will be valuable if NMMU could offer a DEDICATED module in environmental law.	3.8	3.3	2.9	306	0.004	0.40
	Q4_16: It will be valuable if NMMU could offer a DEDICATED module in 'green' design and construction.	3.9	3.5	2.8	313	0.005	0.37
	Q4_18: It will be valuable for NMMU to develop a specialised UNDERGRADUATE qualification (degree/diploma) in environmental management that will address various elements of this topic (legal, financial, reporting, ISO accreditation etc.)	3.9	3.6	2.2	314	0.028	0.29

	Q4_19: It will be valuable for the NMMU to incorporate environmental management modules in POSTGRADUATE qualifications e.g. the MBA program.	3.7	3.3	2.3	316	0.020	0.31
	Q4_22: It is important that the Government makes financing available to NMMU for the development of environmental management modules.	4.1	3.8	2.1	314	0.035	0.28
'Green' research at NMMU	Q5_5: It is important to me that 'green' research is conducted at NMMU.	4.2	3.8	2.3	318	0.022	0.31
'Green' practices at NMMU	Q6_1: While on campus, do you switch off your computer when you are done using it?	2.7	3.3	-2.5	318	0.012	0.34
	Q6_4: While on campus, do you turn off lights where possible?	3.4	4.0	-3.3	317	0.001	0.44

(a) Practical significance was 'small' for all of the statements except Q2_15 which has 'moderate' practical significance

Although no obvious answers exist for all of these significant differences, it should be noted that students staying in University residences / student villages generally did less to conserve energy and water on campus compared to students staying off campus. This might because residence students do not "foot these bills" themselves.

Students' responses in relation to Q2_15 (I respect all animal life on the campus where I study) raise some concerns. Students staying off campus exhibited significantly more respect for animal life on campus compared to students staying in University residences / student villages (this statement also had a moderate level of practical significance). The researchers are concerned that this finding might be a reflection of residence students' attitudes towards NMMU assets (animate and inanimate). Although residence students tried to conserve more electricity than off campus students at the time of the survey (Q6_1 and Q6_4), the statistics in Table 25 should be read in conjunction with those in Table 15. It was shown there that residence students tried to conserve water but had 'very low' means scores (less than 1.8) when it came to saving electricity whilst at the residences.

Based on the above empirical findings $H_{0,5.1}$, $H_{0,5.3}$, $H_{0,5.4}$ and $H_{0,5.5}$ can be rejected, whereas $H_{0,5.2}$ cannot be rejected.

6.6 Summary of significant differences in students' perceptions

Table 28 presents a summary of the hypotheses testing for the student questionnaire.

Table 28: Summary of significant differences in students' perceptions

Null hypothesis	Sub-hypotheses	Outcome of test	Significant differences
$H_{0,1}$: There is no difference between male and female students with regard to their perceptions of:	$H_{0,1.1}$: Environmental management at NMMU	Can be rejected	Female students had higher mean scores than male students indicating that they were more aware of their impact on the natural environment on campus.
	$H_{0,1.2}$: Incentives for 'going green'	Can be rejected	Male students had higher mean scores than female students indicating that they would be more motivated by a 'green' research of the year award to engage in 'green' activities.
	$H_{0,1.3}$: 'Green' education at NMMU	Can be rejected	Male students exhibited higher means than females with regard to the incorporation of 'green' design and construction principles into existing NMMU modules.
	$H_{0,1.4}$: 'Green' research at NMMU	Cannot be rejected	-
	$H_{0,1.5}$: 'Green' practices at NMMU	Cannot be rejected	-
$H_{0,2}$: The faculty in which a student is registered is unrelated to his/her perceptions of:	$H_{0,2.1}$: Environmental management at NMMU	Can be rejected	Science students had more respect for plant and animal life on campus and attached more value to maintaining plant and animal biodiversity on campus.
	$H_{0,2.2}$: Incentives for 'going green'	Can be rejected	The *post hoc* test was not powerful enough to indicate significant pair wise differences between groups.
	$H_{0,2.3}$: 'Green' education at NMMU	Can be rejected	Multiple differences exist in the perceptions of students registered in different faculties. In most cases Science students had higher mean scores and were more in favour of 'green' education at NMMU.
	$H_{0,2.4}$: 'Green' research at NMMU	Can be rejected	Science students had higher mean scores than students in the Business and Economic Sciences faculty indicating that they are more willing to undertake research on environmental management topics.
	$H_{0,2.5}$: 'Green' practices at NMMU	Can be rejected	Students in the Arts and Business and Economic Sciences faculties engaged in fewer 'green' practices on campus compared to Science and Business and Economics Sciences students.
$H_{0,3}$: There is no difference between the perceptions of undergraduate and postgraduate students with regard to:	$H_{0,3.1}$: Environmental management at NMMU	Can be rejected	Undergraduate students were more concerned about promoting good environmental management principles among their peers than postgraduate students.
	$H_{0,3.2}$: Incentives for 'going green'	Cannot be rejected	-
	$H_{0,3.3}$: 'Green' education at NMMU	Cannot be rejected	-

	$H_{0,3.4}$: 'Green' research at NMMU	Cannot be rejected	-
	$H_{0,3.5}$: 'Green' practices at NMMU	Cannot be rejected	-
$H_{0,4}$: The campus where a student is studying is unrelated to his/her perceptions of:	$H_{0,4.1}$: Environmental management at NMMU	Can be rejected	Students studying at Summerstrand North campus were more concerned about conserving the natural environment than Second Avenue students. South campus students had more respect for plant life on campus than students at other campuses.
	$H_{0,4.2}$: Incentives for 'going green'	Can be rejected	The *post hoc* test was not powerful enough to provide a pair wise distinction between groups.
	$H_{0,4.3}$: 'Green' education at NMMU	Can be rejected	Several differences were noted in the perceptions of students studying at different NMMU campuses. South campus students were in favour
	$H_{0,4.4}$: 'Green' research at NMMU	Cannot be rejected	-
	$H_{0,4.5}$: 'Green' practices at NMMU	Cannot be rejected	-
$H_{0,5}$: There is no difference between students staying off campus and students staying in the University residences / student villages with regard to their perceptions of:	$H_{0,5.1}$: Environmental management at NMMU	Can be rejected	Several significant differences were noted in this regard. Students living off campus were generally more aware and concerned about the natural environment than those living in University residences / student villages.
	$H_{0,5.2}$: Incentives for 'going green'	Cannot be rejected	-
	$H_{0,5.3}$: 'Green' education at NMMU	Can be rejected	Several differences were found in the perceptions of students living off campus and those living in University residences / student villages. Student living off campus were more in favour of 'green' education at NMMU compared to students staying in University residences / student villages.
	$H_{0,5.4}$: 'Green' research at NMMU	Can be rejected	Students living off campus were more willing to undertake 'green' research than student staying in University residences / student villages.
	$H_{0,5.5}$: 'Green' practices at NMMU	Can be rejected	In this case it seemed as if students living in University residences / student villages participated in more 'green' practices than their peers living off campus. This finding should however be interpret in light of other findings about 'green' actions of residence students.

From the above it is clear that biographical descriptors such as gender, faculty, level of study, campus and whether the student stays off campus play an important role in their perceptions. Science students and students studying at the Summerstrand South campus were the most interested in improving their knowledge of 'green' issues. In general 'green' practices among students, and particularly those staying in the University residences / student villages need to be promoted. This could be done by integrating more environmental management topics into existing modules, developing dedicated modules, encouraging research, providing recycling and other 'green' infrastructure on campus, raising awareness and offering incentives for 'going green'.

In the following section, the perceptions of 252 NMMU staff members on 'greening' NMMU will be presented.

7. PERCEPTIONS OF NMMU STAFF ON 'GREENING' THE UNIVERSITY

7.1 Environmental management at NMMU

In this section the perceptions of NMMU staff members were obtained on environmental management at NMMU. Questions were phrased on a 5-point Likert scale with (1) representing strongly disagree and (5) representing strongly agree. Tables 29 and 30 summarise the most significant findings in this regard. Statements are ranked from the highest to the lowest mean score[3].

From Table 29 it is clear that NMMU staff perceived a number of issues regarding the conservation of the natural environment on campus as very important. Close to 94 percent of NMMU staff who responded to the survey 'agreed' or 'strongly agreed' that the protection of the natural environment on campus is important to them (Q3_1). More than 90 percent of staff also indicated that they respected plant and animal life on the NMMU campus where they work (Q3_16 and Q3_17). Their positive attitude to the natural environment is reaffirmed by results obtained for statements Q3_14 and Q3_15 which gauged staff members' views on the importance of maintaining plant and animal biodiversity on campus (these questions had 'very high' mean scores of 4.4 and 4.3 respectively).

Staff members also felt that it is very important for NMMU to become a leader in environmental management, not only among South African universities, but also among local organisations (both Q3_4 and Q3_5 had 'very high' mean scores of 4.4 and 4.4 respectively).

[3] The following categorisation was used to the rank mean scores:

- Mean scores ranging from 1.0 – 1.8: Very low importance
- Mean scores ranging from 1.8 – 2.6: Low importance
- Mean scores ranging from 2.6 – 3.4: Neutral
- Mean scores ranging from 3.4 – 4.2: High importance
- Mean scores ranging from 4.2 – 5: Very high importance

Table 29: Environmental management at NMMU – staff perceptions

Statements	Valid N	Mean	Std.Dev.	% Agreed	% Strongly Agreed
Q3_1: The protection of the natural environment on the NMMU campus where I work is important to me.	252	4.6	0.8	22.2	71.4
Q3_16: I respect all plant life on the campus where I work.	252	4.6	0.8	23.0	69.8
Q3_17: I respect all animal life on the campus where I work.	251	4.6	0.9	19.9	71.3
Q3_4: It is important to me that NMMU becomes a leader in the field of good environmental management among South African universities.	250	4.4	0.9	26.8	60.8
Q3_5: It is important to me that NMMU becomes a leader in the field of good environmental management among organisations in South Africa.	251	4.4	0.9	29.1	58.6
Q3_14: It is important to me that NMMU maintains plant biodiversity on the campus where I work.	249	4.4	0.9	28.1	56.6
Q3_15: It is important to me that NMMU maintains animal biodiversity on the campus where I work.	250	4.3	0.9	27.6	56.0
Q3_2: I have an impact on the natural environment on the NMMU campus where I work.	251	4.0	1.1	28.7	45.8
Q3_8: Engaging in ‘greening’ initiatives at the NMMU will not be too much effort for me.	250	3.9	1.0	39.6	33.2
Q3_7: ‘Greening’ NMMU will save the University money.	248	3.8	1.1	29.8	33.1
Q3_11: I am interested in becoming involved in programmes to conserve natural resources at NMMU.	249	3.7	1.0	38.2	24.1
Q3_6: ‘Greening’ NMMU will not be too expensive.	249	3.5	1.1	27.7	22.5
Q3_12: I promote good environmental management principles among my colleagues.	247	3.5	1.1	25.1	20.7
Q3_13: I promote good environmental management principles among my students.	240	3.4	1.2	21.3	23.3
Q3_3: I have become more aware of my impact on the natural environment on the NMMU campus where I work within the past 12 months.	251	3.3	1.3	25.5	21.9

NMMU staff also recognised that they have an impact on the natural environment on the campus where they work (74.5% either 'agreed' or 'strongly agreed' with statement Q3_2). Staff members further expressed their willingness to make NMMU a 'greener' University (Q3_8 and Q3_11 had 'high' mean scores of 3.9 and 3.7 respectively). With regard to the perceived financial impact of 'greening' NMMU, many staff members reacted positively. Large percentages 'agreed' or 'strongly agreed' that 'greening' initiatives would save the University money and would not be too expensive to undertake. Other positive findings show that staff members were already promoting good environmental management principles among their colleagues and students (Q3_12 and Q3_13). Forty six percent of staff already motivated fellow staff members to become 'greener' in their daily activities, while close to 45 percent did the same with students. The ideal would be to increase this percentage substantially in time to come.

Less than 15 percent of staff (only 13.9%) was involved in programmes to conserve the natural environment at NMMU in 2009 (Table 30). The majority of these programmes were informal in nature and involved paper recycling as well as mechanisms to reduce energy consumption on campus.

Table 30: Staff participation in 'green' programmes at NMMU in 2009

Q3_9: I am currently involved in programmes at NMMU to conserve the natural environment.	**Frequency (N)**	**Percentage (%)**
Yes	35	13.9
No	217	86.1
Total	**252**	**100.0**

Staff members who answered YES to Q3_9 were requested to provide the names of programmes in which they were involved in 2009. Table 30 provides a summary of the staff members' responses in this regard. It should be noted that most of the 'green' programmes indicated by staff members were informal in nature. More than 60 percent of staff (62.3%) however indicated in Q3.11 that they would be willing to engage in more 'greening' activities at NMMU if formal programmes were available.

Table 31: 'Green' programmes in which staff members were involved in 2009

Programme	**Frequency (N)**	**Percentage (%)**
Recycling	10	28.6
Conserving energy / Conducting research on energy-related topics	9	25.7
Being involved in awareness campaigns	4	11.4
Game ranch management	5	14.3
Conducting research on environmental management topics	4	11.4
Being involved in the 'green' campus initiative at George campus)	1	2.9
Implementing 'Green' IT initiatives	1	2.9
Being involved in 'greening' the new NMMU Business School building	1	2.9
Total	**35**	**100.0**

7.2 Incentives for 'going green'

A ranking of incentives that could motivate staff to become more environmentally sensitive in their daily activities is provided in Table 32.

Table 32: Incentives for 'going green' – staff perceptions

Statements	Valid N	Mean	Std.Dev.	% Agreed	% Strongly Agreed
Q2_1: I would be more willing to engage in 'greening' actions at the University if incentives were offered.	248	3.4	1.4	20.6	27.8
Q2_5: A 'green' award for any initiative to protect the natural environment on campus will motivate me to become 'greener' in my daily activities.	249	3.4	1.3	26.9	24.5
Q2_6: Incentives like competitions between departments or faculties for green status would encourage me to become 'greener' in my daily activities.	249	3.3	1.4	26.1	24.1
Q2_4: A 'green' employee of the year award will serve as incentive for me to become more environmentally sensitive.	249	3.2	1.4	22.5	20.9
Q2_3: A 'green' researcher of the year award will serve as incentive for me to become more environmentally sensitive.	245	3.0	1.3	18.8	15.9
Q2_2: A 'green' lecturer of the year award will serve as incentive for me to become more environmentally sensitive.	246	2.9	1.3	16.3	16.3

As in the case of NMMU students (Table 6), the highest ranking statement in this section relates to a willingness to engage in 'greening' actions at the University if incentives were offered. Based on the mean score for this question (Q2_1), students were more interested in 'going green' than staff *should incentives be offered* (student mean score = 3.858; staff mean score = 3.367). 'Green' awards and competitions for 'green' status between departments and faculties were also highly regarded by staff as incentives for 'going green'.

In an open-ended question staff members were requested to provide examples of other incentives that would motivate them in becoming 'greener' whilst on campus. Table 33 provides the most pertinent findings in this regard.

Table 33: Incentives that would motivate staff to 'go green'

Type of incentive	Frequency (N)	Percentage (%)
Money / Prizes / Competitions	46	55.4
No incentives needed	18	21.7
Providing recycling infrastructure on campus / Participating in decision making processed to facilitate the 'greening' of the University	14	16.9
Education / Awareness campaigns	5	6.0
Total	**83**	**100.0**

As in the case of NMMU students, the most prolific incentives for 'going green' suggested by staff members involved money, prizes and competitions. It should however be noted that quite a number of staff (21.7%) stated that they do not need incentives to become 'greener' in their daily activities. As this was *not* the case with students, intrinsically motivated staff can be value role models in NMMU's 'greening' campaign. They can show students and colleagues that a concern for the natural environment could (and should actually) stem from a sense of moral obligation and not mere because a reward is offered. One staff member remarked: *"For me, going green is a rational decision, not based on incentives. Use information not incentives."*

Several staff members said that they will be motivated to 'go green' should visible and easy-to-use recycling infrastructure be made available. A small percentage of staff (6%) indicated that more awareness and education was needed to motivate NMMU staff and students on the need for action.

7.3 'Green' education at NMMU

This section of the staff questionnaire was only answered by academic staff and was aimed at obtaining their perceptions on the 'greening' of NMMU syllabi. Of the 126 academics who participated in the survey, only 11.1 percent presented at least one module that included environmental management topics in 2009. These modules are summarised in Table 34.

Table 34: NMMU modules that included environmental management topics in 2009 – staff responses

Modules	Number of academics who presented such modules in 2009 (N)	Percentage (%)
Botany / Zoology / Biology	5	35.7
Society and Environment /Human Environment Interaction[(a)]	4	28.6
Ethics, Governance and Sustainable Development[(b)]	2	14.3
Business Management	1	7.1
Development Economics	1	7.1
Building Science	1	7.1
Total	**14**	**100.0**

(a) The syllabi of these two modules are included in Appendix A.
(b) This module is presented at the NMMU Business School.

As could be expected, most of the modules incorporating 'green' topics were offered in the Science faculty. Note that more than this handful of 'green' modules exists at NMMU. These were merely the ones presented by academics who participated in the survey. The perceived value of a number of environmental management topics which could be incorporated into existing NMMU modules are indicated in Table 35. These are ranked from highest to lowest mean score.

From Table 35 it is clear that academics at NMMU place a high value on incorporating all of the suggested environmental management topics into existing NMMU modules (note that all the statements in Table 35 had 'high' mean scores in excess of 3.4). Questions were furthermore posed to academics on the relative importance of developing dedicated modules on selected environmental management topics.

Table 35: The perceived value of environmental management topics to be integrated into EXISTING NMMU modules – staff perceptions

Statements	Valid N	Mean	Std.Dev.	% Valuable	% Extremely Valuable
Q4_9: It will be valuable if a topic such as 'green' design and construction can be incorporated into an EXISTING module.	120	4.3	0.9	30.6	44.0
Q4_6: It will be valuable if a topic such as ecological ethics can be incorporated into an EXISTING module.	122	4.1	1.0	34.9	36.2
Q4_7: It will be valuable if a topic such as 'green' IT can be incorporated into an EXISTING module.	122	4.1	0.9	35.5	36.9
Q4_8: It will be valuable if a topic such as environmental law can be incorporated into an EXISTING module.	121	4.1	1.0	35.0	33.2
Q4_5: It will be valuable if a topic such as environmental economics can be incorporated into an EXISTING module.	122	4.0	0.9	36.4	29.0
Q4_4: It will be valuable if a topic such as environmental reporting (accounting) can be incorporated into an EXISTING module.	121	3.9	1.0	34.9	27.1
Q4_3: It will be valuable if a topic such as environmental journalism can be incorporated into an EXISTING module.	122	3.8	1.1	35.6	24.2

Table 36: The perceived value of environmental management topics to be offered as DEDICATED modules at NMMU – staff perceptions

Statements	Valid N	Mean	Std.Dev.	% Valuable	% Extremely Valuable
Q4_16: It will be valuable if NMMU could offer a DEDICATED module in 'green' design and construction.	121	4.0	1.1	25.7	39.3
Q4_15 It will be valuable if NMMU could offer a DEDICATED module in environmental law.	120	3.9	1.1	26.2	34.1
Q4_13: It will be valuable if NMMU could offer a DEDICATED module in ecological ethics.	119	3.8	1.1	25.8	31.9
Q4_12: It will be valuable if NMMU could offer a DEDICATED module in environmental economics.	120	3.8	1.1	26.4	30.1
Q4_14: It will be valuable if NMMU could offer a DEDICATED module in 'Green' IT.	120	3.7	1.1	26.4	31.5
Q4_11: It will be valuable if NMMU could offer a DEDICATED module in environmental reporting (accounting).	119	3.7	1.1	25.8	26.8
Q4_10: It will be valuable if NMMU could offer a DEDICATED module in environmental journalism.	119	3.6	1.1	23.1	27.4

All statements in Table 36 had 'high' mean scores in excess of 3.4 implying that academics viewed the development of dedicated modules on all of the suggested environmental management topics as valuable. Some similarities in the ranking of environmental management topics to be integrated and developed into dedicated modules can be observed in Table 37. Topics dealing with 'green' design and construction, environmental law and ecological ethics were seen as the most valuable in both cases.

Table 37: Rankings of the perceived value of environmental management topics – staff perceptions

Environmental management topics to be integrated into EXISTING modules	Environmental management topics to be developed into DEDICATED modules
1. 'Green' design and construction	1. 'Green' design and construction
2. Ecological ethics	2. Environmental law
3. 'Green' IT	3. Ecological ethics
4. Environmental law	4. Environmental economics
5. Environmental economics	5. 'Green' IT
6. Environmental reporting (accounting)	6. Environmental reporting (accounting)
7. Environmental journalism	7. Environmental journalism

This was also the case with students' perceptions in Tables 9 and 10. In contrast to students, academics perceived greater value in topics and modules dealing with environmental law and ecological ethics (which by definition involves activities that go beyond the letter of the law). This might be because academics are older than students and hence have more life experience. They consequently have a greater appreciation for complying with the law and being a virtuous person (i.e. engaging in activities which are not necessarily prescribed by the law). Given the Government's commitment to reduce CO_2 emissions in South Africa by 34 percent by 2020 and 42 percent by 2025, legislation is bound to follow (Mundy 2009). As regulation is a powerful means of changing individuals' and organisations' behaviour, the integration of environmental law topics will become more important in future.

Academics' perceptions on other pertinent issues relating to 'green' education at NMMU are indicated in Table 38.

Academics at NMMU perceived most of the statements in Table 37 as 'highly' important (mean scores in excess of 3.4) with the exception of the last four statements. NMMU academics felt strongly that Government should provide funding for the development of a full qualification (Q4_24) as well as specific modules in environmental management (Q4_23). More than three quarters of academics 'agreed' or 'strongly agreed' with statements Q4_24 and Q4_23 which dealt with the topic of Government funding (77.42% and 77% respectively).

Academics also saw the need for opportunities to develop their knowlegde on selected environmental management topics (73.9% of academics either 'agreed' or 'strongly agreed' with statement Q4_25). The majority of academics (71.0%) thought it would be valuable to develop a specialised undergraduate qualification in environmental management. Similarly, 70.2 percent thought it would be 'valuable' or 'extremely valuable' to incorporate environmental management topics at postgraduate level.

Table 38: Other pertinent issues relating to 'green' education at NMMU – staff perceptions

Statements	Valid N	Mean	Std.Dev.	% Valuable	% Extremely Valuable
Q4_24: It is important that the Government makes financing available to the NMMU for the development of a full qualification in environmental management.	122	4.2	1.0	30.9	46.5
Q4_23: It is important that the Government makes financing available to NMMU for the development of environmental management modules.	119	4.2	0.9	30.5	46.5
Q4_25: NMMU should provide significant staff development opportunities to enhance teaching in environmental issues.	122	4.0	1.0	37.2	36.7
Q4_18: It will be valuable for NMMU to develop a specialised undergraduate qualification (degree/diploma) in environmental management that will address various elements of this topic (legal, financial, reporting, ISO accreditation etc.).	120	4.0	1.0	34.6	36.4
Q4_19: It will be valuable for the NMMU to incorporate environmental management modules in POSTGRADUATE qualifications e.g. the MBA program.	121	4.0	1.0	36.2	33.9
Q4_26: I am willing to teach modules that include environmental management topics.	120	3.6	1.3	20.6	22.6
Q4_17: A module in environmental management should be compulsory for all UNDERGRADUATE students at NMMU.	120	3.4	1.3	25.4	28.6
Q4_27: I am able to teach modules that include environmental management topics.	122	3.1	1.3	13.5	12.0
Q4_22: All lecturers at NMMU should include environmental management topics in modules offered at POSTGRADUATE level.	122	2.8	1.2	21.2	14.8
Q4_20: I include environmental management topics in the module(s) I offer.	120	2.8	1.4	13.9	11.1
Q4_21: All lecturers at NMMU should include environmental management topics in modules offered at UNDERGRADUATE level.	122	2.8	1.2	17.7	14.9

The ‘high’ mean score of 3.612 for Q4_26 suggests that academics are generally willing to present environmental management topics/modules. Quite a large number of NMMU academics (42.2%) felt it would be valuable if a module in environmental management be made compulsory for all undergraduate students.

