Cape Peninsula
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THE EFFECTIVENESS OF IMPLEMENTING ECO INITIATIVES TO RECYCLE WATER AND FOOD WASTE IN SELECTED CAPE TOWN HOTELS

by

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ABSTRACT

The objective of the research study was to investigate how effective an eco initiative to recycle water and food waste would be when implemented in selected Cape Town hotels. Earthworm farms are able to convert organic food waste into usable compost as an alternative to landfills. Harvesting rainwater as a direct method for the reuse of waste water makes it possible to store captured rainwater for future use. This serves as an alternative source of surface water. The study further investigated whether implementing these initiatives would be successful as a future endeavour.

Environmental movements were the instigators of the high demand for recycling initiatives. These movements aimed to address the deteriorating quality of water supplies, as well as growth in landfills. In South Africa, a decrease in the availability and quality of surface water has been coupled with an annual increase of 3.7 % in the demand for water. Landfills furthermore release toxic smoke when burned. Within the Hospitality Industry, travelers are increasingly seeking out environmentally friendly hotels as part of their corporate travel policy. This has occurred as a result of the increased focus on environmental initiatives by the International community. The researcher therefore aimed to provide practical examples of how existing theory regarding these initiatives is applicable to operations within hotels.

The research methodology was determined through analysing the research strategy, the design and the research instruments. The research strategy was based on gathering facts relevant to the theory of the study. A descriptive approach was therefore adopted as the "-*what*-" question that was asked when measuring data to answer the research questions. The research design utilised a multi-strategy approach whereby both quantitative and qualitative data were gathered. This resulted in questionnaires, interviews and case studies forming part of the research instruments. The researcher found it effective to corroborate the findings from both quantitative and qualitative data: that is, the findings from the questionnaires were enhanced by the findings from the interviews. The case studies were conducted to provide a practical context to the theory. Recommendations have been made according to technological and social developments. Ultimately, this study illustrates the success of eco initiatives aimed at recycling water and food waste produced by selected hotels in Cape Town and a reduction in the waste generated by the hotels.

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DEDICATION

For my family and friends' constant support, encouragement, love and prayers.

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GLOSSARY

Term/Abbreviation	Explanation
EIA	Environmental Impact Assessment
INORA	Institute of Natural Organic Agriculture
Niir	National Institute of Industrial Research
GHA	Green Hotels Association
WTO	World Tourism Organisation
UNEP	United Nations Environment Program
GNP	Gross National Product
RWQO	Receiving Water Quality Objective
IWOM	Integrated Water Quality Management
MBR	Membrane Bioreactor

CHAPTER ONE
ORIENTATION AND BACKGROUND TO THE STUDY

1.1 INTRODUCTION AND BACKGROUND TO THE STUDY

Awareness of the state of our environment stems from mass movements during periods in history when industrial development became more important than the public's concern for their own health and that of the ecology (Earth Day, 2011). The causes of these movements, namely to bring environmental concerns to the attention of the public, continues with current issues such as a clean environment (Earth Day, 2011). According to Alexander (2002: 5), up to 1499 litres of water may currently be used daily in a single luxury hotel room and hotels may produce food waste of up to 46% of a hotel's total waste, which is clear evidence of the impact of the hospitality industry in this regard.

The water supply in South Africa is under stress due to the rapidly deteriorating quality of available surface water (Jimenez & Asano, 2008: 167). As a result it has become necessary to adopt methods for the reuse of water. Recycled water which has been properly treated may be used as a substitute for ground sources, as in the case of harvesting rain water (Durham, Angelakis, Wintgens, Thoeye & Sala, 2005: 2; Jimenez & Asano, 2008: 169).

Recycling waste will offer an alternative to depositing it in landfills which, according to Niir Board of Consultants and Engineers (n.d.: 140), harms the environment through toxic smoke that is released when the waste is burned to dispose of it. Food waste will inevitably spoil which provides the opportunity to turn it into compost for landscaping purposes through vermicomposting (Alexander, 2005: 7; Niir Board of Consultants and Engineers, 2004: 3-5). This may be applied in the form of an earthworm farm (Jeffery, Barclay & Grosvenor, 2008: 163; McKelvey, 2008: 32; Oliver, 2009: 140-142). Alternatively, leftover food may be donated as a social initiative by a hotel to local food banks (Alexander, 2005: 7).

This study investigated the effectiveness of the steps taken by selected hotels in Cape Town to contribute to sustainable tourism by means of waste water and food waste recycling.

1.2 MAIN RESEARCH PROBLEM

The main research problem was approached by asking the question: Will implementing eco initiatives to recycle water and food waste in selected Cape Town hotels reduce this waste generated by the hotels?

1.2.1 SUB PROBLEM

A sub problem to the main research question concerned: Will implementing eco initiatives to recycle food and water waste in selected Cape Town hotels be a successful future endeavour?

1.3 HYPOTHESIS

The following hypothesis was formulated: There is a relationship between implementing eco initiatives to recycle water and food waste and a reduction in this waste generated by selected Cape Town hotels.

1.4 PURPOSE OF THE STUDY

The concept of eco tourism may no longer be placed in the unexplored bracket as, apart from the related campaign which has stretched over a decade, it is also measurable through environmental audits, such as an Environmental Impact Assessment (EIA), which may be utilised to determine the effects of a hotel's activities on the environment (Honey, 1999: 430; Lubbe, 2005: 76-78; South Africa. Department of Environmental Affairs and Tourism, 1998: 1).