From the above it is clear that NMMU academics see the need for integrating more ‘green’ topics into existing modules and developing dedicated modules, most notably on ‘green’ design and construction, ecological ethics and environmental law, and then especially so at undergraduate level. Several academics did however acknowledge that they might need training in this area.

7.4 ‘Green’ research at NMMU

This section of the staff questionnaire was only answered by NMMU academics. Just over a quarter of respondents (27.0%) have conducted research on an environmental management topic in the 12 months up to August 2009. As illustrated in Table 39, a large percentage of academics were of the opinion that doing ‘green’ research at NMMU is important. They also expressed fairly strong views on the need for more staff development and funding opportunities. In terms of statement Q5_6, academics thought NMMU should provide more faculty and staff development opportunities to promote research on environmental management topics (this statement had a ‘high’ mean score of 4.1).

Table 39: 'Green' research at NMMU – staff perceptions

Statements	Valid N	Mean	Std.Dev.	% Agree	% Strongly Agree
Q5_5: It is important to me that 'green' research is conducted at NMMU.	122	4.3	0.9	30.5	47.6
Q5_6: NMMU should provide significant faculty and staff development opportunities to enhance research in environmental issues.	122	4.1	1.0	35.4	37.3
Q5_4: I would do research about environmental management if the opportunity was there to do so.	122	3.2	1.4	20.6	15.2
Q5_3: I would do research about environmental management if funding was available to do so.	122	3.1	1.4	17.7	15.2
Q5_2: I am interested in doing research about environmental management topics.	122	3.1	1.4	15.6	12.7

Table 40: 'Green' practices of NMMU - staff

Statements	Valid N	Mean	Std.Dev.	% Frequently	% Always
Q6_5: While on campus, do you close taps properly after using them?	249	4.8	0.6	6.4	90.4
Q6_6: While on campus, do you open taps only minimally when using them?	251	4.4	0.9	18.7	64.9
Q6_4: While on campus, do you turn off lights where possible?	249	4.3	1.0	18.9	61.0
Q6_13: While on campus, do you re-use the reverse side of previously used paper for scrap paper and drafts?	252	4.1	1.1	24.6	48.8
Q6_3: While on campus, do you keep doors closed between air conditioned and non-conditioned spaces?	241	3.9	1.1	25.7	41.5
Q6_1: While on campus, do you switch off your computer when you are done using it?	252	3.9	1.4	19.8	49.6
Q6_2: While on campus, do you optimise the use of sunlight to reduce the use of electricity?	252	3.8	1.3	27.0	38.5
Q6_8: While on campus, do you dispose hazardous waste properly (If you have access to any hazardous materials like chemicals)?	216	3.6	1.3	9.3	39.8
Q6_7: While on campus, do you recycle paper in the bins provided to reduce waste on campus?	250	3.5	1.4	15.6	35.6
Q6_9: While on campus, do you print and copy documents on both sides of a page?	249	3.3	1.4	28.5	22.5

7.5 'Green' practices at NMMU

This section of the staff questionnaire was completed by all staff (administrative and academic) and shows the extent to which certain 'green' practices were undertaken by NMMU staff whilst on campus at the time of the survey.

The statistics in Table 40 show that, at the time of the survey, NMMU staff members were very serious about conserving water whilst on campus. This is reflected in the 'very high' means scores of 4.8 and 4.4 for Q6_5 and Q6_6. Mean scores for staff on these two questions were higher than the mean scores of students, probably because they were aware of the financial implications of water wastage and perhaps because they have a greater sense or moral obligation in terms of conserving this previous commodity. Almost ninety seven percent and 83.7 percent of staff 'frequently' or 'always' closed taps properly after using them (Q6_5) and only opened taps minimally when using them (Q6_6).

In terms of paper usage, 73.4 percent of staff 'frequently' or 'always' re-used the reverse side of used paper, while 51.2 percent 'frequently' or 'always' recycled paper whilst working on campus. The relatively low percentage of staff who recycled paper can be explained by the lack of recycling infrastructure on NMMU campuses. With regard to statement Q6_4, 79.9 percent of staff 'frequently' or 'always' turned off lights where possible. Staff members also attempted to conserve energy on campus by switching off their computers when leaving at night (Q6_1 had a 'high' mean score of 3.869) and using sunlight instead of artificial light where possible (Q6_2 also had a 'high' mean score of 3.798).

One employee commented on the need for ongoing training for staff about 'green' practices. *"Also train cleaning staff on how to save water etc. and tell them why it is important."* Ideally all staff and students should try to reduce energy and water consumption whilst on campus especially in light of Eskom's proposed tariff hikes and the water crisis in the Eastern Cape.

7.6 Open-ended comments by staff on 'greening' NMMU

Sixty six staff members suggest other practices that they felt are necessary for NMMU to become a 'greener' University. Some of their suggestions are listed below:

- A large percentage of staff members who responded to the survey indicated that more awareness is needed to sensitise staff and students on issues pertaining to the natural environment. Some of the suggestions included incorporating 'green' education into staff and student induction processes, sending a 'green tip for the day' via email to all staff and students, weekly environmental education sessions to discuss progress on environmental issues, training of custodian staff to raise their environmental literacy, using signage to promote 'greener' practices across campuses, making staff and students aware of the benefits of using organic products, using staff outings to the NMMU nature reserve as educational tool and encouraging staff to arrange hikes with their students. Some *verbatim* responses are shown below. All responses are included in Appendix E.

> *"All new members of staff and students should have a green component in their induction process."*
>
> *"Educate the masses."*

"Perhaps ITC could send a practical (not vague) 'green tip for the day' to all staff at the beginning of each week/day. Creating a broader awareness is more important than incentive based schemes if you would like to ensure sustainability."

"Providing a green awareness communiqué (like the MMMU communiqué). Encourage departments to incorporate aspects of social, ethical and environmental awareness within various fields."

"Ongoing training for staff about green practices. Train cleaning staff how to save water etc. and tell them why it is important."

"Posters which remind people on greening and place more bins for the litter"

"We cannot just teach green, we must live green. Therefore, things like waste separation and recycling must be a bare minimum. How can we preach one thing and practice another."

- A small group of staff also raised concerns about the energy usage on campus. In line with student responses, several staff suggested that funding is needed for research into alternative energy sources that can be used on campus such as wind or solar energy. Two staff members mentioned the use of solar geysers for residences.

"Invest in wind & solar sources of energy."

"Awareness regarding the switching off of lights should be emphasised. Use of solar power to be investigated for new external lighting installations."

"More efficient use of solar energy to heat geysers in the Residences. All new buildings to be designed with green technology in mind."

"Please install individual light switches for offices."

"Support the initiatives and efforts of staff and students at the CER to make NMMU less dependent on dirty fossil fuel".

- Others requested more support for staff and students involved in the Centre for Energy Research (CER). As indicated in Section 1.2, the CER is already doing stellar work in educating students in the field of energy management and doing strategic and competitive research on topics such as photovoltaics, energy Storage and materials characterization as well as energy Forecasting and modelling.
- A very large percentage of staff called for more and easier access to recycling facilities and suggested that more funding be put into this. Staff members also indicated their willingness to re-use scrap paper to print drafts, but said that the current printing facilities do not allow for this. Similar concerns were raised by students in Section 5.6.

"Missionvale does not have paper recycling and masses of old manuals, papers etc are thrown out."

"I am longing for a set of bins to be put up behind the conference centre on North Campus. The one there is only for cardboard."

"The University must introduce recycle bins for paper, cans and plastic all across campus."

"Save paper by going electronic in meetings and also distributing learning materials to students electronically"

"Simply ensuring that the printers that are granted to staff can do automatic two-sided printing could in itself help conserve quite a bit of paper (and time)."

"Waste paper competition between departments at the NMMU. I have seen this work at the Herbert Hurd primary school (Great satisfaction). More paper you recycle the more points you receive (based on weight and the size of your department)."

- Some staff members mentioned that better transport systems are needed to reduce NMMU's transport related carbon footprint. One staff member also requested better enforcement of traffic regulations, specifically speed limits, to conserve the animal life on campus. Another staff member suggested that NMMU work closely with local municipalities (Nelson Mandela Bay and George) to provide safe and reliable public transport to reduce the number of cars on campus.

"Do something to enforce the speed limit, ignored by most road users, in order to make it safer for both pedestrians and indigenous wildlife, especially the Grysbok."

"Work closely with the City to provide reliable & safe public transport."

"Refrain from relocating staff to a campus which will oblige them to travel for work purposes (and consequently opt out of a lift club)."

- Two staff members expressed their support for 'greening' NMMU. One suggested a pro-active approach to this issue and indicated that it will save NMMU money in the long run. Another said that "It is GREAT that the NMMU is finally beginning to think about greening" while also stating that the University is lacking in this field compared other institutions.
- One staff member proposed a change in NMMU's management structure to allow for 'green' monitoring and reporting as well as the establishment of a 'green' committee
- A particularly valuable comment was made by a staff member on the mindset shift required among staff and students: He/She said: "If we can deal constructively and positively with the individuals with no regard for morality, the task of creating a green campus will be far easier to implement. The same individuals that disregard OUR lives and OUR safety are the same individuals that would litter, over turn bins, encourage vermin invasions (monkeys etc.), damage 'greenery' etc. Treat the cause not the symptoms."

The following section summarises the general patterns that were observed regarding staff members' opinions when asked to indicate any other practices they felt were necessary for NMMU to become a 'greener' University:

- Most staff members called for greater awareness to not only educate NMMU staff and students on how to be more 'greener' in their daily activities, but also to change their mindset / attitude toward the conservation of the natural environment. An 'education session' for staff and students was suggested to raise awareness. Other staff members said that greater awareness needs to be raised about existing environmental management practices at NMMU.
- Staff members once again raised their concerns about recycling on NMMU campuses. Some proposed that greater awareness be raised about this issue, while others called for simpler and easier ways to recycle. Quite a number of staff said that they just do not

know where and how to recycle on campus. Some asked that other materials such as plastic and glass be recycled too. One staff member indicated that he /she has been trying to obtain recycling bins on campus but with no success.

- Some staff members also commented on the inefficient energy practices happening across NMMU campuses. They mentioned that a single switch operates multiple lights in different offices which prevents them from switching off lights out of consideration for other staff members. It was also indicated that lights are left on unnecessarily and that some staff members refuse to turn off lights.
- One staff member raised concern about the inefficient water usage on campus, noting that sprinklers wet the concrete instead of the grass and that irrigation takes place during the hottest times of the day.
- It was further suggested that a Council resolution is needed to speed up the process of 'greening' NMMU. "*Council should have a green committee, and our internal auditing as well as annual reporting should include specific targets for rating on energy and waste.*"
- Another suggestion was to develop and publish a declaration that states the University's commitment to becoming a more environmentally friendly organisation[4]. This is a very valid comment and indeed a crucial step in designing and implementing an EMS.

7.8 Summary of staff perceptions on 'greening' the University

Staff members perceived a number of issues pertaining to environment management at NMMU as very important. As they respect plant and animal life on campus, it comes as no surprise that protecting the natural environment and maintaining plant and animal biodiversity are important priorities to them. Staff also stressed that NMMU should become a leader in environmental management, not only among South African universities, but also among local organisations. Staff members showed great interest and willingness to participate in actions to 'green' the University and thought that 'greening' the University will have a positive financial impact. Many staff members were already promoting good environmental management principles among their colleagues and students.

As in the case of students, only a small age of staff (only 13.9%) participated in programmes to 'green' the University at the time of the survey. Programmes in which staff members were involved in were mainly informal in nature and ranged from recycling paper to 'greening' the new NMMU Business School building (see Appendix C for more details in this regard).

In terms of incentives for 'going green', competitions, financial incentives and awards for 'green' status were generally supported. In contrast to the students, some staff members indicated that they did not need incentives to motivate them to become more environmentally conscious. They can serve as valuable role models in NMMU's 'greening' campaigns.

Academics were generally in favour of incorporating environmental management topics into existing NMMU modules and developing dedicated modules on selected environmental management topics. As in the case with NMMU students, academics viewed topics relating to 'green' design and construction as the most important environmental management topic to incorporate into existing NMMU modules and to be developed into a dedicated module.

[4] Developments in this regard are underway with the establishment of the South East African Climate Consortium (SEACC). See Appendix D for more details on NMMU's role in this regard.

Academics viewed government funding as critical for the development of 'green' modules and a full qualification (preferably to be offered at undergraduate level).

Several academics did however request opportunities to enhance their knowledge of selected 'green' topics. Schulze and Steyn (2003:155) highlight the importance of providing professional development opportunities to educators (especially to older and more experienced ones) as it serves as a valuable intrinsic motivator.

Academics viewed 'green' research as important and once again requested that opportunities and funding be made available to encourage more research on environmental management topics. At the time of the survey, staff performed various 'greening' activities whilst on campus, the most common centring on water and energy conservation.

The awareness and willingness to 'go green' among staff is clearly present - it just needs to be more focused and supported through the provision of funding, infrastructure and training opportunities. The commitment of top management is critical in fostering a 'greener' culture on campus. At present NMMU's vision is to be "a values-driven university and to be the leader in optimising the potential of our communities towards sustainable development in Africa". As respect for the natural environment and the implementation of good environmental management principles form the foundation of sustainable development, top management is encouraged to take the recommendations of staff seriously. As one staff member commented: *"It's not that hard. Let's stop talking...and actually start doing!*". Another also said: *"it is time that the environment becomes a priority at NMMU"*.

8 SIGNIFICANT DIFFERENCES IN STAFF PERCEPTIONS

In this section, significant differences in the perceptions of staff will be investigated based on gender, age, highest level of education, job description (administrative vs. academic) and campus where the staff member is working. When evaluating the following results it should be kept in mind that two sections of the staff questionnaire (those dealing with 'green' education and 'green' research at NMMU) were only completed by academic staff (N = 126). Statistical significance was measured at the five percent confidence level. Practical significance was measured by means of Cohen's *d* and Eta-squared η^2 using the guideline set out in Table 18.

8.1 Gender

To test whether gender influences the 'green' perceptions and actions of NMMU staff the following null hypotheses were formulated:
$H_{0,6}$: There is no difference between male and female staff with regard to their perceptions of:
$H_{0,6.1}$: Environmental management at NMMU
$H_{0,6.2}$: Incentives for 'going green'
$H_{0,6.3}$: 'Green' education at NMMU
$H_{0,6.4}$: 'Green' research at NMMU
$H_{0,6.5}$: 'Green' practices at NMMU

8.1.1 Environmental management at NMMU (this section was completed by all staff)

As indicated in Table 41, several significant differences exist in the perceptions of male and female staff on environmental management at NMMU.

Table 41: Significant differences in staff members' perceptions of environmental management at NMMU based on gender

Statements	Mean - Male	Mean – Female	t-value	df	p-value	Cohen's $d^{(a)}$
Q3_2: I have an impact on the natural environment on the NMMU campus where I work.	4.3	3.8	3.5	249	0.000	0.45
Q3_3: I have become more aware of my impact on the natural environment on the NMMU campus where I work within the past 12 months.	3.5	3.0	2.9	249	0.005	0.37
Q3_4: It is important to me that NMMU becomes a leader in the field of good environmental management among South African universities.	4.6	4.2	3.3	248	0.001	0.42
Q3_5: It is important to me that NMMU becomes a leader in the field of good environmental management among organisations in South Africa.	4.6	4.2	3.5	249	0.001	0.44
Q3_7: 'Greening' NMMU will save the University money.	4.0	3.7	2.1	246	0.036	0.27
Q3_8: Engaging in 'greening' initiatives at the NMMU will not be too much effort for me.	4.1	3.7	2.4	248	0.016	0.31
Q3_11: I am interested in becoming involved in programmes to conserve natural resources at NMMU.	3.8	3.6	2.0	247	0.041	0.26
Q3_16: I respect all plant life on the campus where I work.	4.7	4.4	2.6	250	0.009	0.34
Q3_17: I respect all animal life on the campus where I work.	4.7	4.4	2.0	249	0.043	0.26

(a) Practical significance was 'small' for all of the statements

Table 42: Significant differences in academics' perceptions of 'green' education at NMMU based on gender

Statements	Mean - Male	Mean - Female	t-value	df	p	Cohen's $d^{(a)}$
Q4_8: It will be valuable if a topic such as environmental law can be incorporated into an EXISTING NMMU module.	3.8	4.3	2.7	121	0.009	0.48
Q4_24: It is important that the Government makes financing available to the NMMU for the development of a full qualification in environmental management.	4.0	4.4	2.1	122	0.040	0.37
Q4_25: NMMU should provide significant staff development opportunities to enhance teaching in environmental issues.	3.8	4.3	2.8	122	0.007	0.50

(a) Practical significance was 'small' for the first two statements and 'moderate' for the third statement

Table 43: Significant differences in 'green' practices of staff based on gender

Statements	Mean - Male	Mean - Female	t-value	df	p	Cohen's $d^{(a)}$
Q6_1: While on campus, do you switch off your computer when you are done using it?	4.1	3.6	2.7	250	0.010	0.34
Q6_9: While on campus, do you print and copy documents on both sides of a page?	3.5	3.1	2.2	247	0.032	0.28
Q6_13: While on campus, do you re-use the reverse side of previously used paper for scrap paper and drafts?	4.3	3.8	3.4	250	0.001	0.43

(a) Practical significance was 'small' for all three statements

For all of the above statements, male respondents had higher mean scores than females indicating that male staff at NMMU was more concerned about environmental management issues than female staff. Men were in particular more concerned about NMMU's reputation for becoming a leader in the field of good environmental management in South Africa (Q3_4 and Q3_5). In a study about gender difference in 'green' purchase behaviour in Hong Kong, Lee (2009:88) also found that males had a significantly average score on self identity in environmental protection than females. At the time of the survey, men were also more concerned about their impact on the natural environment on campus. The findings in Table 40 however contradict literature on socially responsible and 'green' investing which show that female investors the USA tend to be 'greener' in their outlook (Beal & Goyen 1998:129; Krumsiek 1997:25).

As significant differences exist between the perceptions of male and female staff on environmental management at NMMU, $H_{0,6.1}$ can be rejected.

8.1.2 Incentives for 'going green' (this section was completed by all staff)

As t-tests did not reveal any significant differences in the perceptions of male and female staff with regard to incentives for 'going green', $H_{0,6.2}$ cannot be rejected. This finding corresponds to empirical evidence reported by Schulze and Steyn (2003:138) who found that male and female educators are motivated by the same factors.

8.1.3 'Green' education at NMMU (this section completed by academic staff only)

The statistics in Table 42 reveal that three significant differences exist in the perceptions of male and female academics on 'green' education at NMMU. Not only did female academics view the integration of environmental management topics into existing modules as more important than their male counterparts, they also requested more support (in terms of the availability of funding and staff development opportunities) to 'green' NMMU modules.

As significant differences exist in the perceptions of male and female staff on the topic of 'green' education at NMMU, $H_{0,6.3}$ can be rejected.

8.1.4 'Green' research at NMMU (this section was completed by academic staff only)

No significant differences were observed in the perceptions of male and female academics on 'green' research at NMMU. As such $H_{0,6.4}$ cannot be rejected.

8.1.5 'Green' practices at NMMU (this section was completed by all staff)

Three significant differences exist in the 'green' practices of male and female staff whilst on campus. Details are indicated in Table 43. In all three cases, males engaged more in 'green' practices whilst on campus than females. As such $H_{0,6.5}$ can be rejected.

The mixed findings on gender differences contradict the literature on socially responsible and 'green' investing (Beal & Goyen 1998:129; Krumsiek 1997:25) which claims that women are 'greener' in their outlook.

8.2 Age

For the purpose of this research three age categories for staff members were used: between 22 and 30, between 31 and 40 and older than 40 years of age. To test whether any differences exist among NMMU staff of different ages, the following null hypotheses were formulated:
$H_{0,7}$: There is no difference between younger and older staff with regard to their perceptions of:
$H_{0,7.1}$: Environmental management at NMMU
$H_{0,7.2}$: Incentives for 'going green'
$H_{0,7.3}$: 'Green' education at NMMU
$H_{0,7.4}$: 'Green' research at NMMU
$H_{0,7.5}$: 'Green' practices at NMMU

8.2.1 Environmental management at NMMU (this section was completed by all staff)

The statistics in Table 44 indicate that three significant differences exist between the perceptions of staff of varying ages.

Table 44: Significant differences in staff members' perceptions of environmental management at NMMU based on age

Statements	Mean - 22-30 years	Mean - 31-40 years	Mean - Older than 40 years	F-value	p-value	Eta-squared[(a)]
Q3_2: I have an impact on the natural environment on the NMMU campus where I work.	3.6	4.2	4.1	4.0	0.020	0.03
Q3_8: Engaging in 'greening' initiatives at the NMMU will not be too much effort for me.	3.5	3.9	4.0	3.8	0.023	0.03
Q3_14: It is important to me that NMMU maintains plant biodiversity on the campus where I work.	4.0	4.3	4.5	6.2	0.002	0.05
Q3_15: It is important to me that NMMU maintains animal biodiversity on the campus where I work.	4.1	4.2	4.5	4.3	0.014	0.03

(a) Practical significance was 'small' for all four statements

With regard to Q3_2 (I have an impact on the natural environment), the Tukey HSD test reveals significant differences in the perceptions of staff older than 40 and both of the younger age groups i.e. with the 22-30 year category ($p = 0.019$) and with the 31-40 year category ($p = 0.038$). Older staff might be more aware of the legacy they are leaving to future generations, might feel a sense of guilt in terms of the damage that have already inflicted on the natural environment during their lifetimes and might even attach more value to their constitutional rights (such as the right to clean air and water) than younger colleagues. The literature on intergenerational justice suggests that there is a close correlation between age and a respondent's sense of intergenerational justice (Rydell 2005:4; Hamil-Luker 2001:386).

At the time of the survey, older staff members were more willing to engage in 'greening' initiatives at NMMU (Q3_2) and did not see it as too much effort (which is in contrast to the

perceptions of staff in the 22-30 age category (p = 0.038). Staff older that 40 was also significantly more concerned about maintaining plant and animal biodiversity on campus compare to their younger colleagues in this regard. Significant differences between the 40+ group and the 22-30 category were noted for Q2_14 (p = 0.002) and between the 40+ group and the 30-40 group for Q2_15 (p = 0.042).

As the perceptions of older staff differ significantly from those of younger colleagues, $H_{0,7.1}$ can be rejected.

8.2.3 Incentives for 'going green' (this section was completed by all staff)

Only one significant difference was found in the perceptions of staff of varying ages on this topic. The difference relates to Q2_1 (I would be more willing to engage in 'greening' actions at the University if incentives were offered) (F = 4.4; p = 0.013).

A statistically significant difference is observed between the youngest and the oldest age categories (Eta-squared = 0.03; small practical significance). In line with earlier findings, younger colleagues (like the students in this sample) were more willing to engage in 'green' initiatives if incentives such money, prizes or awards were offered. This is evident from the higher mean score that staff in the 22-30 age category had relative to older colleagues (Table 45). This finding is also in line with research that shows that younger staff is more interested in financial rewards as they are in the life cycle stage where they are raising families and acquiring expensive assets (Schulze & Steyn 2003:138).

Table 45: Tukey HSD test for Q2_1: I would be more willing to engage in 'greening' actions at the University if incentives were offered.

	22-30 years Mean score = 4.0	31-40 years Mean score = 3.4	Older than 40 years Mean score = 3.2
22-30 years		0.140	0.008
31-40 years	0.140		0.641
Older than 40 years	0.008	0.641	

Since a significant difference exists in the perceptions of staff of different ages regarding incentives for 'going green', $H_{0,7.2}$ can be rejected.

8.2.4 'Green' education at NMMU (this section was completed by academic staff only)

Table 46 indicates that three significant differences exist in the perceptions of staff of different ages on 'green' education at NMMU.

Table 46: Significant differences in staff members' perceptions of 'green' education at NMMU based on age

Statements	Mean - 22-30 years	Mean - 31-40 years	Mean - Older than 40 years	ANOVA p-value	Eta-squared[(a)]
Q4_3: It will be valuable if a topic such as environmental journalism can be incorporated into an EXISTING module.	3.9	3.2	4.0	0.003	0.09
Q4_4: It will be valuable if a topic such as environmental reporting (accounting) can be incorporated into an EXISTING module.	4.1	3.4	3.9	0.033	0.06
Q4_6: It will be valuable if a topic such as ecological ethics can be incorporated into an EXISTING module.	4.1	3.7	4.3	0.029	0.06

(a) Practical significance was 'small' for all three statements

With regard to Q4_3: It will be valuable if a topic such as environmental journalism can be incorporated into an existing NMMU module, a significant difference was noted between the perceptions of academic staff in the 31-40 age category and those older than 40 (*post hoc test* p = 0.002). Academics older than 40 years of age were more in favour of the integration of a topic such as environmental journalism into an existing module as compared to younger colleagues. This finding ties in with calls from staff in the open-ended questions to create a greater awareness of 'green' issues on campus and in civil society. Older staff might just have a greater appreciation for the role that better informed journalists can play in this regard compared to younger, less experienced staff.

The same situation prevails with regard to Q4_6 (It will be valuable if a topic such as ecological ethics can be incorporated into an existing NMMU module). Academics older than 40 attached more value to a topic such as ecological ethics than their younger colleagues (*post hoc test* p = 0.019).

Although the ANOVA highlighted a significant difference between age groups with regard to Q4_4, the Tukey HSD test was not powerful enough to indicate a pair wise significance difference at the five percent level.

Based on these results, $H_{0,7.3}$ can be rejected. From the evidence presented it seems that academics older than 40 are just as concerned about integrating environmental management topics into NMMU syllabi and developing dedicated modules as their younger colleagues.

8.2.5 'Green' research at NMMU (this section was completed academic staff only)

$H_{0,7.4}$ cannot be rejected as no significant differences were observed in the 'green' practices of NMMU staff of different ages.

8.2.6 'Green' practices at NMMU (this section was completed by all staff)

Only one statistically significant difference was observed in the 'green' actions of staff of different ages ($F = 3.8$; $p = 0.023$; Eta $\eta^2 = 0.02$; 'small' practical significance). As indicated in Table 47, this related to recycling.

Table 47: Tukey HSD test for Q6_7: While on campus, do you recycle paper in the bins provided to reduce waste on campus?

	22-30 years Mean score = 3.075	31-40 years Mean score = 3.300	Older than 40 years Mean score = 3.2081
22-30 years		0.712	0.036
31-40 years	0.712		0.162
Older than 40 years	0.036	0.162	

Based on the *post hoc* test p-values contained in Table 47, it seems that staff older than 40 are more conscientious about recycling paper than younger staff.

Given this significant difference, $H_{0,7.5}$ can be rejected.

8.3 Educational level

In this section, the researchers were interested in seeing whether staff members with higher levels of education were more concerned about 'greening' the University. Four educational levels were used for this purpose, namely: Matric/Grade 12, national diploma, degree and postgraduate degree. To test whether educational level influences a staff member's 'green' perceptions and actions the following null hypotheses were formulated:
$H_{0,8}$: There is no difference between staff with different levels of education with regard to their perceptions of:
$H_{0,8.1}$: Environmental management at NMMU
$H_{0,8.2}$: Incentives for 'going green'
$H_{0,8.3}$: 'Green' practices at NMMU

Only three sub-hypotheses were formulated as level of education as a biographic descriptor was only applicable to three sections of the staff questionnaire. By definition academics (who completed the sections dealing with 'green' education and research) should have a postgraduate qualification.

8.3.1 Environmental management at NMMU (this section was completed by all staff)

As illustrated in Table 48 three significant differences exist in the perceptions of staff with different levels of education on environmental management at NMMU.

Table 48: Significant differences in staff members' perceptions of environmental management at NMMU based on level of education

Statements	Mean - Matric / Grade 12	Mean - National Diploma	Mean - Degree	Mean - Postgraduate degree	ANOVA p-value	Eta squared[(a)]
Q3_12: I promote good environmental management principles among my colleagues.	2.8	3.4	3.4	3.6	0.002	0.06
Q3_13: I promote good environmental management principles among my students.	2.4	3.0	3.4	3.7	0.000	0.11
Q3_15: It is important to me that NMMU maintains animal biodiversity on the campus where I work.	4.5	4.0	4.4	4.4	0.048	0.03

(a) Practical significance was 'small' for statements Q3_12 and Q3_15, but 'moderate' for Q3_13

A significant difference is noted between staff with a Matric / Grade 12 and those with a postgraduate degree in terms of promoting good environmental practices among their colleagues (*post hoc* test p = 0.000) and students (*post hoc* test p = 0.000). The latter group was found to be more proactive in this regard. Staff with a postgraduate qualification also viewed the promotion of good environmental management principles among students as more important than staff with a national diploma (*post hoc* test p = 0.008). Better qualified staff (in particularly those holding a postgraduate degree vs those with a national diploma) felt more strongly about maintaining animal biodiversity on campus (*post hoc* test p = 0.041).

As staff with higher levels of education tend to be more concerned about environmental management at NMMU, $H_{0,8.1}$ can be rejected.

8.3.2 Incentives for 'going green'

No significant differences exist in the perceptions of staff with different levels of education on incentives for 'going green'. Consequently $H_{0,8.2}$ cannot be rejected.

8.3.3 'Green' practices at NMMU

No significant differences exist in the perceptions of staff with different levels of education in terms this topic. Consequently $H_{0,8.3}$ cannot be rejected.

8.4 Job description (administrative vs. academic)

To test whether a staff member's job description influences his/her 'green' perceptions and actions the following null hypotheses were formulated:
$H_{0,9}$: There is no difference between administrative and academic staff with regard to their perceptions of:
$H_{0,9.1}$: Environmental management at NMMU
$H_{0,9.2}$: Incentives for 'going green'
$H_{0,9.3}$: 'Green' practices at NMMU

Only three sub-hypotheses were formulated as job description as a biographic descriptor was only applicable to three sections of the staff questionnaire. By definition, academic staff should hold a postgraduate qualification which renders comparisons of this biographical description impossible in the sections dealing with 'green' education and 'green' research which were only completed by academics.

8.4.1 Environmental management at NMMU (this section was completed by all staff)

A t-test shows that administrative staff members have become more aware of their impact on the natural environment than academics in the 12 months up to August 2009. Academics were however more concerned about maintaining plant biodiversity on campus and promoting good environmental management principles among students. The significant difference in the perceptions of academic and administrative staff on Q3_13 (I promote good environmental management principles among my students) might also be related to the fact that academics generally have a higher level of education compared to administrative staff.

Based on the findings, $H_{0,9.1}$ can be rejected.

Table 49: Significant differences in staff members' perceptions of environmental management at NMMU based on job description

Statements	Mean - Administration	Mean - Academic	t-value	df	p	Cohen's $d^{(a)}$
Q3_3: I have become more aware of my impact on the natural environment on the NMMU campus where I work within the past 12 months.	3.5	3.1	2.2	249	0.028	0.28
Q3_13: I promote good environmental management principles among my students.	3.0	3.8	-5.8	238	0.000	0.75
Q3_14: It is important to me that NMMU maintains plant biodiversity on the campus where I work.	4.2	4.5	-2.2	247	0.029	0.28

(a) Practical significance was 'small' for all three statements

Table 50: Significant differences in staff members' perceptions of incentives for 'going green' based on job description

Statements	Mean - Administration	Mean - Academic	t-value	df	p	Cohen's $d^{(a)}$
Q2_4: A 'green' employee of the year award will serve as incentive for me to become more environmentally sensitive.	3.4	3.0	2.4	247	0.017	0.30
Q2_5: A 'green' award for any initiative to protect the natural environment on campus will motivate me to become 'greener' in my daily activities.	3.6	3.1	2.9	247	0.003	0.37

(a) Practical significance was 'small' for both statements

8.4.2 Incentives for 'going green' (this section was completed by all staff)

The t-tests in Table 50 indicate that administrative staff will be significantly more motivated to become environmentally sensitive if 'green' awards are designed to recognise their efforts in this area. This might be due to the nature of their jobs. In contrast academics are inspired by intrinsic motivators, such as deriving satisfaction from seeing students grow and develop, administrative staff placing more emphasis on external motivators such as praise and financial incentives (Schulze & Steyn 2003:151).

Given these significant differences in the perceptions of administrative and academic staff on incentives for 'going green', $H_{0,9.2}$ can be rejected.

8.4.3 'Green' practices at NMMU (this section was completed by all staff)

No significant differences exist in the 'green' actions of administrative and academic staff. Consequently $H_{0,9.3}$ cannot be rejected. This finding was to be expected as all staff members have access to the same infrastructure on campus.

8.5 Faculty

To test whether the faculty in which an academic is employed influences his/her 'green' perceptions and actions the following null hypotheses were formulated:
$H_{0,10}$: There is no difference between academic staff employed in different faculties with regard to their perceptions of:
$H_{0,10.1}$: 'Green' education at NMMU
$H_{0,10.2}$: 'Green' research at NMMU

Only two sub-hypotheses were formulated since faculty as a biographic descriptor was only applicable to academics who completed the sections dealing with 'green' education and 'green' research at NMMU.

8.5.1 'Green' education at NMMU (this section was completed by academic staff only)

The statistics in Table 51 reveal only one statistically significant difference in the perceptions of academic staff from different faculties on 'green' education at NMMU.

Table 51: Significant differences in academics' perceptions of incorporating environmental management topics in modules offered at undergraduate level based on faculty

Statement	Mean – Science faculty	Mean – Business and Economic Sciences faculty	Mean – Other faculties	ANOVA p-value	Eta-squared[(a)]
Q4_22: All lecturers at NMMU should include environmental management topics in modules offered at undergraduate level.	2.5	3.2	2.8	0.048	0.05

(a) Practical significance was 'small' for this statement

The significant difference is noted between academics in the Science faculty and those in the Business and Economic Sciences faculty (*host hoc* test p = 0.035). Lecturers in the Business and Economic Sciences faculty were more convinced about the need for integrating

environmental management topics in modules offered at undergraduate level than their colleagues in the Science faculty. In contrast students in the Business and Economic Sciences faculty were less interested in learning about selected environmental management topics would add value to their qualifications. This contradiction is clearly shown in Table 52.

Table 52: Student and staff perceptions on the need for environmental literacy training at undergraduate level

Statement Q4_22: All lecturers at NMMU should include environmental management topics in modules offered at UNDERGRADUATE level.	**Science faculty**	**Business and economic Sciences faculty**	**Statistically significant difference**
Mean score student perceptions for Q4_22	4.4	3.8	No
Mean score staff perceptions for Q4_22	2.5	3.2	Yes

The notion that business education "leads to the erosion of character" is increasingly being documented by researchers such as Elegido (2009:16), James (2009) and Goshal (2005:75). They claim that continued exposure to the economic model of human beings as rational maximisers of individual utility tends to make students selfish and immoral. They argue that the recent wave of corporate scandals is not due to business schools not devoting enough attention to business ethics, but claim that "the very substance of what is taught in business schools" lies at the heart of the problem. From the statistics in Table 49, its seems that some academics in the Business and Economics Sciences faculty might be aware of this criticism against business education and thus want to expose their students to decision making models other than that of the 'rational individual utility maximising man'.

As shown in Table 52, students in the Science faculty really want to improve their environmental literacy skills (especially at undergraduate level), whereas academics in this faculty were not that keen on integrating selected 'green' topics into modules at undergraduate level. This might be indicative of a gap in lecturers' knowledge on selected topics (such as environmental law or ecological ethics) and could be addressed by means of workshops, training sessions and guest lecturers. Cognisance should however be taken of the existing workload of academic which might prevent them from attending. To overcome this problem, sessions could be duplicated.

"Recognition should be good enough, but I am sure some kind of green giveaway would assist. For all the above I suppose one have to write a report why you have done it so much better, but time! When will we get time for all of this? Building evidence that you are 'green' means outcomes must be formulated and progress monitored."

Based on these findings $H_{0,10.1}$ can be rejected.

8.5.2 'Green' research at NMMU (this section was completed by academic staff only)

With regard to 'green' research at NMMU, two significant differences exist in the perceptions of academics from different faculties.

Table 53: Significant differences in staff members' perceptions of 'green' research at NMMU based on faculty

Statements	Mean – Science faculty	Mean – Business and Economic Sciences faculty	Mean – Other faculties	ANOVA p-value	Eta-squared[(a)]
Q5_2: I am interested in doing research about environmental management topics.	3.4	3.4	2.7	0.007	0.08
Q5_3: I would do research about environmental management if funding was available to do so.	3.6	3.3	2.8	0.015	0.07

(a) Practical significance was 'small' for both statements

Table 54: Significant differences in staff members' perceptions of environmental management at NMMU based on campus

	Campus – mean scores					ANOVA p-value	Eta-squared[(b)]
Statement	South	North	Missionvale	Second Avenue / Bird street[(a)]	George		
Q3_7: 'Greening' NMMU will save the University money.	3.9	3.5	4.1	4.2	3.8	0.012	0.05

(a) Due to small numbers of respondents from the Second Avenue and Bird Street campuses, these two campuses were treated as one group.
(b) Practical significance was 'small' for this statement

Academics employed in the Science and Business and Economic Sciences faculties, have significantly higher mean scores than those in other faculties in terms of their interest in conducting research about environmental management topics (*post hoc* tests p = 0.017 and p = 0.038 respectively). Academics in the Science faculty further indicated a significantly higher level of interest than colleagues in other faculties in doing research on environmental management topics should funding be available to do so. This is also significantly higher than the level of interest expressed by academics in the Business and Economic Sciences faculty should funding be available (*post hoc* test p = 0.138). This is probably because the cost of conducting research in the natural science field is significantly more expensive than in other disciplines.

As significant differences are apparent in the views of academics from different faculties on 'green' research at NMMU, $H_{0,10.2}$ can be rejected.

8.6 Campus

To test whether the campus where a staff member is working influences his/her perceptions on the 'greening' of the University, the following null hypotheses were formulated:
$H_{0,11}$: The campus where a staff member is working is unrelated to his/her perceptions of:
$H_{0,11.1}$: Environmental management at NMMU
$H_{0,11.2}$: Incentives for 'going green'
$H_{0,11.3}$: 'Green' education at NMMU
$H_{0,11.4}$: 'Green' research at NMMU
$H_{0,11..5}$: 'Green' practices at NMMU

8.6.1 Environmental management at NMMU (the section was completed by all staff)

With regard to statement Q3_7 ('Greening' NMMU will save the University money), a significant difference was observed in the perceptions of staff from different campuses. In the first instance, between Summerstrand North and Summerstrand South campuses (*post hoc* test p = 0.027) and in the second case between Summerstrand North and Second Avenue/Bird Street campuses (p = 0.049). In both cases staff employed on Summerstrand North campus were less convinced that 'going green' will save the University money. This might be due to the fact that some of the respondents on the Summerstrand North campus are employed in the Engineering, Built Environment and IT faculty and might thus have focused more on the short-term investments required to 'green' existing infrastructure than on the long-term financial benefits of doing so.

Although this is a widely held perception, research has shown that it is not actually true. A recent study in the USA for example showed that most buildings with a modest 'green' rating cost no more to construct than conventional buildings, and that even those with a high rating cost a mere two to six percent more than conventional buildings (Morris 2007:55). Research also shows that employees working in environmentally friendly buildings are more productive and that and 'green' buildings are good for an organisation's corporate image. Another study in the USA also showed that the benefits of 'green' schools by far outweigh the costs of building them (It's not easy being green – or is it? 2009:19). Not only did schools save on energy costs, learners also performed better.

As a significant difference in the perceptions of staff from different campuses on environmental management at NMMU, $H_{0,11.1}$ can be rejected.

8.6.2 Incentives for 'going green' (this section was completed by all staff)

No significant differences were noted in the perceptions of staff employed at different campuses on incentives for 'going green'. Consequently $H_{0,11.2}$ cannot be rejected.

8.6.3 'Green' education at NMMU (this section was completed by academic staff only)

As no significant differences exist in the perceptions of academics employed at different campuses on 'green' research at NMMU, $H_{0,11.3}$ cannot be rejected.

8.6.4 'Green' research at NMMU (this section was completed by academic staff only)

Academics working at Summerstrand South campus expressed a greater interest in conducting research on environmental management topics compared to academics at other campuses, provided that funding and development opportunities were made available. This might be attributed to the fact that academics at the erstwhile UPE (now Summerstrand South campus) have been more exposed to conducting interdisciplinary research, whereas this was not the case at the other campuses (ertwhile Vista and Port Elizabeth Technikon).

Table 55: Significant differences in staff members' perceptions of 'green' research at NMMU based on campus

Statements	Mean – Other campuses	Mean - South campus	t-value	df	p	Cohen's *d*[(a)]
Q5_3: I would do research about environmental management if funding was available to do so.	2.7	3.4	-2.9	123	0.004	0.52
Q5_4: I would do research about environmental management if the opportunity was there to do so.	2.9	3.5	-2.5	123	0.016	0.44

(a) Practical significance was 'moderate' for statement Q5_3 and 'small' for statement Q5_4

As such, $H_{0,11.4}$ can be rejected.

8.6.5 'Green' practices at NMMU (all staff)

$H_{0,11.5}$ cannot be rejected as no significant differences were found in the 'green' practices of staff employed at different campuses.

8.7 Summary of significant differences in staff perceptions

Table 56 presents a summary of the hypotheses testing for the staff questionnaire.

Table 56: Summary of significant differences in staff perceptions

Null hypothesis	Sub-hypotheses	Outcome of test	Significant differences
$H_{0,6}$: There is no difference between male and female staff with regard to their perceptions of:	$H_{0,6.1}$: Environmental management at NMMU	Can be rejected	Male respondents consistently had higher mean scores than females indicating that males were more concerned about environmental management at NMMU, particularly in terms of their impact on the natural environment and NMMU's reputation in becoming a leader in environmental management in South Africa.
	$H_{0,6.2}$: Incentives for 'going green'	Cannot be rejected	-
	$H_{0,6.3}$: 'Green' education at NMMU	Can be rejected	Not only did female academics view the integration of environmental management topics into existing modules as more important than their male counterparts, but they also expressed stronger views with regard to support required for 'greening' NMMU syllabi (such as the availability of funding and staff development opportunities).
	$H_{0,6.4}$: 'Green' research at NMMU	Cannot be rejected	-
	$H_{0,6.5}$: 'Green' practices at NMMU	Can be rejected	In all three cases, males engaged in more 'green' practices whilst on campus compared to females.
$H_{0,7}$: There is no difference between younger and older staff with regard to their perceptions of:	$H_{0,7.1}$: Environmental management at NMMU	Can be rejected	Compared to younger staff, staff older than 40 were more aware of their impact on the natural environment, more willing to engage in 'greening' initiatives at NMMU and more concerned about maintaining plant and animal biodiversity on the campus where they work.
	$H_{0,7.2}$: Incentives for 'going green'	Can be rejected	Younger colleagues (in the 22-30 age category) were more wiling to engage in 'green' initiatives on campus should incentives such money, prizes or awards were offered.
	$H_{0,7.3}$: 'Green' education at NMMU	Can be rejected	Academics older than 40 were more concerned about integrating environmental topics into existing NMMU modules than younger colleagues.
	$H_{0,7.4}$: 'Green' research at NMMU	Cannot be rejected	-
	$H_{0,7.5}$: 'Green' practices at NMMU	Can be rejected	Staff older than 40 showed a greater concern for the natural environment when going about their daily activities on campus than younger colleagues.
$H_{0,8}$: There is no difference between staff with different levels of education with regard to their perceptions of:	$H_{0,8.1}$: Environmental management at NMMU	Can be rejected	Staff members with higher levels of education tend to be more concerned about environmental management at NMMU than their less qualified colleagues. Staff with higher levels of education scored higher than less qualified colleagues in terms of promoting 'green' practices among their peers and students. Better qualified staff furthermore showed a greater concern for maintaining animal biodiversity on campus.
	$H_{0,8.2}$: Incentives for 'going green'	Cannot be rejected	-
	$H_{0,8.3}$: 'Green' practices at NMMU	Cannot be rejected	-

$H_{0,9}$: There is no difference between administrative and staff with regard to their perceptions of:	$H_{0,9.1}$: Environmental management at NMMU	Can be rejected	Administrative staff members have become more aware of their impact on the natural environment in the 12 months before August 2009. On the other hand academics viewed maintaining plant biodiversity on campus as more important than administrative staff. As academics are in closer contact with students, they scored higher in terms of promoting good environmental management practices among students than administrative staff.
	$H_{0,9.2}$: Incentives for 'going green'	Can be rejected	Administrative staff will be significantly more motivated to become environmentally sensitive if 'green' awards (such as 'green' employee of the year or a 'green' award for any initiative to protect the natural environment on campus) are available to recognise their efforts in this regard.
	$H_{0,9.3}$: 'Green' practices at NMMU	Cannot be rejected	-
$H_{0,10}$: There is no difference between academic staff employed in different faculties with regard to their perceptions of:	$H_{0,10.1}$: 'Green' education at NMMU	Can be rejected	Lecturers in the Business and Economic Sciences faculty were more convinced about the need for integrating environmental management topics in modules offered at undergraduate level than colleagues in other faculties.
	$H_{0,10.2}$: 'Green' research at NMMU.	Can be rejected	Academics employed in the Science and Business and Economic Sciences faculties, had significantly higher mean scores than colleagues in other faculties in terms of their interest in conducting research about environmental management topics. Academics in the Science faculty further indicated a significantly higher level of interest in doing research on environmental management topics should funding be available to do so.
$H_{0,11}$: The campus where a staff member is working is unrelated to his/her perceptions of:	$H_{0,11.1}$: Environmental management at NMMU	Can be rejected	Staff working at the Summerstrand North campus was less convinced than colleagues on other campuses that 'going green' will save the University money.
	$H_{0,11.2}$: Incentives for 'going green'	Cannot be rejected	-
	$H_{0,11.3}$: 'Green' education at NMMU	Cannot be rejected	-
	$H_{0,11.4}$: 'Green' research at NMMU	Can be rejected	Academics working at the Summerstrand South campus were more willing to conduct research on environmental management topics compared to academics at other campuses, provided that funding and development opportunities were made available.
	$H_{0,11..5}$: 'Green' practices at NMMU	Cannot be rejected	-

From the evidence presented in Table 56, it is clear that significant differences exist in the perceptions of staff based on biographical details. One important finding is that staff members with higher levels of education are more concerned about 'green' issues. This is especially important if staff members (and academics in particular) are to create a greater awareness of environmental management issues among NMMU students. The responsible students of today will be the responsible professionals and policy makers of the future.

9 DIFFERENCES BETWEEN STAFF AND STUDENTS' PERCEPTIONS

This section deals with significant differences in the perceptions of NMMU staff and students. Statistical significance was measured at the five percent confidence level. Cohen's *d* and Cramér's *V* values were calculated to indicate practical significance and were interpreted based on the guidelines presented in Table 18. The following null hypotheses were formulated:
$H_{0,12}$: There are no significant differences in the perceptions of NMMU staff and students on:
$H_{0,12.1}$: Environmental management at NMMU
$H_{0,12.2}$: Incentives for 'going green'
$H_{0,12.3}$: 'Green' education at NMMU
$H_{0,12.4}$: 'Green' research at NMMU
$H_{0,12.5}$: 'Green' practices at NMMU

9.1 Environmental management at NMMU

Based on the statistics in Table 57, four statistically significant differences are observed in the perceptions staff and students with regard to environmental management at NMMU.

Staff members agreed more strongly than students with the notion that 'greening' NMMU will save the University money. This might be due to staff having more experience with financial matters than students. Students however fared better than staff in terms of encouraging 'green' practices among their peers. This might be because younger people have been more exposed to 'green' issues at primary and secondary school in recent years (SADC Regional Environmental Education Programme 2010) and are generally more 'connected' via social networking sites.

Staff members apparently have more respect for animal life on campus and attach more value to maintaining animal biodiversity on campuses. This might be due to the fact that they spend more hours on campus than students and want to feel proud of their work environment. It is also important to view students' comments on the presence of monkeys on campus:

> *"We should conserve the plants- the monkeys should go they are an inconvenience."*
>
> *"Being green is important however it should not be at the expense of students. These monkeys for example inconvenience most people even if they are not aggravated."*
>
> *"Design special bins for outside, to keep the monkeys from trashing. These monkeys are not supposed to rely on students food, it makes them aggressive."*

Table 57: Significant differences in staff members' and students' perceptions of environmental management at NMMU

	Mean Staff	Mean Students	t-value	df	p	Valid N Staff	Valid N Students	Std.Dev. Staff	Std.Dev. Students	Cohen's $d_{(a)}$
Greening' NMMU will save the University money.	3.8	3.6	2.0	568	0.042	248	322	1.1	1.1	0.168
I promote good environmental management principles among my peers.	3.5	3.7	-2.5	566	0.012	247	321	1.1	1.1	0.210
It is important to me that NMMU maintains animal biodiversity on the campus where I work.	4.3	4.1	2.5	571	0.011	250	323	0.9	1.1	0.210
I respect all animal life on the campus where I work.	4.6	4.4	2.5	574	0.014	251	325	0.9	1.0	0.210

(a) Practical significance was 'small' for all the statements

Table 58: Significant differences in staff members' and students' perceptions of incentives for 'going green'

	Mean Staff	Mean Students	t-value	df	p	Valid N Staff	Valid N Students	Std.Dev. Staff	Std.Dev. Students	Cohen's d[(a)]
I would be more willing to engage in 'greening' actions at the University if incentives were offered.	3.4	3.9	-4.6	570	0.000	248	324	1.4	1.2	0.391
A 'green' **lecturer / student** of the year award will serve as incentive for me to become more environmentally sensitive.	2.9	3.5	-5.5	568	0.000	246	324	1.3	1.3	0.468
A 'green' researcher of the year award will serve as incentive for me to become more environmentally sensitive.	3.0	3.6	-5.5	567	0.000	245	324	1.3	1.2	0.467
A 'green' award for any initiative to protect the natural environment on campus will motivate me to become 'greener' in my daily activities.	3.2	3.6	-3.8	571	0.000	249	324	1.4	1.2	0.320
Incentives like competitions between departments or faculties for 'green' status would encourage me to become 'greener' in my daily activities.	3.4	3.7	-3.0	569	0.003	249	322	1.3	1.2	0.254

(a) Practical significance was 'small' for all the statements

A Cramér's V of 0.08 shows that significantly fewer students were involved in programmes at NMMU to conserve the natural environment in 2009 compared to staff members. This finding could be explained by the complete lack of 'green' programmes for students, whereas some staff members have been able to participate in departmental initiatives to 'go green' and engage. Staff might also have better access to printers which can print double-sided to save paper. As indicated in the open-ended responses of students in Section 5.6, there is an urgent need for formal initiatives / programmes on campus and in the residences / student villages.

9.2 Incentives for 'going green'

The statistics in Table 58 indicate that students would definitely be more motivated than staff to become 'greener' in their daily activities should incentives be offered. As cautioned earlier, incentives should not be the only means of encouraging 'greener' behaviour among students. The underlying virtues of respect for nature and future generations should be cultivated first.

9.3 'Green' education at NMMU

Table 59 indicates the statements where significant differences in the views held by staff and students on 'green' education at NMMU. Recall that this section of the staff questionnaire was only completed by academics.

Being experts in their respective fields, academics felt more strongly about incorporating selected environmental management topics into existing modules than students, especially with regard to topics such as environmental accounting, environmental economics and ecological ethics.

Academics were also more in favour of the development of a dedicated module in environmental economics compared to students. They are clearly not aware that such a module actually already exists. The module is offered as part of the Economics Honours programme (course code ECO400). It deals with topics such as economic incentives and human behavior, cost-benefit analysis and policy interventions (more details on this module are included in Appendix A).

Several students participating in this survey wanted all of their lecturers, at both undergraduate and postgraduate levels, to integrate environmental management topics into existing modules. The reason why lecturers might not be as enthusiastic as students, might be because some are battling to get through existing syllabi as it is - they don't have space to add new topics. Another reason might be that they are not informed enough about environmental management issues in their respective fields to integrate it with authority into their lectures. Workshops, training sessions and guest speakers could perhaps be organised to address this issue.

Table 59: Significant differences in academics' and students' perceptions of the perceived value of integrating environmental management topics into EXISTING modules

	Mean	Mean				Valid N	Valid N	Std.Dev.	Std.Dev.	
	Staff	Students	t-value	df	p	Staff	Students	Staff	Students	Cohen's d[(a)]
Q4_4: It will be valuable if a topic such as environmental reporting (accounting) can be incorporated into an EXISTING module.	3.8	3.5	2.5	444	0.011	123	323	1.0	1.2	0.270
Q4_5: It will be valuable if a topic such as environmental economics can be incorporated into an EXISTING module.	4.0	3.7	2.8	440	0.005	124	318	0.9	1.2	0.300
Q4_6: It will be valuable if a topic such as ecological ethics can be incorporated into an EXISTING module.	4.1	3.8	3.1	444	0.002	124	322	1.0	1.2	0.330
Q4_7: It will be valuable if a topic such as 'Green' IT can be incorporated into an NMMU module.	4.1	3.9	2.0	445	0.048	124	323	0.9	1.2	0.210
Q4_9: It will be valuable if a topic such as 'green' design and construction can be incorporated into an EXISTING module.	4.3	3.9	2.7	436	0.007	122	316	0.9	1.1	0.290

(a) Practical significance was 'small' for all the statement

Table 60: Significant differences in academics' and students' perceptions of the perceived value of developing DEDICATED modules on selected environmental management topics

	Mean	Mean				Valid N	Valid N	Std.Dev.	Std.Dev.	
	Staff	Students	t-value	df	p	Staff	Students	Staff	Students	Cohen's d[(a)]
Q4_12: It will be valuable if NMMU could offer a DEDICATED module in environmental economics.	3.787	3.530	1.983	435	0.048	122	315	1.115	1.250	0.210

(a) Practical significance was 'small' for this statement

Table 61: Significant differences in academics' and students' perceptions on other 'green' education issues at NMMU

	Mean	Mean				Valid N	Valid N	Std.Dev.	Std.Dev.	
	Staff	Students	t-value	df	p	Staff	Students	Staff	Students	Cohen's d[(a)]
Q4_19: It will be valuable for the NMMU to incorporate environmental management modules in POSTGRADUATE qualifications e.g. the MBA program.	4.0	3.6	3.2	439	0.002	123	318	1.0	1.2	0.340
Q4_21: All lecturers at NMMU should include environmental management topics in modules offered at UNDERGRADUATE level.	2.8	3.1	-2.6	434	0.009	124	312	1.2	1.4	0.280
Q4_22: All lecturers at NMMU should include environmental management topics in modules offered at POSTGRADUATE level.	2.8	3.2	-2.5	439	0.014	124	317	1.2	1.4	0.260

(a) Practical significance was 'small' for all the statements

Table 62: Significant differences in staff members' and students' perceptions of 'green' research at NMMU

	Mean	Mean				Valid N	Valid N	Std.Dev.	Std.Dev.	
	Staff	Students	t-value	df	p	Staff	Students	Staff	Students	Cohen's d[(a)]
Q5_2: I am interested in doing research about environmental management topics.	3.0	3.3	-2.1	444	0.035	125	321	1.4	1.3	0.220
Q5_5: It is important to me that 'green' research is conducted at NMMU.	4.3	4.1	2.0	443	0.047	125	320	0.9	1.1	0.210

(a) Practical significance was 'small' for both statements

9.4 'Green' research at NMMU

Two important findings are worth exploring in this section. Based on the statistics in Table 61, academics were significantly more in favour of 'green' research being conducted at NMMU than students. This finding ties in with previous findings where staff members were more in favour of integrating selected environmental management topics into existing modules. Academics clearly recognise the need to do research to increase their knowledge of 'green' topics in their respective fields before sharing this knowledge with their students. Academics might also be more aware than students of the internationally acclaimed research being conducted at NMMU.

A second finding relates to students who are more interested in doing 'green' research than staff. As students still require the guidance of an academic study leader or promoter, a win-win situation in terms of 'green' research is likely to take place at NMMU in future.

9.5 'Green' practices at NMMU

Based on the findings of Table 63, staff members engaged more regularly in 'green' behaviour whilst on campus than students did at the time of the survey. It might be that staff members have more opportunities to do so, for example having printers that can print double-sided, whereas students might not have access to such infrastructure. Students generally use computer labs and are thus less likely to switch computers off when they are done as compared to staff members who have their own PCs. It is however recommended that security staff is assigned the responsibility of switching off PCs when they are there and no students are using the labs.

Table 63: Significant differences in staff members' and students' 'green' practices

	Mean Staff	Mean Students	t-value	df	p	Valid N Staff	Valid N Students	Std.Dev. Staff	Std.Dev. Students	Cohen's d[(a)]
Q6_1: While on campus, do you switch off your computer when you are done using it?	3.9	2.8	7.9	570	0.000	252	320	1.4	1.7	0.660
Q6_2: While on campus, do you optimise the use of sunlight to reduce the use of electricity?	3.8	3.3	4.4	570	0.000	252	320	1.3	1.4	0.370
Q6_4: While on campus, do you turn off lights where possible?	4.3	3.6	7.3	566	0.000	249	319	1.0	1.4	0.620
Q6_9: While on campus, do you print and copy documents on both sides of a page?	3.3	2.5	6.5	564	0.000	249	317	1.4	1.5	0.550
Q6_13: While on campus, do you re-use the reverse side of previously used paper for scrap paper and drafts?	4.1	3.8	2.9	565	0.003	252	315	1.1	1.4	0.250

(a) Practical significance was 'moderate' for statements Q6_1, Q6_4 and Q6_9 and 'small' for the rest of the statements

Table 64: Summary of significant differences in staff members' and students' perceptions

Null hypothesis	Sub-hypotheses	Outcome of test	Significant differences
$H_{0,12}$: There is no significant difference between the perceptions NMMU staff and students on:	$H_{0,12.1}$: Environmental management at NMMU	Can be rejected	Four significant differences were observed. Staff perceived 'greening' NMMU to save money while students thought less so. Staff also respected animal life more then students did and more staff members were involved in programmes to conserve the natural environment than staff. Students were more likely to encourage good environmental management practices among their peers than staff.
	$H_{0,12.2}$: Incentives for 'going green'	Can be rejected	A number of differences exist regarding incentives to 'go green'. Students perceived incentives as more valuable in motivating them to 'go green' compared to staff.
	$H_{0,12.3}$: 'Green' education at NMMU	Can be rejected	Several significant differences exist between staff and student perception on 'green;' education at NMMU. Staff members were more enthusiastic than students about integrating 'green' topics into existing NMMU modules while staff showed more interest in the development of a dedicated module in environmental economics. Students were also more in favour of lecturers incorporating environmental management topics into both undergraduate and postgraduate programmes.
	$H_{0,12.4}$: 'Green' research at NMMU	Can be rejected	Two significant differences were observed between students and staff in this regard. Staff members were for in favour of doing 'green' research than students. Students were more willing to undertake research on environmental management topics should incentives be offered.
	$H_{0,12.5}$: 'Green' practices at NMMU	Can be rejected	Several significant differences exist between the extent of 'green' practices performed by staff and students. It was found that staff members were more active in 'green' activities than students.

9.6 Summary of significant differences in staff and students' perceptions

Based on statistical and practical significance, all five sub-hypotheses ($H_{0,12.1}$ - $H_{0,12.5}$) can be rejected. Pertinent differences in the perceptions of staff and students are highlighted in Table 64.

10 SUMMARY AND CONCLUSIONS

In this section the pertinent findings of the research will be presented.

10.1 Student perceptions

Students at NMMU perceived the conservation of the natural environment as very important. They had a great deal of respect for plant and animal life on campus, although some commented that the monkeys created a nuisance. Students felt strongly about maintaining plant and animal biodiversity on campus as well as establishing NMMU as a leader in environmental management among local universities and organisations.

Most students recognised that they have an impact on the natural environment and expressed their willingness to work towards mitigating this impact. At the time of the survey (August 2009), some students were already actively promoting good environmental management principles among their peers. Half of the students participating in the survey felt that 'green' initiatives will save the University money and will not be too expensive to implement. Although only a few students were involved in programmes aimed at conserving the natural environment on campus, a large percentage indicated their willingness to participate in such progammes, especially if incentives were offered. The most prolific suggestions for 'green' incentives involved money, competitions and prizes.

Students attached a high value to integrating selected environmental management topics into existing modules and developing dedicated modules. As shown in Table 65, topics relating to 'green' design and construction, environmental law, ecological ethics and 'green' IT were seen as the most valuable and relevant to their qualifications. It should be noted that some of these topics are already incorporated into a number of existing NMMU modules (see Appendix A for examples).

Table 65: Rankings of the perceived value of environmental management topics – student perceptions

Environmental management topics to be integrated into EXISTING modules	Environmental management topics to be developed into DEDICATED modules
1. 'Green' design and construction	1. 'Green' design and construction
2. Environmental law	2. Environmental law
3. 'Green' IT	3. Ecological ethics
4. Ecological ethics	4. 'Green' IT
5. Environmental journalism	5. Environmental journalism
6. Environmental economics	6. Environmental economics
7. Environmental reporting (accounting)	7. Environmental reporting (accounting)

In respect of 'green' research at NMMU, one in four students in this sample had already conducted such research in the 12 months leading up to the survey. A large percentage of students also expressed their willingness to do 'green' research if more opportunities and funding were made available to do so.

Students generally considered the natural environment in their daily activities whilst on campus. Ninety percent of students tried to conserve water whilst on campus while most kept doors closed between air-conditioned and non conditioned spaces. In addition many students switched off lights where possible and re-used scrap paper for notes. Most students staying in University residences / student villages were serious about conserving water, but seldom switched off lights or unplugged appliances that were no longer needed. This is a disconcerting finding, given the high cost of electricity.

Significant differences were observed in the perceptions of students based on gender, faculty, level of study, campus and whether the student lived on or off campus:

- Female students have generally become more aware of their impact on the natural environment, while male students placed more value on incentives to motivate them to become 'greener' in their daily activities.
- Students registered in the Science faculty placed a higher value on maintaining plant and animal biodiversity on campus. Science students were significantly more in favour of integrating environmental management topics that fall outside their immediate field of study into existing modules, compared to Business and Economic Sciences students. Science students were also more interested in conducting research on 'green' topics, especially if funding was made available.
- Undergraduate students were more active in promoting good environmental management principles among their peers than postgraduate students.
- Students studying at the Summerstrand South campus had more respect for plant life on campus and also attached more value on incorporating 'green' topics into existing modules than students studying at Second Avenue campus.
- Students from the faculties of Arts and Business and Economic Sciences were the least likely to engage in 'green' actions whilst on campus (particularly when it came to switching off lights and using water sparingly).
- Students living off campus were more concerned about the conservation of the natural environment on campus than students living in University residences / student villages and also had more respect for animal life on the campus.

The high response rate of students offering suggestions on how NMMU can become a 'greener' University suggests that students are aware of the need for University to 'go green'. Many students stated that NMMU should be innovative in dealing with environmental management issues, by for example, harnessing wind and solar power to generate electricity for use on campus.

Students called for more awareness campaigns to educate stakeholders about the consequences of climate change. They also requested more opportunities to participate in 'greening' activities (such as recycling) on campus. They suggested that the University place more emphasis on commemorating national and international environmental awareness 'days' and provide electronic tips on 'going green'. Students also raised considerable concern about the inefficient water and energy usage on campus citing that "cement is watered" and lights are left on unnecessarily.

10.2 Staff perceptions

As in the case of students, staff at NMMU felt that it was very important for the University to become a leader in the field of environmental management in South Africa. Staff expressed their willingness to work towards this goal by participating in 'green' initiatives on campus

and many were already actively promoting good environmental management principles among their colleagues and students.

The majority of staff members were of the opinion that 'green' initiatives would save the University money and would not be too expensive to implement. Awards for initiatives to protect the natural environment and competitions among faculties and departments for 'green' status were highlighted as incentives that would motivate staff to become 'greener' in their daily activities on campus. Other initiatives suggested by staff included money and prizes as well as opportunities to participate in decision making processes on environmental management at NMMU. A large number of staff in the sample also stated that they do not need any incentives to 'go green' and merely called for more awareness and education about environmental management issues. This finding corresponds with an earlier report at the erstwhile UPE in 1996 on the attitudes and opinions of students and staff toward the environment (Fullard *et al*. 1996).

Very few of the academics who participated in the survey presented modules that incorporated environmental management topics in 2009. As could be expected most of these modules were offered in the Science faculty. In line with the students' responses, academics viewed the most important 'green' topics to be incorporated into existing modules and to be developed into dedicated modules as those dealing with 'green' design and construction, environmental law and ecological ethics. Academics called for more Government funding for the development of dedicated 'green' modules as well as a full undergraduate qualification in environmental management. This finding suggests that academics are not well informed on the range of environmentally orientated modules that already exist at NMMU. Academics were generally willing to present 'green' topics / modules, although several requested support to increase their knowledge on selected topics.

Regarding 'green' research at NMMU only 26 percent of academics who responded to the questionnaire had done such research in the twelve months leading up to the survey. Most academics were however of the opinion that conducting 'green' research at NMMU was important. Several academics called for more funding to enable them to do research into environmental management topics.

Staff members, both academic and administrative, performed various 'green' activities on campus to mitigate their impact on the natural environment. Many were actively conserving water and switching off lights where possible. They also re-used scrap paper and recycled paper even though hardly any facilities are available on campus to do so. Several staff also raised concerns about inefficient energy management on campus and called for funding to implement alternative energy sources on campus. Staff furthermore requested infrastructure that would allow them to make double sided prints and copies.

Significant differences in staff perceptions were identified based on gender, age, educational level, job description, faculty, and campus:

- Males showed a greater interest in NMMU's reputation as a leader in environmental management in South Africa compared to females. Males have also become more environmentally consciousness in the 12 months leading up to the survey. Female academics attached more value to incorporating environmental management topics into existing modules and also thought it was more important that support and development opportunities be made available to enable them to present 'green' topics / modules. At the

time of the survey, males engaged in more 'green' activities whilst on campus than females.

- Older staff members, particularly those older than forty, were more concerned about conserving the natural environment, placed a higher priority on maintaining plant and animal biodiversity on campus, had a greater realisation of their impact on the natural environment, engaged in more 'green' initiatives on campus and were more willing to be involved in 'green' programmes at NMMU.
- Staff possessing a postgraduate degree was more likely to promote good environmental management principles among their peers and students. They also perceived maintaining plant and animal biodiversity on campus as more important than less qualified staff.
- Compared to academics, administrative staff had become more aware of their impact on the natural environment in the twelve months leading up to the survey. Academics were however more concerned about maintaining plant biodiversity on campus and were also more active in promoting good environmental management principles among students. Concerning incentives, administrative staff members were more likely to be motivated by 'green' awards than academic staff who might be more encouraged by intrinsic motivators.
- Academics in the Science faculty attached less value to integrating environmental management topics into existing modules and developing dedicated modules at undergraduate level compared to their peers in the Business and Economic Sciences faculty. Academics in the Science and Business and Economics Sciences faculties were more interested in conducting research in the field of environmental management than academics in other faculties.
- Staff employed at Summerstrand North campus was more skeptical about the financial benefits of implementing an EMS at NMMU compared to staff working at the Summerstrand South and Second Avenue campuses. Academics from Summerstrand South campus showed greater interest in conducting research on 'green' topics provided that funding and development opportunities were made available.

10.3 Significant differences in staff and student perceptions

A number of significant differences in the perceptions of staff and students were observed. Staff members felt more strongly that 'greening' the NMMU would save the University money, while students were more active in encouraging their peers to engage in 'green' activities. Staff showed more respect for animal life and attached more value to maintaining animal biodiversity on campus.

Students were more motivated by incentives for 'going green' than staff which raises some moral concerns. Compared to students, lecturers viewed incorporating environmental management topics into existing modules as more valuable, especially when it comes to topics such environmental reporting (accounting), environmental economics and ecological ethics. Academics were also more in favour of developing a dedicated module in environmental economics than students. It should be noted that such a module actually already exists in the Faculty of Business and Economic Sciences (see Appendix A). Students generally wanted all NMMU lecturers to incorporate environmental management topics into modules at both undergraduate and postgraduate level.

Compared to students, academics perceived it as more important that 'green' research be conducted at NMMU. Students were however more willing to conduct research on environmental management topics, particularly if incentives were offered to do so. Staff

members participated in more ‘green’ actions than students whilst on campus. This could be attributed to the fact that some staff members indeed have access to facilities that allow them to do so (for example access to printers that can print double-sided).

11 RECOMMENDATIONS

In this section a number of recommendations will be made with reference to ‘green’ education at NMMU, ‘green’ research at NMMU, ‘green’ engagement with stakeholders and ‘greening’ of internal operations.

11.1 ‘Green’ education at NMMU

In terms of ‘green’ education at NMMU the following recommendations are made:

- A link should be placed on the ‘carbon footprint webpage’ of the NMMU intranet outlining the details of environmentally-orientated modules that are currently offered at the University. The details in Appendix A should be extended to include the names and contact details of lecturers to facilitate the sharing of information across faculties and campuses. The existence of these modules suggests that a great deal of expertise is already available within NMMU and that better communication and collaboration are needed to create awareness of ‘green’ issues. Information sharing will also lead to improved interdisciplinary teaching and learning.
- Academics should integrate the following topics into existing modules (as far time and credit values allow): ‘green’ design and construction, environmental law, ecological ethics, ‘green’ IT, environmental journalism, environmental economics and environmental reporting (accounting).
- An investigation should be undertaken into developing dedicated modules on the following four environmental management topics: ‘green’ design and construction, ecological ethics, environmental law and ‘green’ IT. This should best be done at programme level to avoid duplication.
- An investigation should be undertaken into developing a specialised undergraduate qualification in environmental management. Given that a number of modules dealing with environmental management are already offered at NMMU, close cooperation at faculty level is required. Particular attention should also be given to the needs of private practice as well as competitive qualifications offered at other South African universities. Interested parties could contact Mr Riyaadh Lillah as his MCom studies serve as a continuation of this research and will largely focus on ‘green’ education at NMMU.
- Responsibility should be assigned to a particular academic or support department within NMMU to develop workshops and training sessions on various ‘green’ topics. This department should also be responsible for inviting knowledgeable guest speakers in the field of environmental management. SEACC could play a valuable role in establishing and maintaining relationships between NMMU and other academic institutions, business as well as local and international governments. Workshops, training sessions and guest lecturers will not only create a greater awareness of ‘green’ issues among staff and students, but will specifically assist academics to integrate more environmental management topics into their modules. Development opportunities could further serve as motivation for staff and students to become ‘greener’ in their practices whilst on campus.

11.2 'Green' research at NMMU

With regard to 'green' research at NMMU the following recommendations are made:

- A link should be placed on the 'carbon footprint webpage' of the NMMU intranet highlighting details of 'green' research projects undertaken at the University. This 'database' will showcase interesting projects and allow for information sharing across faculties and campuses.
- A link should also be placed on the 'carbon footprint webpage' of the NMMU intranet containing details of research grants and bursaries in the area of environmental management.
- The development of a 'green' researcher of the year award should be discussed at the faculty and NMMU Research, Technology and Innovation (RTI) committees.

As NMMU funds are increasingly being allocated to research projects that are in line with faculty and NMMU 'research themes', researchers are encouraged to familiarise themselves with these themes when applying for funding internally (Personal communication, Van Breda 2010). The NMMU Research Themes Grant in particular is aimed at fostering interdisciplinary research and developing expertise within the following research themes:

- Social cohesion.
- Regional economic development (including SMMEs and entrepreneurship).
- Ethics, governance and leadership.
- Curriculum development for all faculties across the university.
- Automotive and related manufacturing.
- Health and disease management responsive to regional needs.
- Natural resource management and energy.

More details on the faculty and NMMU research themes are available from the respective faculty RTI committees and Research Management.

11.3 'Green' engagement with stakeholders

With the exception of the Science faculty, limited engagement with stakeholders beyondNMMU's borders is taking place on environmental management issues. Given the growing awareness of climate change and its impact on society, several opportunities exist for NMMU to engage in 'green' awareness campaigns, research and consultation.

A student participating in this survey commented that "*NMMU must launch projects like environmental training campaigns especially in disadvantaged areas and involve as many students as possible'*. It was also suggested by some staff members that the University should aid communities around NMMU to become 'greener' and involve community stakeholders more if we are to be seen as an "engaged university". Another suggestion was that "*better and more marketing should be conducted to create this awareness among all NMMU stakeholders*".

Responsibility should be assigned to a particular academic or support department within NMMU to facilitate such initiatives. Once again close cooperation with SEACC is recommended.

11.4 'Greening' of internal operations

To be effective change agents, it is of critical importance that universities get their own house in order first (Thomas 2009:25). Mahatma Gandhi said it best: "be the change you want to see in the world". Based on the findings of this research NMMU has a long way to go in this regard. The best way to do so would be to design and implement a comprehensive environmental management system (EMS).

To successfully implement an EMS at NMMU top management needs to show commitment and provide direction. In particular they need to develop a comprehensive environmental system that will incorporate a climate change strategy and carbon management plan. This will demonstrate the University's commitment to understanding its impact on the environment, its preparedness for impending carbon legislation and dedication to continuous improvement.

11.4.1 Climate change strategy

The purpose of a climate change strategy will be to guide NMMU in formulating an effective response to the challenges posed by climate change and to align the University with Government's objectives to reduce South Africa's greenhouse gas emissions significantly within the next decade. Developing a bespoke climate change strategy in conjunction with specialist consultants will allow NMMU to:

- Assess and manage the physical risk of climate change to NMMU.
- Develop academic/private/government partnerships that help demonstrate NMMU's environmental commitment.
- Develop and articulate a clear position and objectives related to climate change.
- Respond to changing staff, student and stakeholder attitudes and demand patterns, higher or fluctuating prices of inputs such as energy and water as well as actions by other local universities.
- Respond to changing stakeholder and community priorities in relation to climate change, by developing stakeholder's understanding of climate change and the impact thereof. This would serve the public good and allow NMMU to place its climate change initiatives in a favourable light.
- Generate revenue by exploring opportunities to grow revenue streams through 'green' qualifications, modules and short courses, whilst offering 'green'-related products/services to public and private enterprises.
- Create new opportunities for sponsorships and academic/private partnering through 'green'-related research and consulting.
- Improving market opportunity by building capacity to succeed in a low carbon economy, firstly by attracting students, and thereafter preparing them appropriately through 'green'-orientated module content.

11.4.2 Carbon management plan

Creating a tailor-made carbon management plan will provide a framework that NMMU can apply to maximise environmental outcomes and drive business benefits in relation to energy and greenhouse gas management as well as waste reduction. NMMU's carbon management plan could be applied to decision making processes having regard to the specific economic, technological and social considerations of each situation. This process will involve

conducting a carbon footprint assessment to global best practice standards and will allow NMMU to ascertain its greenhouse gas impact on the environment. Thereafter a carbon assessment has to be undertaken to identify, prioritise and quantify emission, energy and waste reduction initiatives. These will not only reduce NMMU's carbon footprint, but may also result in cost savings.

Other benefits of developing a carbon management plan include:

- Managing the University's carbon emissions footprint.
- Implementing energy efficiency and emission reduction opportunities.
- Reducing input costs by driving energy, water and efficient materials consumption.
- Reducing business risk by reducing exposure to increasing energy costs, possible future carbon prices and future regulation.
- Developing greenhouse gas indicators to measure and track performance over time.
- Developing systems to capture greenhouse gas data.
- Setting targets to drive improvement in indicators to ensure continual improvement.
- Preparing for impending carbon related legislation.
- Displaying environmental leadership and enhancing the Universities reputation.
- Generating revenue through the development of carbon projects within NMMU's asset portfolio or on NMMU property.

Carbon emissions can no longer be viewed as a by product of an organisation, it increasingly has a direct impact on the bottom line. As such carbon emissions must be monitored, inventoried, forecast, managed and then valued against a financial baseline.

In developing a university-wide EMS, attention should be given to recommendations of Fabricius and Du Preez (2009) regarding energy management on campus. This report is available on the NMMU carbon footprint webpage at http://my.nmmu.ac.za/default.asp?id=1488&bhcp=1.

Finally, responsibility should be assigned to a particular academic or support department within NMMU to develop a 'green' employee of the year award and facilitate 'green' competitions between faculties, departments and residences. This department should also be responsible for creating greater awareness of 'green' initiatives, infrastructure and programmes at the University. Particular attention should be paid to the recommendations of staff and students who participated in this survey. A number of specific recommendations are contained in Table 66.

"*It's not that hard. Let's stop talking...and actually start doing!*"

Table 66: Specific recommendations from staff and students on 'greening' the internal operations of the University

Area that needs improvement	Recommendations
Energy management on campus	♦ Install individual light switches in each office to enable staff to switch them on and off as they see fit. ♦ Install light sensors as in the case of the new developments. The expertise of staff and students in the Centre for Energy Research could be tapped into in this regard. ♦ Investigate the use of alternative energy on campus (such as solar geysers for residences). ♦ Harness wind and solar power to generate electricity for use on campus.
Waste management on campus	♦ Provide a visible, easy-to-use recycling infrastructure (bins) on all campuses. It was suggested that the recycling system not only allows for paper recycling, but also for other materials such as glass, plastic and tin. This will not only save the University money but can even generate some funds. ♦ Provide more printers that can print double-sided. This presents an opportunity to significantly reduce paper usage on campus. ♦ Save paper by distributing learning materials electronically to students.
Water management on campus	♦ Implement proper water management systems on all campuses. ♦ Invest in better irrigation systems and manage this process more effectively (e.g. only water lawns and plants at cooler times of the day). ♦ Install motion sensitive taps and low flow toilets to reduce water usage.
Awareness of 'green' initiatives / campaigns / programmes on campus	♦ Send a 'green' tip of the day via email to all staff and students. ♦ Use internal marketing and communication to create more awareness about what is happening on campus. ♦ Present regular 'environmental update sessions' on the progress of various environmental issues. ♦ Use signage to promote 'green' issues on campus. ♦ Organise staff and student outings to the Summerstrand South campus nature reserve. ♦ Train custodian and cleaning staff to raise their environmental literacy. ♦ Use awards for 'green' initiatives and competitions for 'green' status between residences, faculties and departments to create awareness, change mindsets and improve behaviour. ♦ Integrate environmental education into all staff and student induction processes. ♦ Encourage staff to serve as role models for students – especially in terms of motivating students to 'go green' from a moral perspective. ♦ Use technology, especially social networking sites such as Facebook and Twitter, to create more awareness about environmental management issues. ♦ Establish a 'green' student society on campus. ♦ Show movies to create awareness and stimulate debate about climate change topics. ♦ Commemorate national and international environmental awareness 'days'.
Transport related carbon emissions	♦ Organise shuttles between campuses. ♦ Create an intranet-based notice board system to enable staff and students to organise lift clubs / carpooling. ♦ Utilise video conferencing technology or Skype for meetings instead of driving to meetings. ♦ Establish affordable housing near campus.
Governance	♦ Adjust management structures to allow for 'green' monitoring and reporting ♦ Establish a 'green' committee with representatives from each department, academic and administrative, as well the student governing body.

12. LIMITATIONS OF THIS RESEARCH AND SUGGESTIONS FOR FUTURE RESEARCH

No students from the Bird Street campus participated in the survey. This is a pity as students at the Business School could have given valuable insights into 'greening' the University based on their experience from the private sector. Very few academics from the Law department participated in the survey. This is disappointing as environmental law is bound to become a very important topic and module in future.

Suggestions for future research include a follow-up study in one or two years' time to establish whether perceptions on the 'green' status of NMMU have changed.

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APPENDIX A:

SYLLABI OF NMMU MODULES THAT INCORPORATED ENVIRONMENTAL MANAGEMENT TOPICS IN 2009

QUALIFICATIONS AND MODULES THAT INCLUDED ENVIRONMENTAL MANAGEMENT TOPICS IN 2009 (AS IDENTIFIED BY STAFF AND STUDENTS WHO PARTICIPATED IN THE SURVEY)

6.2 NATIONAL DIPLOMA: ENVIRONMENTAL HEALTH: FULL-TIME (QUALIFICATION CODE: 3135 – 01) (NQF LEVEL: 6, TOTAL NQF CREDITS FOR QUALIFICATION: 360)

ADMISSION REQUIREMENTS

- Admission Points Score of 32.
- Minimum NSC requirements for diploma entry must be met.
- English, Afrikaans or isiXhosa (home language or first additional language) on at least level 3 (40-49%).
- NSC achievement rating of at least 2 (30-39%) for Mathematics or 6 (70-79%) for Mathematical Literacy.
- NSC achievement rating of at least 2 (30-39%) for Physical Sciences.
- Applicants with an Admission Points Score between 26 and 31 will be referred to write the Access Assessment Test before a decision is made on whether or not to admit the applicant to the course.
- Admission is subject to Department selection.
- Must meet diploma entry status as there are no extended programmes.
- Only if testing is included in the selection process or if it is for placement in related extended programmes; otherwise stream into 2nd-choice option.

If an applicant presents with Mathematical Literacy instead of Mathematics, he/she could be placed in an extended programme

APPLICABLE RULES

Community service

Upon completion of training all South African students are required by law to undertake one year of community service. Most other health professionals e.g. doctors, dentists, pharmacists, physiotherapists etc have a similar requirement. Completion of community service is a prerequisite for the registration with the Health Professions Council of South Africa (HPCSA), as an EHP in independent practice.

Promotion rules

Prerequisites for the following modules are indicated:

Module	Prerequisite
Community Development II	Community Development I
Environmental Pollution II	Environmental Planning I
Environmental Pollution III	Environmental Pollution II
Epidemiology II	Microbiology I
Epidemiology III	Epidemiology II
Food and Meat Hygiene II	Microbiology I
Food and Meat Hygiene III	Food and Meat Hygiene II
Management Practice III	Community Development II
Occupational Health & Safety II	Anatomy and Physiology I or Physics and Chemistry I
Occupational Health & Safety III	Occupational Health & Safety II

Registration with HPCSA

Each student is required to be registered with the HPCSA as a student Environmental Health Practitioner. The NMMU undertakes this responsibility.

DURATION

The qualification shall extend over at least three years of full-time theoretical and practical study.

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Faculty of Health Sciences NMMU

CURRICULUM

		Presented	Module Code	Credit Value
First Year				
1	Anatomy and Physiology	Year	GAF1110	24
2	Community Development	Year	GGS1110	24
3	Computer Skills I (compulsory occasional)	Semester 2	CCP1112	
4	Environmental Planning	Year	GEN1110	24
5	Physics and Chemistry	Semester 1	GPH1311	12
6	Chemistry Practical	Semester 1	GCH12P1	6
	Chemistry Theory	Year	GCH12T0	6
7	Microbiology	Year	GMI1110	24
	Credits First Year			**120**

		Presented	Module Code	Credit Value
Second Year				
1	Community Development	Year	GGS2210	24
2	Environmental Pollution	Year	GWW2110	24
3	Epidemiology	Year	GED2120	24
4	Food and Meat Hygiene	Year	GMH2210	24
5	Occupational Health and Safety	Year	GBS2110	24
	Credits Second Year			**120**

		Presented	Module Code	Credit Value
Third Year				
1	Environmental Pollution ♦	Year	GAN3110	24
2	Epidemiology ♦	Year	GED3210	24
3	Food and Meat Hygiene ♦	Year	GMH3310	24
4	Occupational Health and Safety ♦	Year	GBS3210	24
5	Management Practice ♦	Year	GMP3110	24
	Total Credits Third Year			**120**

♦ Major modules (please refer to the General Prospectus).

Environmental planning I (GEN1110)

- Housing
- Town planning
- Building sciences
- Ecology

Environmental pollution – Waste and water II (GWW2110)

- Water quality management
- Sources of water pollution
- Principles of water quality
- Sewerage (or waste water) purification
- Water purification
- Sanitation
- Waste technology
- Types / Definition
- Sources
- Collection and storage
- Transport

- Disposal
- “Tidy town system”

Environmental pollution – Air and noise III (GAN3110)

- Air pollution
- Combustion principles
- Sources and occurrences / incidence
- Engineering control
- Legislation
- Measurement
- Meteorology of air pollution
- Environmental noise
- Legal requirements
- Sources
- Measurement
- Control

8.4 BACCALAUREUS SCIENTIAE: ENVIRONMENTAL SCIENCES: FULL-TIME (QUALIFICATION CODE: 20026 – A1) (NQF LEVEL: 6, TOTAL NQF CREDITS FOR QUALIFICATION: 368)

The following curriculum is a recommended programme for the BSc degree in the Faculty of Science. Other subject combinations are possible but not necessarily sensible. Any other subject combinations must be discussed with the relevant Heads of Department.

ADMISSION REQUIREMENTS

- Admission Points Score of 40.
- Minimum NSC requirements for degree entry must be met.
- English, Afrikaans or isiXhosa (home language or first additional language) on at least level 3 (40-49%).
- NSC achievement rating of at least 3 (40-49%) for Mathematics.
- Applicants with an Admission Points Score between 30 and 39 will be referred to write the Access Assessment Test before a decision is made on whether or not to admit the applicant to the course.

DURATION

The programme shall extend over a minimum of three years of full-time study.

CURRICULUM

		Presented	Module Code	Credit Value
First Year				
	Compulsory Module:			
	Computer Science 1			
	Computing Fundamentals	Semester 1	WRFC101	8
Select four of the following (30 credits each) from options 1 to 6:				
1	**Botany 1**			
	Plant Cell Biology	Semester 1	BOT110	7
	Plant Structure	Semester 1	BOT120	8
	Plant Evolution and Systematics	Semester 2	BOT130	7
	Plant Ecology and Environmental Botany	Semester 2	BOT140	8
2	**Chemistry 1**			
	Chemistry General	Semester 1	CHG101	15
	Chemistry Inorganic	Semester 2	CHI101	9
	Chemistry Organic	Semester 2	CHO101	6
3	**Geography 1**			
	Introduction to Economic and Settlement Geography	Term 1	GEO111	7
	Introduction to Meteorology and Climatology	Term 2	GEN101	8
	Introduction to Geomorphology	Term 3	GEN102	7
	Introduction to Geo-Information Science and Cartography	Term 4	GIS101	8
4	**Geology 1**			
	Introduction to Earth	Semester 1	GGL111	7
	Mineralogy and Petrology	Semester 1	GGL112	8
	Physical Geology	Semester 2	GGL113	7
	Structural and Economic Geology	Semester 2	GGL114	8
5	**Mathematics Special 1**			
	Mathematics Special 101	Semester 1	MATA101	8

		Presented	Module Code	Credit Value
	Mathematics Special 102	Semester 2	MATA102	8
	Physics Special 1			
	Mechanics & Thermodynamics	Semester 1	FBB101	7
	Electricity, Magnetism & Optics	Semester 2	FBB102	7
6	**Zoology 1**			
	Animal Cell Biology and Histology	Term 1	ZOO110	7
	Animal Diversity	Term 2	ZOO120	8
	Invertebrate Functional Zoology	Term 3	ZOO130	8
	Animals in the Environment	Term 4	ZOO140	7
	Credits First Year			**120**

		Presented	Module Code	Credit Value
Second Year				
Select three of the following (40 credits each) from options 1 to 5 (the modules you choose must have been taken at first-year level or equivalent prerequisites):				
1	**Botany 2**			
	Plant and Algal Systematics	Semester 1	BOT210	8
	Plant Ecology	Semester 1	BOT220	8
	Project	Year	BOT250	8
	Marine Botany	Semester 2	BOT230	8
	Economic Botany and Plant Biotechnology	Semester 2	BOT240	8
2	**Chemistry 2**			
	Chemistry Analytical	Semester 1	CHA201	9
	Chemistry Inorganic	Semester 1	CHI201	7
	Chemistry Physical	Year	CHP203	12
	Chemistry Organic	Semester 2	CHO201	12
3	**Geography 2**			
	Pedo-Geomorphological Studies	Term 1	GEN211	10
	Economic and Development Geography	Term 2	GEO212	10
	Introduction to Cartography and GIS	Term 3	GIS211	10
	Society and Environment	Term 4	GEN212	10
4	**Geology 2**			
	Palaeontology	Semester 1	GGL201	10
	Structural Geology	Semester 1	GGL202	10
	Mineralogy	Semester 2	GGL203	10
	Sedimentary Petrology	Semester 2	GGL204	10
5	**Zoology 2**			
	Ecology	Semester 1	ZOO210	10
	Comparative Vertebrate Anatomy	Semester 1	ZOO220	10
	Physiology	Semester 2	ZOO230	10
	Physiological Ecology	Semester 2	ZOO240	10
	Credits Second Year			**120**

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		Presented	Module Code	Credit Value
Third Year				
Select two of the following as majors (60 credits each) from options 1 to 5 (the modules you choose must have been taken at second-year level or equivalent prerequisites):				
1	**Botany 3 ♦**			
	Applied Marine Botany	Semester 1	BOT310	12
	Plant Physiology	Semester 1	BOT320	12
	Project	Year	BOT350	12
	Plant Eco-physiology	Semester 2	BOT330	12
	Plant Ecology and Environmental Management	Semester 2	BOT340	12
2	**Chemistry 3**			
	Chemistry Inorganic	Year	CHI303	20
	Chemistry Organic	Year	CHO303	20
	Chemistry Physical	Year	CHP303	20
3	**Geography 3 ♦**			
	Geo-Information Systems	Term 1	GIS301	15
	Geomorphology	Term 2	GEN301	15
	Photogrammetry and Remote Sensing	Term 3	GIS304	15
	Environmental Resource Management	Term 4	GEN313	15
4	**Geology 3 ♦**			
	Igneous Petrology	Semester 1	GGL301	15
	Stratigraphy	Semester 1	GGL302	15
	Geo-tectonics and Metamorphic Petrology	Semester 2	GGL303	15
	Economic Geology	Semester 2	GGL304	15
5	**Zoology 3 ♦**			
	Aquatic Ecology	Semester 1	ZOO311	15
	Environmental Physiology	Semester 1	ZOO321	15
	Evolution	Semester 2	ZOO330	15
	Systems Ecology	Semester 2	ZOO341	15
	Credits Third Year			**120**
♦ Major modules (please refer to the General Prospectus).				

Society and environment (GEN212)

- Industrial and agrarian society
- Impact on the environment
- Urban environmental problems
- Resource depletion
- Environmental degradation
- Sustainable settlements

Environmental resource management (GEN313)

- Environmental conservation
- Resource management
- Environmental resource management
- Management techniques and tools
- Future of environmental management

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10.9 BACCALAUREUS SCIENTIAE HONORES: GEOGRAPHY: ENVIRONMENTAL GEOGRAPHY: FULL TIME
(QUALIFICATION CODE: 21519 – A1)
(NQF LEVEL: 7, TOTAL NQF CREDITS FOR QUALIFICATION: 120)

A two-pronged Honours programme will be on offer. This will comprise a BSc Honours in Geography and BSc Honours in Geographic Information Systems. The programme consists of 5 modules - four compulsory modules and one elective.

All students who wish to offer a BSc Honours in Geography must have passed Geography as a major with an aggregate mark of 55%. The requirement applies also to students who wish to offer BSc Honours in Geographic Information Systems. However, at the Head of Department's discretion, students from other backgrounds who wish to obtain a qualification specifically in GIS could be allowed to register for the programme.

DURATION
The qualification shall extend over at least one year of full-time study.

CURRICULUM

	Modules	Presented	Module Code	Credit Value
1	Research Project	Year	GEN411	24
2	Human Environment Interaction Elective	Year	GEN401	24
3	Environmental Impact Studies	Year	GEN402	24
4	Applied Physical Geography	Year	GEN404	24
5	Geographical Information Systems	Year	GEN405	24
6	Economic Geography Elective	Year	GEN406	24
7	Settlement Geography Elective	Year	GEN407	24
8	Urban Geography Elective	Year	GEO406	24
	Total Credits			120

Human environmental interaction (GEN401)

- Cultural diversity in relation to environmental utilisation
- Human induced environmental problems – desertification, deforestation, weather modification and global warming
- Energy and resource exploitation
- Population explosion
- Poverty and famine
- Waste,
- Acid rain and ozone

Environmental impact studies (GEN402)

- Industrial environmental management
- Introduction to environmental management systems
- Environmental aspects and impacts
- Carbon foot-printing.
- Environmental management systems – related legislation
- Implementing environmental management systems

EXAMPLES OF OTHER MODULES DEALING WITH ENVIRONMENTAL MANAGEMENT TOPICS IDENTIFIED VIA DESK RESEARCH

A review of the 2009 prospectuses of the various faculties was conducted to identify other modules containing the word 'environmental' in the title. The syllabi of these modules are presented next.

FACULTY OF SCIENCE

Environmental management (BOT440)
- Environmental law
- Environmental impact assessment – Pre-application
- Environmental impact assessment – Scoping
- Environmental impact assessment – Investigation
- Strategic environmental assessment
- Environmental risk assessment
- Environmental monitoring
- Environmental auditing

Environmental management III (FEM3110) (George campus)
- Integrated environmental management
- Environmental impact assessments
- Forest certification
- Forest site classification and evaluation.
- Soil conservation
- Forest hydrology
- Biodiversity conservation.

Environmental studies (GEN312)
- The atmosphere
- Water
- Land and soil
- Fauna and flora
- Population debates
- Waste
- Sustainable development
- Combating crises

Environmental management (MEA5120)
- Environmental law and governance
- Environmental management tools
- Environmental management systems
- Water management
- Environmental auditing.

FACULTY OF ENGINEERING, THE BUILT ENVIRONMENT AND INFORMATION TECHNOLOGY

Environmental management for engineers (Theory) (CEEM4A1/2)
- Environmental impact assessments
- Integrated environmental management
- Environmental audits
- Case studies

Environmental engineering 4 (EEN4112)
- Environmental issues
    - Environmental problems
    - Environmental ethics
    - Environmental codes
    - Environmental legislation

    - Engineers and the environment
- Integrated environmental management
    - Theory
    - Environmental impact assessments
    - Social issues – SIA & PP
    - Strategic environmental assessment
    - Environmental audits
- Environmental practice
    - Sustainable development
    - Environmental economics

Environmental management (KEM510)
- Environmental legislation
- Environmental implications of the Constitution
- Impact of construction on the environment
- Environment and health and safety
- Environmental impact assessments (EIAs)
- Project environmental plans
- Environmental management systems (EMSs)
- Role of environment in total quality management and project performance
- Influence of procurement and procurement systems
- Role of clients, designers and project managers
- Construction related interventions

Building science (Environmental services 1A) (KES111)
Introduction to environmental control in buildings and its influence on design for climate, sunlight and shade control and effects of wind around buildings. The syllabus includes:
- Introduction to environmental control in buildings
    - The building environment
    - Requirements of a building
    - Environmental problems in buildings
    - Methods of environmental control
    - The environmental design process

- Design for climate
    - Vernacular buildings
    - Classification of climate
    - Macro, micro and site climate
    - Design for climate
- Sunlight and shade design of buildings
    - Sunlight control: planning, solar angles, charts
    - Graphical design methods: sunlight penetration, shading of windows, shadows
    - Solar shadowscope

FACULTY OF BUSINESS AND ECONOMIC SCIENCES

Environmental economics (ECO400)
- Scope of environmental economics and interpretation of sustainable development
- Sustainable use of renewable and non-renewable resources
- Cost benefit analysis
- Valuation techniques
- Appropriate government intervention.

Health, safety and environmental management (EHS201) Part B: Environment

- Environmental management
- Why consider the implementation of an environmental management system?
- Legal requirements
- Public pressure
- Financial implications
- Sustainable development
- The ISO 14001 international standard
- The requirements of the standard, general environmental policy.
- Planning implementation and operation
- Checking and corrective action
- Management review
- Integration with other system (e.g. quality systems, health and safety systems)
- Achieving sustainability

FACULTY OF LAW

Environmental law (JJN441)

- The constitution and the National Environmental Management Act 107 of 1998
- International environmental law
- Water law and the environment
- Conservation and biodiversity
- Pollution control and waste management
- Land use and planning
- Implementation and administration of environmental law

FACULTY OF ARTS

Social and environmental issues (SSS201)

Theoretical and empirical perspectives on selected social and environmental issues, such as: family disorganisation, teenage pregnancy, child sexual abuse and molestation, rate, youth, ecology, eco-tourism, leisure, unemployment, urban and rural dynamics, crime and social deviance, and violence.

FACULTY OF EDUCATION

Health and environment (PFSH203)

- Health education
- Pupil and self-care
- Health problems and the spread of infections diseases.
- Caring for others including your siblings
- Environmental studies
- Environmental education with reference to nature, culture and socio-economic aspects
- Ecology
    - Abiotic aspect
    - Biotic aspects: food relationships, symbiosis

Source: 2009 Prospectuses of the various faculties (available on the NMMU website)

APPENDIX B:

CARBON OFFSETTING INITIATIVE – 21ST ANNUAL CONFERENCE OF THE SOUTHERN AFRICAN INSTITUTE FOR MANAGEMENT SCIENTISTS HOSTED BY THE NMMU DEPARTMENT OF BUSINESS MANAGEMENT

Business Management leads the way with new style (02 December 2009, Volume 05, Issue 16)

NORMALLY one associates 'green' conferences with the biological sciences but our Business Management Department is leading the way for business to get involved with 'green' issues. The annual Southern Africa Institute for Management Scientists (SAIMS) conference at NMMU was hosted as a low-carbon event with a 'green' theme in September. The organisers shared their ideas on national radio station Radiosondergrense (RSG) after the conference.

GREEN CONFERENCE … The team who raised awareness about climate change and carbon emissions at a national business management conference included (back from left) Business Management Department's Jennilee Bezuidenhout, Prof Madele Tait and Dr Shelley Farrington, (front) Prof Elmarie Venter and Dr Suzette Viviers (absent Albert Nelmapius).

The 150 delegates from 17 SA universities, four international universities and six prívate conferences were introduced to a series of 'green' practices to educate students about climate change since this is becoming integral to business management.
A specialist carbon solutions firm Cleaner Climate was commissioned to conduct a Scope 3 carbon footprint assessment on the direct and indirect emissions of hosting the conference. Usage of electricity, air, vehicles and other transport, accommodation, waste and event collateral was assessed.

Sustainable initiatives to reduce conference emissions included printing on recycled paper, use natural fabric conference bags, applying energy management and recycling initiatives at the venue, recycling name tags for future use and 'green' catering.
Host NMMU also scooped the "best paper award" on research identifying factors influencing success in "copreneurial" businesses in South Africa won by first-year lecturer Carey Eybers, with co-researchers Dr Shelley Farrington, Prof Elmarie Venter and Prof Christo Boshoff (Stellenbosch University and formerly NMMU).

Some 87 competitive and work-in-progress papers were presented.

Source:
http://my.nmmu.ac.za/default.asp?id=492&monthid=79&storyid=694&cyear=2009&cmonth=02%20December&volume=05&issue=16&deadline=19%20January%202010&bhcp=1

THE SAIMS 2009 CONFERENCE GOES 'GREEN'

Climate change is the greatest challenge the world has ever faced, and will affect each and every one of us. NMMU respects the limits of the planet's environment, resources and biodiversity, and will apply key sustainability principles in hosting the SAIMS 2009 Conference as a **low carbon event**. The NMMU's Department of Business Management has commissioned a specialist carbon solutions firm, Cleaner Climate, to conduct a Scope 3 **carbon footprint assessment** encompassing direct and indirect emissions related to hosting the conference. A Scope 3 assessment incorporates emissions associated with electricity use; air, vehicle and other travel; accommodation, waste and event collateral. This methodology is consistent with global best practice.

The NMMU has implemented a series of sustainable initiatives to reduce conference emissions where possible, including printing on recycled paper where possible, purchasing natural fabric conference bags from Warnyenga Trading (a local BEE SMME), applying energy management and recycling initiatives at the venue; recycling name tags (lanyards) for future use; and liaising with Hotel Management regarding 'green' catering. The remaining emissions will be offset using Kyoto compliant carbon credits from registered carbon projects. This effectively mitigates the global warming effects of the event-related emissions and ensures the SAIMS conference is a low carbon, climate-friendly event. The carbon credits used to offset the event arise from projects that display *clear and measurable* environmental benefits, as they produce *permanent* emission reductions that are independently validated by accredited auditors and meet a stringent assurance framework. It is these projects that stimulate the clean technology industry which plays a vital part in reducing global emissions.

Why is the NMMU hosting the SAIMS 2009 Conference as a 'green' event?

In recent years the scientific evidence on climate change has become increasingly clear: it is now almost universally accepted that, in order to minimise the risk of irreversible damage to our planet and our livelihoods, we need to strive to keep the average global temperature increase below 2°C. It is also widely recognised that, to achieve this, we will need to peak global emissions before 2020 and then reduce them by 50-85% below 2000 levels to ensure we don't exceed the commonly acknowledged danger level of 2^0C. Besides reducing the event's environmental footprint, a fundamental motivation behind 'greening' the conference is to increase delegate's awareness of climate change, so that they can engage and educate students on a topic that will increasingly become integral to Business Management. The potential economic effects of climate change were brought into sharp focus in 2006 with the release of the Stern Review on the Economics of Climate Change.[1] The report states that the consequences of ignoring climate change will be very much bigger than the consequences of ignoring risks in the financial system.

The potential financial implications of climate change on businesses are receiving increasing attention and recognition, with investors and other stakeholders encouraging companies to identify, assess and report publicly on the risks and opportunities that climate change poses to their business. With increasing public awareness and concern, taking action on climate change is also starting to become a reputational and strategic issue for companies. Higher education institutions need to shape graduates who through an understanding of pressing environmental issues can contribute value to society and address the challenge that global warming presents. Academics share the responsibility of instilling in students a greater sense of sustainability in a changing global environment.

Please help us reduce the SAIMS 2009 Conference footprint by disposing of waste in the appropriate bins, returning your name tags (lanyards) at the end of the conference; switching off the lights and air conditioning when you leave your hotel room; and unplugging laptop and mobile phone chargers when batteries are full.

Learn more about Climate Change, and what you can do to reduce your own footprint, by visiting Cleaner Climate's website http://www.cleanerclimate.com/useful-information. Cleaner Climate is a specialist carbon solutions firm with expertise in developing tailored corporate climate change strategies and carbon management plans to assist businesses in minimising the risk and identifying the opportunities in a carbon constrained world.

1. Stern, N. 2007. Stern Review on the Economics of Climate Change. London: HM Treasury. Available: http://www.hm-treasury.gov.uk/sternreview_index.htm

Source: Extract from the SAIMS 2009 conference programme available from Dr Viviers

APPENDIX C:

‘GREEN’ BUILDINGS INITIATIVES

We are going green (15 September 2009, Volume 05, Issue 13)

Various wide-reaching initiatives are underway at NMMU to decrease the university's carbon footprint as talk@nmmu's editor Elma de Koker shares

NMMU is committed to going green – and that's far beyond simply switching off lights and fixing leaking taps. Greens building are also on the cards for NMMU, taking energy management to an even higher level.
PUTTING DOWN ROOTS … **The Staff Association invited staff including (second from left) Marketing and Corporate Relations' (MCR) *Bev Erickson,* and MCR's new brand manager *Vuyo Bongela* to contribute to a greener campus by planting trees alongside the new link road between the North and South Campus. Bev is involved in our energy management campaign to decrease our carbon footprint on campus. Staff Association deputy chairperson *Bernie Booysen* and Executive Committee member *Ramani Somiah,* both from Procurement, joined them. For more on our Casual Day and the 4 September tree planting initiative see our October edition.**

The university's belief in decreasing its carbon footprint is such that the South Campus Library Building, presently under renovation, will soon boast a lighting system on par with that used in Terminal 5 at Heathrow Airport, London, and the Olympic Stadium known as the Bird's Nest in Beijing, China. Both are recognised as green buildings.

Furthermore, we have academics actively pursuing 'green' business practices, systems that will make the world a better place, and staff are eager to pursue various green benefits at the university (as evidenced in a recent survey at NMMU). And then there's the Staff Association's greening initiative on Casual Day when they planted dozens of trees on the new link road between North and South Campuses.
It's all part of a bigger energy management initiative.

The lighting and ventilation at the South Campus Library is 35 years old and urgently needed to be upgraded. The upgrading is in line with the new library at Missionvale Campus with its DALI (digital address lighting interface) system that relies on sensors to control the lighting levels within a building. It will be one of the first buildings in South Africa use the new green technology.

This R27m upgrade of the South Campus Library started in May and is expected to be completed in June next year. The bulk of the upgrade to the architecture area will take place during recess period and ultimately mean a healthier working and study environment.

Not only will be the improvements be better for NMMU's collective health, but the energy saving will also "pay" for the installation within three years.

ROLEPLAYERS ... **Deputy Director: Engineering Services *Peter Peters*, Library representative *Noel Penny* and Library Director *Robert Pearce* in front of the South Campus Library which is receiving a much-needed lighting and ventilation upgrade.**

What green buildings will do ...

NMMU's adherence to green building principles is an all-round win-win situation. Students and staff will benefit from a cleaner environment, the university will reduce its carbon footprint and ultimately save itself money. The multi-million upgrade of ventilation and lighting at South Campus is a case in point. The ventilation upgrade includes complete replacement of the current internal air distribution. The ducting had to be replaced for health reasons.

Furthermore, summer cooling is required to reduce the indoor humidity levels to better preserve collections, records and books from mould growth. Fresh air will be controlled through CO_2 level monitoring. All internal light fittings will be replaced with energy efficient light fittings, giving better light while using much less power. Electric lighting will also be integrated with daylight adapting and dimming to save energy and provide good lighting. The new light fittings will have sensors to automatically switch off when there is nobody in the area. As a result a power saving of 50% is expected in the library lighting power consumption.

Did you know?

- Lighting consumes 19% of all electricity in the world and savings of 40% are possible today (Dept of Energy and IEA).
- Energy efficiency in buildings is anticipated to become compulsory from June 2010 and power consumption will be monitored.

What are green buildings?

Green building principles look at everything that goes into the design of a building, such as:

- Architectural design, including size, shape, internal floor space layout, roofing, walls, windows, floors and the orientation of the building.
- Engineering design, including lighting, ventilation systems, elevators, mechanical items, water heating, solar and wind power generators.
- The actual materials used, their makeup, processes used to manufacture them and the destruction of products at the end of their useful life.

According to Planning and Projects Director **Stuart Blignaut** when NMMU designs new buildings, it tries to implement as many of these initiatives as possible.

One example is the new air-conditioning systems in lecture halls which have been designed with sensors to detect the carbon dioxide levels within a venue.These sensors either speed up the ventilation fans or slow them down depending on the number of persons in the venue. This went a long way to ensure energy efficiency in buildings.

Green tips

Send your green tips to beverley.erickson@nmmu.ac.za and you could win a T-shirt!

Jaci Barnett (jaci.barnett@nmmu.ac.za) would like ideas and opinions with regards to starting a recycling initiative on the Summerstrand campuses. Jaci recycles at home through a company called Green Cycle.

Some tips:

- Use different waste bins for plastic, glass, paper, and kitchen garbage
- Lights in passages should be switched off during daylight hours. Lecture venues and offices are often unattended with lights on.
- Promote “switching off“ in computer labs.
- Switch off air conditioners when not needed.
- Encourage cycling instead of driving. More bicycle paths, like in Admiralty Way, should be created for safe cycling.
- More affordable student accommodation is needed closer to campus

Source:
http://my.nmmu.ac.za/default.asp?id=492&monthid=74&storyid=660&cyear=2009&cmonth=15%20September&volume=05&issue=13&deadline=23%20September%202009&bhcp=1

More variety in future (23 September 2009, Volume 05, Issue 14)

Major new capital investments on our Missionvale Campus are aiming to position this campus to play a major educational role in the city. By December 2010, NMMU will have invested more than R100m in new buildings and existing buildings as part of its long-term overarching development plan towards poverty alleviation and sustainable development.

STATE OF THE ART ... *The new Missionvale Campus Library (already at roof height) boasts "green building principles", and will be one of the first buildings in South Africa to incorporate a system that relies on sensors to control its lighting levels as well as carbon dioxide sensors to ensure energy efficiency.*

The centrally-situated campus will become a thriving hub of activity extending its mix of programmes to both undergraduate and postgraduate markets, as well as increasing its offerings to adults on a part-time basis, and continuing its highly successful Saturday morning maths and science outreach programmes to both teachers and learners. The new plan builds on the original vision of Missionvale as a maths and science centre of excellence but brings in a fuller range of academic and skills-upgrading programmes for both younger and adult learners to the campus.

According to Vice-Chancellor **Prof Derrick Swartz**, NMMU is affirming its commitment to the Missionvale Campus as a first-rate site of educational provision.

"Our students and staff will not only gain first class education and training, but also play a dynamic role in vigorously supporting renewal of surrounding communities," he said, adding that NMMU had a unique opportunity to work with social partners to improve the quality of life in the surrounding communities.

A new library, elevators, the revamping of the present library and adjacent study area into a dedicated student centre, the introduction of a traditional medicinal garden, the upgrading of computer laboratories, lecture halls, and the facilities at the province's biggest indoor centre will all be completed before December 2010. According to the development plan, many of the new programmes will have poverty eradication as their focus such as the new Bachelor for Human Settlement Development, an interdisciplinary programme that examines all facets of housing.

Much of the present construction is aimed specifically at meeting the needs of the extended curriculum programmes and other academic programmes to be located on the campus. We are also committed to meeting the needs of the surrounding community and existing projects like the teacher outreach drives, the Law Clinic, a psychology clinic, the Institute for Sustainable Government and Development (ISGAD) and the Community Development Unit and a number of new ones aimed specifically at serving the immediate community, have been incorporated in the plan.

Source:
http://my.nmmu.ac.za/default.asp?id=492&monthid=75&storyid=672&cyear=2009&cmonth=23%20September&volume=05&issue=14&deadline=28%20September&bhcp=1

APPENDIX D:

SOUTH EAST AFRICAN CLIMATE CONSORTIUM (SEACC)

SEACC

SOUTH EAST AFRICAN CLIMATE CONSORTIUM

Nelson Mandela Metropolitan University for tomorrow | Rhodes University Where leaders learn | SST Sustainable Seas Trust | University of Fort Hare Together in Excellence | WILDERNESS FOUNDATION SOUTH AFRICA

'Copenhagen didn't get us the legally binding global carbon emission reduction agreement we so wanted. To many it was a disappointment … I see it more as an opportunity for others to step in and fill the leadership void left by politicians; a chance for businesses, local communities and individuals to drive forward the low carbon agenda despite the lack of international political consensus.'
Sir David King, director of the Smith School of Enterprise and the Environment at the University of Oxford, 9 February 2010

SOUTH EAST AFRICAN CLIMATE CONSORTIUM'S (SEACC) OUTLOOK

Every generation has its share of challenges. Climate change is ours! Mankind has left some giant-size footprints all over our planet and it is time to get involved. Time to SEACC sustainable changes. Changes that not only promote the health of the planet but the health of all our planet's dependants. It's our turn to stand up and say, "**We can and will make a change; the difference is in our hands."** The truth is this change won't happen overnight so we need to take action NOW. We all need to get involved, sooner than later, no matter how small our contribution.

ABOUT SEACC

The founding partners of SEACC are Rhodes University, Nelson Mandela Metropolitan University, University of Fort Hare, the Sustainable Seas Trust and the Wilderness Foundation. SEACC encourages the partnership between these academic institutions, business and local and international government. These partnerships bridge the gap between knowledge, civil society, world leaders and industry. SEACC will develop skills and competence; promote research and transfer knowledge and understanding to develop practical ways of reduction and adaptation to climate change. **Without knowledge there is no change**. SEACC Aims to provide this knowledge through its strengths in science, technology, communication and education to reach the people of southern and eastern Africa in their efforts to achieve sustainability.

SEACC'S UPCOMING EVENTS FOR CHANGE

The keynote speaker at all events will be Sir David King, director of the Smith School of Enterprise and the Environment, University of Oxford. Sir David King was Chief Scientific Adviser to the UK government for seven years. He is acknowledged globally for his role in helping to place climate change on the agenda of the UK, other European and African governments. Born in South Africa, Sir David is a respected global commentator on climate and international development. He works closely with the former vice-president of the United States, Al Gore, to promote an understanding of climate change issues and to mould international policy.

- 8 March, am, at the Johannesburg Stock Exchange, Johannesburg. Hosted by JSE and Institute of Directors.
- 9 March, pm, Rhodes University, Grahamstown. The official launch of SEACC.

- 10 March, am, Nelson Mandela Metropolitan University, Port Elizabeth. Delegates from academia, business and government will attend a conference focusing on what contributions SEACC can make.
- 11 March, pm, BoE Building, V&A Waterfront, Cape Town. An Event for parliamentarians.

Full media coverage is planned prior to and during the events.

MEMBERS STEERING THE CHANGE
SST is responsible for drawing together the consortium.

Nelson Mandela Metropolitan University:	Prof. A Leitch & Dr D du Preez
Rhodes University:	Prof. P Clayton & Dr J Roberts
Sustainable Seas Trust:	Dr A Ribbink (chairperson) & Mrs C Stapleton
University of Fort Hare:	Prof. G de Wet & Prof. J Raats
Wilderness Foundation:	Mr A Muir

TAKE ACTION: CONTACT DETAILS

Ms K Sutherland
Sustainability Co-ordinator
South East African Climate Consortium (SEACC)
Port Elizabeth
South Africa

Phone +27 (0)41-504 2721
Fax +27 (0)41-504 1070
e-mail **seacc@nmmu.ac.za**

APPENDIX E:

VERBATIM RESPONSES OF NMMU STUDENTS AND STAFF ON 'GREENING' THE UNIVERSITY

VERBATIM RESPONSES OF NMMU STUDENTS

Other comments that you would like to make regarding the 'greening' of NMMU?

- more awareness
- In the main building all lights are controlled by a few central switches which means that one cannot switch off lights in individual offices. Paper recycling bins should be on all floors. Get your infrastructure in line before you start evangelising about individual responsibility.
- -I have realised that Port Elizabeth is windy, trial into wind harnessing would be great in a portion of land in the varsity. - The era in which we live in, is now seeking other measures in greening up. An upcoming university like NMMU should invest or rather sponsor greatly into the research of greening up. This will make NMMU a renowned and unique varsity or hub in environmental issues.
- i think its a gr8 idea bcoz it will make us be the examplees towards the rest of the campuses and universities in south africa
- It is good to save paper in order to save trees, the only thing i am able to do at this point in cOntributing towards these efforts are the little things like preventing waste. i am however unable to partake in any organisation that encourages 'greening' at NMMU.
- There are no appaent recycling bins in and around the campus, where the students can throw recyclable goods in. There should be more awareness campaigns for 'green' living.
- i think its a great idea that you are introducing Nmmu to the greenness
- Being green is important however it should not be at the expense of the student.These monkeys for example inconvienience most people even if they are not agrievated. For example the NMMU needs to alert prospective students that the institution is actually a game reserve
- nmmu must not only collabrate with the government but must look beyond eg lobbying some non governmental organisations with greater financial muscles to fund these intiatives
- The greening of NMMU is a topic that needs crucial attention, as I feel that not enough is done in this concern!
- The management must make sure that lights are off during weekends in unattended offices.
- As an NMMU student, i am one of the students who take alot effort to see green practices are used, though i feel like there is no awareness especially to students to make any effort to carry out the green practices.NMMU should make campaigns for raising the awareness on going green and make this a green university.
- cant think of any at this very moment
- It would be a good thing if everyone who lives on campus switches off the light where there is no use of them because of the natural light.
- I feel that the relaxed view that NMMU has toward allowing Monkeys to `degenerate` into the the vandals they have become without making a concerted effort to keep the campus as close to their natural environment as possible is unacceptable. Open dustbins a case in point. this is not environmentally beneficial at all
- I encourage the greening of NMMU as it is a nature reserve but I dont really understand the actual importance of greening the environment other than to sustain nature.
- i currently have my own vegeatable garden on the saasveld campus and is proving fruitful! i think it would be a good idea if funding and structurs where made avalible to campus students.
- Use less water, by switching off the sprinklers.
- I have never seen bins for the recycling of paper on campus.
- To my knowledge there are no facilities for recycling paper as the association responsible for it has refused to collect our paper as there was always other rubbish in these bins.
- I really think this topic is important because it is a good thought to reserve our scarce resources. It has made me realise how precious nature are to our children who still must use it.It will learn us to be more an respectful and to protect our heritage.
- RECYCLE PAPER AND WATER PLANTS
- If NMMU was to instal better electrical management systems, like Clipsal C-Bus system, it would be much easier to conserve electricity!
- recycling!!

- Greening of the NMMU will require efforts and supports from all students staff and the government to fund projects.
- the lights in the main building on south campus always seem to be at night. perhaps the people in the main building should lead by example and turn the lights off at night
- introduce natural lighting systems
- I really do not think enough is done on this matter.
- I think this greening program should not only based on NMMU campuses, but it should be carried out to surrounding schools more especialy primary school because are the one that are easilly influenced. Teaching them at a young age could help the future of the country
- Commemorate the national days that encourage greening e.g. World Environmen Day. Keep the world Clean, World water day etc.
- Just do it already!
- I STRONGLY AGREE WITH THIS INITIATIVE,HOWEVER INCORPERATING IT INTO ALL MODULES MIGHT BE OF NO INTEREST TO SOME,THEREFORE IT SHOULD BE DISCUSSED IN FORMS OF MEETINGS /BY E-MAIL TO ALL. WE ARE ALL RESPONSIBLE IN MAKING THE ENVIROMENT A HEALTHIER & FRIENDLIER ONE.
- There are paper recycling bins? We are not allowed to turn PC's or light off in most cases - if we do they will be turned on almost immediately afterwards. Who's responsibility is it to turn lights off at the end of the day and when? Staff? Security? Also most people don't know how to print/photocopy on both sides - and even if they did, many lecturers ask that their assignments are printed only on one side.
- Large amounts of electricity are wasted at the univesity(mainly seen at building 3). The central cooling system is on during winter while the wall heaters are on. Outside lights are frequently left on during the day. With regards to watering, it is done during the middle of the day and sprinkler systems are on during the windiest of days. Surely at a university filled with educated people they should know watering at these time do no good and most of the water is either evaporated or blown away. Groundsmen should be assigned to check up on this to ensure efficiency and not wastage. More recycling bins should be made available to the students, not just the few that are in the library. Aswell as recycling of other materials like tins and plastics.
- please provide for recyclimg by placing plastic, glass, paper recycling bins in convenient spots on all campuses.
- great idea that need to take effect
- keep the concept of a campus in the nature reserve as primaly important
- I know very little about therefore i had nothing positive to say on this.
- Making the Varsity a nature reserve is doing more harm tthan good. First take care of the living conditions of students in residences and build more residences on -campus. then carbon emissions will really be reduced by redcuing commuting. buy varsity vans to pick students up from surrounding areas. allow printers to print both sides at the same cost.
- I think students should be sensitised about the actual environmental issues at NMMU. For instance, short and concise workshops could be organised to advise students how to go green in their everyday lives. The trick about preserving and conserving the environment lies much in the education one gets concerning the protection of the environment. Maybe if a few teaches could tip off students on how to make re-use of their previously used papers/scraps/drafts, it would be a good start.
- this initiative needs to be more widely publisised.students are barely aware that nmmu is undergoing a greening process.
- THIS WILL REALLY BENEFIT OUR CAMPUS
- spledid idea
- I think that this is a very good initiative, you know try and keep things this beautiful even for future generations.
- It is important for a general environmental module to be done by all undergraduate students irespective of their faculties. The module should be complulsory for all students. Resreseach for greening the institution and general environment should be funded as well.
- Students should be encouraged to show more respect to the animal and plant life on campus

- I cannot work without switching on the light because the sunlight doesn't reach the lab. I have to leave the door open in an airconditioned room otherwise I freeze (I am not allowed to turn it off). I can't print double sides cause the printer will crash.
- To make a `green` change at NMMU it is crucial that the smaller things are done right (e.g. do not leave light or taps on, dispose of waste properly etc) by everyone. The more specialised aspects of being green doesnt require everyone,but only a small group of entheusiatsic individuals.
- North Campus is for me already a very beautiful campus, with all the green grass and tress. It is kept very clean and I enjoy sitting outside and seeing how beautiful it is. The only thing that can maybe make it better, is planting trees that grow flowers or even flowers by itself.
- Many of the students are unaware of the current environmental situation, and do not have any regard for the environment. There is a lot of litter on the campus for example the south campus pond in front of the library is filthy.
- It is very important that NMMU policies promote coexistence, than separating humans from nature. This is evident by embracing policies that leave hectors of land for plants/animals and make 90% of students daily scholars. This applies to NMMU-South Campus where expansion of residences cannot take place because of the declaration that was made in 1960's or 1970's to make part of the former UPE a nature reserve. NMMU policies should make humans part of that nature and promote coexistence.
- Greening of NMMU should apply at all levels
- Greening is a noble idea that I think if implemented nicely will help make aware the need to conserve both our surroundings and our resources
- Nmmu should cosider all students when they advertise graduate recruitment, it is threatening towards the career of the young ones who will think that their career choices are not well cared for and there are no funds in the form of Bursary. This will always lead to unrealistic motives for choosing careers. I am really worried of the way things are operating. If we want to green NMMU, then let every individual feel safe with regard to life's path. career diversity is crucial.
- just go green
- Let us maintain God's creation
- I think it's a very good idea. All students, even school learners, should be taught good environmental practices in any qualification they're studying towards. It should not be left to environmental science students to fix the environmental management mistakes of the past, it is everybody's problem as we are all dependent on nature for survival, not the other way around.
- i hope that the greening programme help us mre about the importance off a healthy and clean world
- it will be intersting to see how quickly ppl will adapt to this sort of outlook because there were the majority of nmmu students live, there is very little regard for keeping the environment healthy. i would enjoy seeing it implimented sooner rather than later
- lets work together and make nmmu a grener place who knows maybe one day we could make south africa clean and green
- I think that NMMU is already green;I just wish that students could stop taking everything around them for granted and be more responsible for their environment at large not only on campus.I would also like to thank everyone who's behind this `GREENING` initiative as it revive our conscience in taking care of our surroundings.
- I think it is good of NMMU to go green.
- I would print on both sides of a page, but the Aberdare labs and library don't allow you to. I am currently looking at a sign that says DO NOT PRINT BACK TO BACK and DO NOT PRINT 2 PAGES ON 1 PAGE!!!!!!!!!!!!!!
- people should try and stop walkiing on the natural vegetation. lights at res coridors should be switched of during the day
- Too many lights are left on in the main building and other building at night time. If NMMU wants students to be green then the Faculty and staff have to be the role models and leaders by setting a good example.
- it is a good initiative
- It is important to improve the awareness of protecting environment in the daily life. So maybe some more logos and signs can notice people on campus!

- Its good and it help NMMU with possible incidence and excessive expeditores. It will also save the life of students and staff.
- Greening is a great initiative.
- make funding available
- NMMU has the means and ability to educate and incorporate students (the youth of south africa) in and into environmental awareness. The environment is influenced by us, as we are influenced by it.
- Use solar pannels for residences, solar geasers, rainwater runoff for drinking and grey water runoff if fields are to be watered. Adjustable light switches and new energy efficient bulbs be placed in every room. Also introduce a basic `green Manual` for students apon arrival on campus/residences giving tips on sustainable usage. sensors to turn off lights in areas not used for say more than 3 minutes.
- Thumbs UP for this great idea, should've been done a long time ago. All students and NMMU staff should take responsability for creating and maintaining a green campus, and earth.HEAL THE WORLD!!!!!! MAKE IT A BETTER PLACE,FOR YOU AND FOR ME AND THE ENTIRE HUMAN RACE AND ALL OTHER ORGANISMS DEPENDANT ON OUR ECO-SYSTEM.
- Don't make it cost the students money... i.e. higher fees. Also government sponsoring increases our taxes.
- Some of the aspects are difficult to do such as recycling - as the campus does not recycle
- Greening NMMU is a good initiative!
- It's not that hard. Lets stop talking...and actually start doing!
- NMMU should save water by making sure the irrigation system waters plants and not cement.
- it would be a mission getting students to follow the greening programme unless it is made a hype thing
- Modules covering environmental impact assessment and other related fields particularly social impact assessment would be most welcome. We should always remember that over doing certain things that we feel protects the environment could actually be detrimental and more damaging to the environment we are protecting.
- greening is not something that should be forced on people,it needs intergration.
- University societies are a good way of introducing `greening` activities such as - waste clean up sessions. They create awareness about better ways of disposing the different kinds of waste. It would also be great if there was a green society of sorts- which touched on all the aspects of greening- legal etc. could show documentaries etc.. ie: (collective)living examples of greener practises.
- This research is overly important as it raises an awareness of things were previously not given attention most by the staff and students. eg sparing use of water and electricity.
- A `Green IT` Innitiatve Programme would serve the NMMU Community at a total benefit. Staff and Students can be Educated on how to look after the enviroment not only in thier social surroundings but also as a Country as a whole.
- i have never seen recycle bins at south campus. We aren't allowed to print on both sides of paper coz it jamz the printers.
- WE NEED TO IMPROVE THE ENVIRONMENT, INSREAD OF HAVING DJS PLAYING AT THE KRAAL ADVERTISING STUPID THINGS WE NEED TO INCORPORATE GREENING ACTIVITIES. WE ARE THERE TO HELP YOU OUT
- It would have helped a lot if you had explained the NMMU greening at the beginning of the questionnaire. I don't have a clue as to what this is all about.
- As indicated earlier. Having the option to join an NMMU 'green team' and have that on a CV will be most useful for job hunting. Furthermore the information learn and awareness created will be invaluable. Being part of a green research tea would be most fun. Furthermore reading the results would be enjoyable too. This would gain recognition for NMMU and possibly award money through journals published. It is essential that society become aware of its environment, in order for us to continue enjoying the lives we know. Furthermore, greening creates great opportunities for social reconstruction and stimulates awareness. This awareness brings about the possibility for changing to current ecological crisis we face.

- I think it is imperative that 'green' modeules be incorporated into all courses offered. An overall 'environmental management' course is a good idea, but in my opinion this will mostly attract those that are already concerned about environmental issues, while I feel it is more important to try and reach those that are not already that way inclined. However, even those of us that are already environmentally concerned could do with a reminder sometimes e.g. recycling, using lift clubs etc - so communication of the simple things that we can all do in our everyday activities to reduce our consumption of resources etc is also very important in my opinion. I really believe the 'greening NMMU' initiative is exciting, important and could provide a good example to other institutions in the country.
- Yeah I'd like to comment, to be honest I think the survey should be a lot more concise. It is very important and in fact I would get some students to actually interview other students (I bet you so many people just delete this email!). I think the use of incentives to get guys involved will always be a strong point, this pertains particularly to the non-environmentally orientated faculties ie business, law, etc.etc. Personally I'm converted and am willing to participate in anything you offer, however I think also getting some personalities, parties, prizes into the fray of things....this is how you are going to win people over. Hope this helps
- offer tours to students that will explore the campuses and the surrounding environment.
- The university needs to make a much bigger effort to recycle and to motivate students to do the same. More effort needs to be put into creating a sense of awareness and repsect for the environment.
- It would be very beneficial to get students aware and involved in initiatives that promote a greener NMMU. This may be accomplised through such things as monthly seminars and promotions.
- The university should really have workshops, campains and researches about making the NNMU greener and the beneficts and risks that come with it.
- Lecture halls/rooms need windows
- Students and management should do their best in ensuring that the university is as green as possible.
- More needs to be done in incorporating solar power into the exsting power grid, such as is done at the Outdoor Research Facility of the CER, where Photovoltaics power the electrics and solar water heaters provide hot water. More solar geysers such as at Oceana Res!
- I think its a great plan. Not everybody is treating this beauty(nature) as one should treat beauty. If this greening is a way of showing them, then why not...
- Be rid of the monkey's
- I think students should be informed about the impotance of greening by e-mails because many of us do not care and do understand what this is all about.
- Main building lights are most times on. Dont see much of what NMMU are doing to be greener.
- Don't make this subject compulsory to student but personal preferent.
- More research should be done in green chemistry.
- Not enough effort is being made, period. but i am glad 2 see some initiative, definately a starting point. I hav read the environmental policy within my course (Geography environmental studies) & even as a third year student i could c there were quite a few indiscreptences. If the policy lacks truth & no actual commitment how can we expect true commitment & support from the students? Students love credits,so give them that. I could even form a environmental society 2 promote green living & make it become nmmu tradition with the years. Its a joke 2 students especially not concerned with earth science, but its honestly become a global issue in which we have 2 play our role. We already hav so many problems in S.A, & with the continuing climate change these will escalate along with it. We can ride on the springboks pride: `Our blood is Green`, step up & take our position in the world. Thank u for the survey, looking forwd 2 greener & more sustainable times.
- It will be a valueable thing to promote greening among our campuses and off-campus.

Please indicate any other practices that you feel are necessary for NMMU to become 'greener'.

- green days!!
- Provide more recycling bins, for glass, paper and plastic

- during the day the mainswitch for lioghts should be off unless we cannt use sunlight
- NMMU SHOULD PROVIDE TRAINING SESSION FOR ALL COURCES IN ORDER FOR US TO GET EXPERIENCE IN THE WORLD OF WORK
- Promote car-pools in students who live off campus. Give insentives for all those who comply.
- inform students of what can be done to keep the campuses and where they live green
- Libraries should switch off their computers during after hours when they're not operating.
- separate bins for different type of trash
- nmmu must first show potential with the little resource that it posses in greaning our enviroment for example the relevent authorites at south campus are legging behind in terms of grrening as compared to north campus to claffiy this one can take the place behind the south campus audotrium as his case study the area is evergreen.thus to reccap the above the institution as a whole students and staff members we need to develop a holistic approach for all our uttrances to be turned into reality
- GOOD JOB! Please keep it up! It would be wonderful to have NMMU `greener`. Thanks!
- 1) Recycle bins for glass, paper, and all sorts of material should be made available in key places (e.g. car parks). 2) Movie screenings of movies related to the environment (global wrming, etc.) should be shown on every campus
- the IT architecture needs attention in regards to being environmentally friendly. use of thin Client architecture should be used in various computer laboratories on campuses. http://en.wikipedia.org/wiki/thin_client
- Informing NMMU staff and students about important of greening.
- As mentioned on a previous page, penalties need to be levied against littering and other such detrimental practices. Littering is one of the factors which, though illegal, on this campus, not taken very seriously at all. Also, public urination.
- Well I think people should be informrd about the actual importance of greening in the form of posters around the campus.
- using rain water to its full potential and reuse of grey water for food irrigation purposes
- Removal of alien vegetation. Incorporation of renewable energy technologies, e.g. solar energy. Promotion of recycling of paper, glass, plastics and metals, and incorporation of recycling programme in all faculties.
- Students need to be made aware of what they can do in and around campus that will contribute to a greener NMMU. Recycling of paper, glass and plastic must be encouraged and there should be containers on campus where we can put these things. The public should also have access to these facilities.
- The university much launch projects like environmental training campaigns especially in the disadvantage areas and involve as much students as possible.
- Provide recycling bins; departments have a lot of scrap paper; make students aware of green issues and of the sensitivity of the environment on campus!
- recycling!!
- since ive been at the university, ive noticed that the pole lights outside the library, is alwyas swithced on even during the day. swithing them off during the day, will not only save energy but will also, save the university, a lot of money
- consider using electric vehicles for on campus transportation. possibly initiate designing and building electric vehicles
- students should try to print 2-4 per-pege on both sides. nmmu officials should introduce recycling bins at missionvale campus and they should also instruct students to switch off PC's when done using them.
- I think the should be an enviromental aware society and it will be an hounor if I could be part of it
- Encourage recycling activities in the campas.
- The students at NMMU need to be made more aware of greening. I think that if given the chance,we would all do our part to preserve our environment.
- Provide more safe, inexpensive accomodation in walking distance to campus. Identify the person responsable for turning off lights in passages and hold him accountable to do what he is already being paid to do. (Security?)
- I still have to think about that!

- Lithing
- all nmmu personnel need to become more energy effficient by using energy saving globes all over campus and switching off lights and computers when not in use
- nmmu campuses need to switch light of at night- specifically 2nd avenue!!
- active recycling of paper, asof now there are no real avenues to do so, e.g. department of architecture paper is thrown away aat recycling it.
- Recycle everything, reuse, repair, rethink advertised products on fashion and buy what's needed. treat ponds on campuses.
- More signs should be put up to encourage students to ABUSE the available bins on campus(especially for cigarette butts). They should attract the students attention in a sense that it makes them feel guilty to litter around campus, as they are currently doing. People around campus should be sensitised about their environment and the fact that they could contribute to make it a better, greener and more pleasurable environment, should be highlighted. A workshop on easy tips on how items like plastic shopping bags, used papers, used carton boxes etc can be re-used would be a great start. People can be taught how to make wise re-use of plastic bags as bins or even used carton boxes as base for posters.
- more marketing should be conducted to create awareness among all nmmu's stakeholders
- ADDING MORE RECYCLE BINS AT MISSIONVALE CAMPUS
- establishment of a botanical garden
- Open up a depertment that will specifficaly deal with greening the University
- Solar or wind generated electicity apparatus
- Ensure every lab has proper bins for hazardous waste. Nominate one person to switch of computers, machines and lights when not in use. Design special bins for outside, to keep the monkeys from trashing. These monkeys are not supposed to rely on students food, it makes them aggressive.
- use power sparingly, provide recycling bins for cans, bottle, organics, enforce a littering fine.
- Having more open grounds (with trees and grass) and narrowing the size of walking paths that join one building with the other. Not using concrete everywhere. This supports the need for green architects.
- Optimize the use of lights
- to value the importance of each and every human being without partiality, since stones that are not normally used are the most important ones than so many materials.
- have those electricity saving globes which were introduced
- help the community around NMMU to also become greemer
- Regarding switching off PC's - we are not allowed to switch off PC's, as apparently the heating and cooling of the air in the PC towers causes water to condensate which causes the metal parts to corrode, esp. close to the sea. If there are recycling bins, I was not aware of their existence or location. I know that these bins have failed in the past, because people don't know the difference between paper, plastic, glass and an apple core, and the companies who fetch these bins don't take contaminated bins. If there are proper recycling bin points, I will happily recycle. Also, Technical Services wastes a lot of water by too frequent irrigation and irrigating at the wrong time of day. A lot of the plants in the gardens are indigenous and don't even need to be watered, they look after themselves. Also, the skips at the back of the Biological Sciences Building aren't closed properly and rubbish ends up blowing around all over.
- how about teaching or showing ppl how to properly select 'green' attitudes ... as when selecting the better food, the better means of transport, the better means for conducting activities at home, such as showering, amnongst other things... Good luck dudes!
- I think that littering around the campus should be criminalised;or anyone who is caught doing so should face disciplinary actions(drastic ones).
- The recycling bins should be made more accessible and adverised effectively (with emails and locations of them). lecturers should provide notes on the intranet so that students don't have to waste paper (writing uses more paper). And textbooks should be available for purchase in an online format. (scanned) so as to save paper!

- Get motion sensitive taps in bathrooms that switch on and off by themselves.ths could save water. get recyled water in toilets. we waste 8 litres of water flushing a toilet once! put lights off in empty classrooms. we dont need so many lights on in the PC labs.
- Teach all the people about what `GREENING` means. You can not expect everyone to know what `GREENING` means. To test the knowledge of people just ask them what is a `CARBON FOOTPRINT`? This will probably tell you what the know about GREENING and ENVIORNMENTAL MANAGEMENT.
- Water the gardens later in the day, not at the hottest time of the day!!! it is also impossible then for the students to make use of the natural sunlight to warm up and save electricity if the the grass is being watered.
- If you don't turn off the communal lights or tv a fine should be paid max:R10
- A few lectures, seminars or works shops to explain exactly what going green or keeping green means. If that is not possible, then flairs can be given out to students all over NMMU campuses explaining the concepts of Greening. In addition, these flairs can also be placed in the library since every student takes a trip there.
- incentives
- environmental strikes/marches enviromental consumer workshops internet that does not run so dam slow, please!
- Green technology coarse and subsription to interested students to any new developments concerning going `green`
- The NMMU could have declared the September as NMMU GREENDAY, in welcoming spring, and encouraging good environmental practices among students and staff. Could also get a `Green mascot` to promote environmentally friendly habbits among students.
- NMMU is pretty green. Make the environmental students do green projects for extra credit or something.
- Recycling and creating awareness
- We need to introduce recycling on and off campus.
- Recycle Bins should be provided
- A proper recycling programme at Saasveld is long overdue. Further a lack of monkey proof bins is shocking, as they are vital to ensure that animals don't become a problem and may stay `wild`; in the same way rubbish is prevented from being blown out of the bin by strong winds and strewn all over campus. Also electricity saving practises are not in place and too often I find all computers switched on in an empty computer lab. It is important we don't just talk about `green practice`!
- more recycle bins
- NMMU can start by giving people by banning some of the products that a great impact on the environment
- .NMMU GREEN DAY . Promotions through advertising e.g T-shirts . News paper articles .Publications
- They do all that is possible
- the students should not park on the grass by the side of Acts department.
- recycling initiatives on every campus. use of solar energy. general sustainable development...
- To ensure that rubbish bins are all over the campus. Invest in HR department to educate, train and motivate the staff to green NMMU.
- A Workshop Programme on how to better look after the Enviroment
- Recycling of basin water, catching rain water on top of roofs. The campus is so large that there's even ample space for windmills, which could be attractive features and even supply water to streams/dams (which could in turn feed the ground and thereby the plants) and even fountains!
- I think that the fact that a nature reserve falls within the campus should be more celebrated, publicised, utilised (e.g. outdoor lecturing)and incorporated into curricula. Perhaps creating more areas for student utlisation of the 'wild' areas, e.g. bird/game-viewing hides, 'green' braai area/boma (e.g. prior arrangement limited access and no music) and other environmentally-sensitive use of some of this area (e.g. for public education - not sure if this already occurs?) could be made?

- Somehow integrate the agrics, conservationists and ranchers, foresters. Not in the sense of a course, but expose us to each others fields, I dont feel we are getting enough of that. Next year I'll be dealing with extension work with farmers, foresters etc. Although I know the basics, I'm going to need to do my homework in order to reach these people. We need to be working with each other, we need to find that common ground!
- To maximize the spaces available to students to use as a park. refill the South campus dam, there is a family of geese that use it.
- Recycling! Reduction in electricity usage and wastage! And water wastage needs to be addressed in chemistry labs.
- the university should install heaters to keep room warm that dont use alot of energy because students use stoves to warm their rooms up in winter.
- It would be useful to provide recycling bins not only for the recycling of paper, but also of glass, plastic and aluminium tins. Students that live off campus could then also bring their collections of these materials and recycle them on campus. The environmental hazards of factory farming should also not be forgotten e.g. the amount of methane gas produced by the masses of cattle in factory farms; the amount of faeces produced by factory cattle and swine that can ultimately lead to acid rain; deforestation to plant grazing crops to feed livestock etc etc. Perhaps a presentation in this regard would be in order.
- put motion lighting sensers in building to control the loss of power when buildings and corridors are not in use
- solar power& vegetable gardens for eateries!!!
- NMMU needs to introduce automatic lighting controls in the labs, lecture halls and offices and recycle bins.
- the should be a park for students where it is green and peacefull enough to allow them to be intouch with nature
- Planting more trees. Incorporating recycle bins for glass, paper, and other recyclable things.
- Student awareness and glass and paper and plastc recycling bins placed all over campus.
- AS long as they dont cut off the trees, I dont care, just dont cut any trees. Just imagine a forest without trees, imagine a fairy tale without trees, imagine the world without trees, just because you cut of that one tree.
- more and more plants should be planted as the construction is working at the moment.
- Provide colour bins for specific recycling materials on the grounds and passageways of NMMU. educate via email possibly what can be recycled and not. Use reclaimed water to water plants and grass if not already, and possibly in the evening and not during the day when its hot.
- 1.For res: often carbage is put outside ahile waiting 2 b picked up & sometimes ramaged by monkeys...cages should b put outside the reses 2 prevent this. 2.Put lids in bins,@ res and off camp, monkeys tend 2 invade these on especially on fridays 3. within departments keep different coloured bins 4 different materials 2 b throw in (cans, paper, plastic etc.) 4. Have maintenanece do a monthly check on leaks, not wait until they reported. 5.More interaction with the public, we the ones living in this environment so we know the problems & can help come up with solutions. 5. Educate our cleaners & security about green procedures (turning off the lights wen locking the rooms etc.)
- Recycling of paper and litter.

VERBATIM RESPONSES OF NMMU STAFF

Other comments that you would like to make regarding the 'greening' of NMMU?

- A communiqué should be sent periodically stating where materials for recycle can be left.
- A COUNCIL RESOLUTION IS NEEDED TO SPEED UP THE PROCESS OF GREENING THE NMMU.
- A proper recycling process for all office and other paper which does not consist at the moment
- All NMMU members, both staff and students should at least be provided with recycling opportunities i.e. there should be special bins for plastic/ paper/ glass recycling, while the university negotiates with service providers to remove and replace bins regularly.

- Are there any of the glass recycle drums at University? I see them everywhere in PE, but not here. The paper recycle bins at NMMU do not seem to be around anymore. I know that people have misused them and that they where not always emptied in the correct way.
- Are you trying to create a new faculty and work for someone? This initiative should be part of the basic values of a society and should not be enforced through a module pushed onto every student. If lecturers are good examples of solid enviornmentla values it will make an impression on their students.
- As a motoring historian of some repute I strongly disagree with your assertion that manner of driving has much of an effect on carbon emissions. Furthermore, the emissions from a car's exhaust pale into insignificance compared to the emissions from the manufacturing through to the recycling of vehicles. The best way to reduce the impact of the car is not to buy a new car but to keep your old one for a lot longer. Trading one's old `dirty` car for a new `clean` one is simply a deliberate false-hood spread by manufacturers to help them sell more cars. And your naive efforts are helping them.
- Bins for ciggarette stubs should be placed all over campus.
- Currently practices (like sharing printers/network printers) make it very difficult to practice green principles (e.g. doing draft printing on the back of already printed paper). Bird Street campus has NO facilities for recycling/separating waste.
- Documents for meetings is the biggest paper wasting on campus, another way should be found to distribute information.
- Education off staff and contract workers on the economic use of electricity and a clean environment is a priority
- Encourage staff and students to report any leaking taps, toilets wasting water, broken irrigation and unneccesary use of electricity! Give an incentive to report these anti-green acitivities by having a dedicated slot on the intranet to report and by rewarding participating employees!
- Faculty members are not made aware of bins availabe for recycing. Please advise us where these are. What about bins for glass and plastic recycling?
- Fewer contact or office times would mean less people have to come in if it is not really necessary - leading to fewer carbon emmission and less use of utility power.
- Go NMMU go! From a purely marketing perspective green is the only way to go - and if could be seen as leaders, this will be excellent for us.
- Going green is a wide concept, and very expensive one. Don't forget that on the other side you are dealing with commercial companies that making a fortun out of this concept. So I am not too sure of the envoronment at that stage, but very sure about their profits.
- good research.Subject to responses, anlaysis and recommendations thereof, universities of the 21st century should make the subject on 'environmental management' compulsory at all undergraduate levels.
- Greening must be done by all staff members
- Greening NMMU is a great idea. Well done.
- I am retired but still a Research Associate of the NMMU. I initiated the SHE dept and SHE Committee at UPE. The late Prof Fullard and I together with many other colleagues and stake-holders spent about a year designing the curriculum for a degree in Environmental Management - but it came to naught due to the lack of funding. You are welcome to contact me regarding any of these matters. Regards Bruce Robertson Research Asscoiate and Emeritus Professor
- I believe that a large scale 'green' project should be undertaken to make NMMU 'energy' independent and for the most part carbon neutral. We have all the different skill sets on campus already. All that is required is a coordinated effort between the various departments. science, engineering, business, and arts (all have a contribution to make in terms of skills and knowledge in this field). I have written on this topic and would be happy to become involved with any Green initiative planned on Campus. (My name is Anton Botha ext. 2804)
- I disagree with having green researcher of the year etc. Then why not have reserchers of the year for all different sections. The research that I am involved in is just as important yet there is no category for an award. I do it because it is what interests me and it is my passion. Green initiatives such as new courses must be based on sound business principles such as student demand and industry/society needs, not just a feel good course based on government handouts.

- I do not know what the content of the different modules highligted in this questionnaire. As an admin person I do not formally teach students.
- I do not know where the paper recycling bin is at 2nd Ave campus. This would be useful to me.
- I don't think funding changes attitudes and values. I do believe greater awareness could be created. I personally recycle paper, but have not seen any recycling bins here on South Campus, and definitely not on our floor
- I feel that a bigger effort should be made at ensuring that the simple common sense things are easily done rather than focussing on big expensive projects. Creating an attitude that looks after the envorinment in staff and students more be far more beneficial than setting up projects - infortunately it may also be far more difficult to do and to measure.
- I have campaigned for years for a paper recycling bin with no success. I am often told go tp Biology buildingI am afraid that is too far and the one time I went could not locate the bin. I often rather drive to Walmer Boulevard to discard of paper for recycling purposes. The Education Faculty is one of the biggest Faculties on campus why can we not have our own paper recycling bin? My heart aches when I see how much paper is waisted here. I hope you will urgently do something.
- I have heard that paper recycling on South is happening; is it also happening on North, Missionvale and 2nd. When I ask about it no one knows. Perhaps we could also have bins to recycle plastic, glass, cardboard, office equipment etc.I am horrified when I see that amount of waste that goes on on this Campus. Perhaps a compnay like Green cycle could help.Call Laura 082 8635926
- I hope that the NMMU will not fall into the corporate green trap that has consultants charging millions just so we can appear to be green. Green is going to become the next way that companies are going to screw other companies out of money and I hope NMMU is aware enough to avoid that path and to undertake a proper green policy.
- I think people are willing but not educated - need info in easy to access and easy to remember steps.
- I want to recycle on cmpus but do not know where to take waste paper.
- I would be interested in discussing ways that my field of research (using cell and molecular techniques) could be involved in green research.
- I would like to know the procedure for recycling paper at NMMU so that i can make use of it and make others aware.
- I would love to print on the reverse side of paper, however, my printer does not have that facility. It would be wonderful if an educational session could be arranged for all our staff and service workers to educate the staff on how we could save i.e. water for instance. I am often amazed at how the staff can waiste water and not even blink!
- I'm against the `incentive to motivate` idea. I think creating opportunities for those who are already motivated is better. i.e. Don't pay me to plant a tree - organize a tree planting day/festival.
- In regard to `environmental management` as a requirement for all undergraduates, it is a bit of a silly statement as someone in the arts would probably care less about envrionmental management per se, however requireing undergraduates to have a course to introduce them to the natural environment, develope their appreciation of the environment and discuss why it is important to conserve, preserve and protect would lead to support for `greening` and compliance.
- Invest in the future by doing things that really make a difference and being very aware of not simply being 'fashionably green' and paying lip service to a trendy topic.
- It will be wonderful if a green mental set and geen behaviour are encouraged. People should learn to consume less.
- It will become increaingly important for NMMU to realise that they need to put money aside for this. initial outlay could be alot but long term benefits will make it worth while.
- It would be nice to involve everyone, both staff and students, in activities in greening NMMU.
- It's important that the environment becomes a priority at NMMU - not just marketing the fact that we are located in a nature reserve to propspective students but making sure that all in the NMMU community aware of the nedd to preserve our nature.
- knowledge brings green peace
- Lights cannot be switched off as it has no individual light switches

- Litter looks terrible and pollutes. Ever notice the plastic flowers in the thorn tree nex to the main entrance to Embizweni building? Refuse container lids should be made wind-proof. How can be dream to be green while pollution comes form within.
- Make staff and students aware of programmes that already exist (Renewable energy research at the CER) and are being planned (Post Gradute Programme in Renewable Energy) for NMMU.
- More awareness campaigns for students.
- My colleagues need a lot of nagging to leave the lights off in the day time. They seem to want artificial light all day long.
- NMMU is probably the "greenest" university I have come across in the RSA, although I don't remember there being recycling bins when I was there. One of the bains of my life were the sprinklers who seem to throw most of their water over concrete, come on during the hottest part of the day when most of the water evaporates and were designed to give as many passersby as possible an unwanted "shower".
- NMMU should develop and publicise a declaration on environmental management by the institution.
- Plant more trees!!!!!
- Please note that it is not good environmental practice to turn flourescent lights on and off every time you leave an office for short periods of time. NMMU must give the time versus best environmental practice info regarding this to their staff.
- pot plants in all offices
- Recycle bins in all buildings. Switch off lights and equipment not in use
- Reduce traffic congestion and the slow process of negotiating access control gates. Present method is very inefficient.
- Regarding the portion on incentives for greening: I did not answer any of the questions because I don't think people should have to be rewarded for being enviromentally consciece, it should simply be as a matter of course.
- Return Sub-tropical Thicket vegitation to Missionvale Campus - wherever possible
- Staff and students (residential and not) are being robbed blind and their safety compromised, DAILY. MY need for MY safety and the safety of my students and THEIR security is a far greater than my need for a 'green' environment. Give me concrete and safety over green awards and incentives ANY day.
- Staff and students should be taught to switch lights off that are not being used. On many occasions all the passage lights are on plus all the lights in lecture halls with nobody in sight.
- Staff should be made more aware of the re-use of paper and also where the bins are for waste paper
- The Missionvale Campus is rather bleak. I think that more vegetation should be introduced and not only desert plants like aloes and succulents. We need trees!
- The problem with turning off lights and computers is that a computer that acts as the server to the department printer has to stay on for other staff to use the printer. Two to three offices are also connected to the same light switch. So even if I want to turn off my light, I can't.
- The ugly concrete buildings should be covered with Ivy to enable them to blend in to the beautiful environment. This ugly concrete buildings are an eye sore.
- There are many different perception of `green`. I think the term should be defined clearly to avoid confusion. My point of departure is based on the principle of sustainable utilisation - not no utilisation.
- There are spelling mistakes in this survey
- There is a difference in my opinion between greening and sustainable development, the latter implying FUNDAMENTAL change
- There was always a waste box for paper in each office. It has been removed because the cleaners throw the paper and other waste outside the office in one container

Please indicate any other practices that you feel are necessary for NMMU to become 'greener'.

- Plant more indigenous plants invest in wind & solar sources of energy and collect excess water that runsoff roofs for recycling. 2) Work closely with the City to provide reliable & safe public

tranport. The time it takes to get from home to work and back should not vary greatly (e.g. plus minus 20 min)otherwise its always attractive to use your own car.

- Watering gardens in the mornings or late afternoons rather than mid-day. 2. NOT watering the gardens during full gales (dramatic, but serves to make a point). 3. Actually getting the paper from the recycle bins recycled rather than in bins to later be combined with all the other rubbish disposal items. 4. Financial support for the safe disposal of chemicals used in teaching and research 5. Limiting cigarette smoking (passive smoke has effects on plants as well as humans) to restricted areas on campus, and keeping AWAY from open building doors where it blows in and makes the building smell like the smokers are smoking in the building.
- 1.Missionvale does not have paper recycling and masses of old manuals, papers etc are thrown out. 2. If we each had our own printer, I would print most of my stuff on used paper. I used to do this in the old Technikon days, and only did the final drafts of tests/exams on new paper.
- Actively become involved with recycling of all possible materials besides paper. Easy to do but people need to be educated, trained and motivated to do it.
- All new members of staff and students should have a green component in their induction process.
- Any initiatives on recycling of waste paper?
- Awareness regarding the switching off of lights should be emphsized. Use of solar power to be investigated for new external lighting installations.
- Bins need to be placed at 2nd Ave for the recycling of paper
- Council should have a green committee, and our internal auditing as well as annual reporting should include specific targets for rating on energy and waste.
- Do something to enforce the speed limit, ignored by most road users, in order to make it safer for both pedestrians and indigenous wildlife, especially the Grysbok. Use the sprinklers early mornings and evenings in places where the water will not be wasted or become a nuisance to people on campus.
- Educate the masses
- Funding for solar power.
- General awareness
- Get funds to pay for the green game NMMU want to play
- I am a fervent recycler of our home waste. however, finding collective drop-off points is really hard. Apart from having a paper recycling point - what about a glass recycling point, and also one for hard plastic containers? These are some of the biggest culprits in terms of massive space/volume increases in our municipal waste sites, and yet very few dropoff points for the plastics are available. perhaps ITC could send a practical (not vague) 'green tip for the day' to all staff at the beginning of each week/day. Creating a broader awareness is more important than incentive based schemes if you would like to ensure sustainability.
- I am longing for a set of bins to be put up behind the conference centre on North Campus. The one there is only for cardboard.
- I am sure that printer catridgedges could be re-filled in stead of buying new ones all the time. It will save a lot of money also. Perhaps someone could have a look into this also.
- I feel there is little to no information made available regarding environmental initiatives at NMMU. For instance, it was only through this survey that I became aware that NMMU does in fact recycle paper. Why are the staff not made aware of greening opportunities at NMMU such as this?
- I think by introducing green modules you will be growing a future generation who will consciously take better care of their environment. It must become a way of life. Let's get the recycling going - even it means we have to build a paper mill (I believe the one in PE burnt down) for this. Let's be pro-active - even if it costs money initially. The positive spin-offs will far outweigh the initial financial input. This is all good to see. Let's act on it - please!
- I think spelling mistakes on this questionnaire should be eliminated.
- If we can deal constructively and positively with the individuals with no regard for morality, the task of creating a green campus will be far easier to implement. The same individuals that disregard OUR lives and OUR safety are the same individuals that would litter, over turn bins, encourage vermin invasions (monkeys etc), damage greenery etc etc. Treat the cause not the symptoms.

- In my opinion it is not enough to raise awareness; the university must introduce recycle bins for paper, cans and plastic all across campus.
- Introduce weekly environmental sessions, where faculty and staff meet telephonically, face to face or video conferenceing and discuss progress on environmental issues.
- INVOLVE COMMUNITY STAKEHOLDERS AS AN EGAGED UNIVERSITY
- Make money available for more efficient (low energy use) appliances to the departments. e.g. air cons, cold rooms, freezers,.....
- Making available water fountains to discourage purchasing of bottled water
- Making sure our suppliers are doing their part.
- Meetings can always reduce paper consumption by using laptops at these meetings
- More efficient use of solar energy to heat geysers in the Res. All new buildings to be designed with green technology in mind.
- More plants should be available for offices and passages.
- Need to be more careful about caring for animals on the premises i.e. stray cats (utilising and encouraging cat-care support). Providing a green awareness communique (like the MMMU communique). Encourage departments to incorporate aspects of social, ethical and environmental awarenenss within various fields. Provide staff members with opportunities (e.g.bins) to recycle paper, plastics, glass, metals etc even allowing us to bring things from home for recycling.
- NMMU needs to start with basic recyclng initiatives - for example, IF there is paper recycling on campus, the cleaning staff are not aware of it and all waste is simply dumped together. Have bins for light bulbs, fluorescent tubes, glass and batteries (huge waste items on campus). NMMU would have to look at how these are recycled - but if Pick and Pay is able to do it then so should NMMU
- Ongoing training for staff about green practices. Trian cleaning staff how to save water etc. and tell them why it is important.
- Place more water features on campus to attract bird life. Set water sprinkling system for a time when staff are not utilising their parking bays as they in turn have to go and have their cars re-washed to get rid of hardened water marks. Let the Food Court kitchens have separate bins for discarded lettuce leaves, peels, etc. Start vermiculture bins and use compost in flower beds, etc. Encourage a `greener` environment by using signage and making staff and students aware of the benefits as well as of using organic products.
- Please install individual light switches for offices. Provide each office or `floor` with a bin for recycleable paper and other materials.
- Posters which reminds people on greening more bins for the litter
- Promote staff outings to the reserve and encourage staff to arrange hikes with their students
- Proper environmental design of facilities to minimise energy consumption/demand
- Reclycling of glass and plastic. did not even know about paper bins on campus - where are they? must be more visible.
- Refrain from relocating staff to a campus which will oblige them to travel for work purposes (and consequently opt out of a lift club).
- Save paper by going electronic in meetings and also distribution learning materials to students electronically. Glass recycling deposit containers near students' residences.
- So-called `greening` is little more than scare-mongering by scientists keen on padding their research budgets. The amount of greenhouse gasses produced my man-kind pales into insignificance compared to the amount produced by the planet itself. `Greening` is as much of a carefully manufactured lie as the hole in the ozone layer (Its existance predates man - fact) and global warming (this planet's weather patterns are, and always have been in a constant state of flux - fact)Perhaps your energy could be better utilised promoting excellence in NMMU's service delivery rather than wasting time with this irrelevant nonsense.
- Solar panels for residents geysers recycling bins for plastic recycling
- Start recycling of paper - have separate paper bins at all desks/work stations. Create worm farms. Make our own compost and sell to the community. Have separate bins for the recycling of plastic, paper, foodstuffs, cartridges, etc. on every floor. Dispose of redundant equipment by sending to scrap yards etc for correct disposal. Have clean, dust free areas.
- STOP PUTTING UP SIGNPOSTS AND TRAFFIC SIGNS AND SPONSORS LOGOS ON EVERY LAST REMAINING BIT OF OPEN SPACE...RATHER PLANT TREES FIX

RUNNING TOILETS / REPLACE AUTOMATIC URINALS WITH PUSH BUTTONS TO SAVE WATER

- Students/staff should `clear up` after themselves at places like the Kraal. There should be more bins so that empty containers can be dumped. At present the outside of the Kraal looks unacceptable, especially when it is windy. It is cleaned regularly, but as far as i am concerned, there should never be rubbish lying around. This could be a project by that the SRC can initiate - students and staff should be educated in this regard if necessary.
- Support the initiatives and efforts of staff and students at the CER to make NMMU less dependant on dirty fossil fuel.
- Take action asap. Get the drums filled with recycle waste and let companies collect these items from our campuses.
- The printers we're provided do not have automatic two-sided printing. It seems like a simple thing perhaps, why not do manual two-sided printing? But often colleagues who are not techy and rushing for time will not do a manual two-sided print simply because the possibility exists (and is sometimes highly likely) that they will print their documents incorrectly, thereby increasing paper waste and the time it takes to get the task done. So simply ensuring that the printers that are granted to staff can do automatic two-sided printing could in itself help conserve quite a bit of paper (and time).
- The university is making a concerted effort to preserve the environment.
- There is NO recycling of paper in the Pharmacy Department which is unacceptable. Is this carried out in ALL department?
- TO GET STAFF MORE INVOLVE.THANKS FOR THE 4TH September 2009.let's see how many staff will take part in this green day and take it from there.
- Tractor rides or other transport to view wild flowers and animals.
- Value driven societies do not need exams about enviornmental issues or modules that must be passed.
- Waste paper competition between departments at the NMMU. I have seen this work at the Herbert Hurd primary school (Great satisfaction). More paper you recycle the more points you receive. (based on weight and the size of your department)
- We cannot just teach green, we muct live green. Therefore, things like waste seperation and recycling must be a bare minimum. How can we preach one thing and practice another.
- Where there is a taxi rank just between Cape receive and NMMU.
- Working computers MUST be donated to charities/schools NOT recycled (which is effectively being thrown away)
- Think we must find money to provide closing wastebins to protect animals such as monkeys, plant as many trees as possible. Not sure what is happening to the pond - but it used to be an attractive sight- the geese seem to have moved away.
- This survey is only aimed at academic and administrative staff - people who have the largers role to play in the practical application of day to day green management are the 'service delivery' staff - so please include sections for these
- To please provide bins for used: newspaper, bottles etc to make it easier for re-cycling. If you need any advice get it from the Boardwalk. They have already won an award for recycling.
- We have a long way to go!!
- We need bins for recycling paper. We have been very serious about Going Green at Oceana Residence. About 80 students attended a talk by Dr Chantelle Radue on Going Green - what it all means. Students are constantly reminded to switch off lights. All my e-mails sent to students in the res are in green asa reminder and our posters in the res are green. Cleaners and security staff are reminded to switch off any lights left on during the day. This all started at the beginning of this semester-it has been a fun exercise for everyone.
- We need to replace the port jackson and bluegum trees removed as part of the work for water projects with indigineous plants. The sport field areas need specific attention
- Wind turbine generators could assist in creating electricity for the university. Good research opportunity on its effectiveness.
- With regards to one of the previous questions: It is not possible for us to print on two sides of a page because the printing facility we have in the department doesn't allow it. We currently don't

really have facilities to really recycle - paper, plastic etc. That is a pity - we could at least start with something like that. Also, it is more energy consuming to switch fluorescent lights on and off all the time when you leave your office. It is less energy consuming to switch them on when you come and off only when you leave. Furthermore, I have hardly any natural light in my office - which is ergonomically totally unsatisfactory and unacceptable. If it didn't take at least 15 minutes for my computer to boot up, I would happily switch it on and off more regularly. At the moment it is simply too time comsuming to do so. Also, it is not good for such electronic equipment to be switched on and off all the time. It is GREAT that the NMMU is finally beginning to think about greening - we have a lot to catch up on!

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