1.4.1 OBJECTIVE OF THE STUDY

The objective of this study was to determine whether implementing eco initiatives to recycle water and food waste in selected Cape Town hotels would reduce such waste produced by the hotels. This study further aimed to determine whether implementing these eco initiatives would be successful over the long term.

1.5 DELIMITATION OF THE STUDY

This study focused on selected Cape Town hotels located in the vicinity of the City Centre, Foreshore and Atlantic Seaboard. Hotels were not selected on the basis of whether they were implementing eco initiatives: the researcher rather determined the degree to which the selected hotels implemented these initiatives within their operations. The study further investigated whether these eco initiatives would be a successful endeavour to pursue with regard to long term success within hotel operations.

1.6 CLARIFICATION OF TERMS AND CONCEPTS

This concerns concepts used for the research study and are only discussed briefly in this section, to be elaborated on in Chapter Two on the literature reviewed for the research.

1.6.1 BENCHMARKING

Benchmarking ensures that eco initiatives implemented by a hotel are carried through in order to ensure that they meet the hotel's environmental objectives (Bohdanowicz, Simanic & Martinac, 2005: 1644). Through utilising benchmarking, the hotel further ensures that the eco initiatives are constantly implemented. The hotel may measure the results to compare these to the expected outcomes as a tool for improving on their environmental performance.

Two levels of benchmarking may be observed, namely internal and external. According to Bohdanowicz *et al*. (2005: 1644), internal benchmarking is measured within an organisation's different departments, where as external benchmarking is measured against outside organisations.

1.6.2 DIRECT AND INDIRECT WATER REUSE

According to Durham *et al.* (2005: 2-3), water reuse concerns a method of using waste water which has been treated for further use. In the long run, reusing water may present an alternative source of water, especially in areas where the water supply is under stress. Two types of water reuse may be observed, namely direct and indirect (Jimenez *et al*., 2008: 165-169).

Water which is reused directly has been treated. This, however, cannot be used for domestic purposes but may be used for irrigation (Jimenez *et al*., 2008: 169). According to Jimenez *et al*. (2008: 165), water that is reused indirectly has been treated and returned to its source.

1.6.3 EARTHWORM FARMS

Earthworm farms are maintained in a worm bin which consists of three main layers, namely a top layer of soil to which food waste is added to feed the earthworms; the worm cast which is the rich soil produced by earthworms and initially contains the earthworms in the bin and lastly a tray at the bottom of the bin that collects the fluid produced by the earthworms (Jeffery, 2008: 163; McKelvey, 2008: 32). According to the Niir Board of Consultants and Engineers (n.d.: 145), the fluid produced is a by-product of the organic food waste used to feed the worms.

According to the Niir Board of Consultants and Engineers (2004: 52), earthworms may be classified according to their function. Endogeic earthworms ingest organic food waste found in the soil and serve as a suitable type for an earthworm farm.

1.6.4 ECO INITIATIVES

This is a process of implementing operational activities that will have the least harmful effect on the environment (Honey, 1999: 430). According to Lubbe (2005: 76-78), these activities do not necessarily need to be visible to the guests in a hotel but may form part of the hotel's internal operations, such as implementing an earthworm farm, recycling water, such as capturing rain water in a water bladder for non-potable use and through benchmarking.

Eco initiatives create a link between the economy, environment, technology and society (Hamele & Eckardt, 2006: 3; Mahomed & Beires, 2011: 3). According to Mahomed and Beires (2011: 3-4), an economy that invests in green technologies benefits the environment. Society consequently benefits from a healthy environment as they are offered an improved quality of life.

Jeffery *et al.* (2008: 163) and McKelvey (2008: 32) explain that earthworm farms do not require a lot of space and may be kept out of sight as long as they receive constant feeding. A water bladder may furthermore store rain water for reuse while being hidden away, for instance under a deck, where it will not be visible (Waterplex, 2011: 1).

1.6.5 ORGANIC FOOD WASTE

According to Jeffery *et al.* (2008: 163), a suitable method for the disposal of food waste is through the use of an earthworm farm. However, Lourduraj and Yadav (2005: 52), point out that earthworms are only responsible for the decomposition of organic waste. this type of food wastes therefore includes all compostable organic wastes, such as fruit and vegetable scraps (Jeffery *et al.*, 2008: 163).

According to the Institute of Natural Organic Agriculture (INORA), such organic waste should first be shredded to reduce its size before being fed to the earthworms (Niir Board of Consultants and Engineers, n.d.: 141). This increases the speed at which earthworms are able to digest the food waste.

1.6.6 RAINWATER BLADDER

Waste water may be regarded as sewage as it is disposed of through the sewage system (Great Britain, 2006: 69). Considering this, waste water may include the run-off from showers and taps in hotel rooms (Conti, 2009: 37; Lubbe, 2005: 76). Grey water, or rainwater run-off may be captured through the sewer pipes of a hotel and stored in water tanks or bladders for further use (Great Britain, 2006: 69; Waterplex, 2011: 1).

The harvested rainwater may be integrated into the plumbing of a hotel by means of a dual plumbing system (Mounsell, 2004: 5; Sivanappan, 2006: 6). This allows a second set of pipes to lead from the water bladder storing the harvested rainwater to substitute the water used during operations, such as tap water, flushing a toilet or for the first cycle of a washing machine.

1.6.7 RAINWATER HARVESTING

Rainwater harvesting introduces a suitable non-potable source of water for irrigation purposes (Jimenez *et al*., 2008: 165; Maunsell, 2004: 3; Sivanappan, 2006: 11). As a separate source of water, rainwater may be used to substitute the use of available surface water through *in situ* or *ex situ* harvesting methods (United Nations Environment Program, 2009: 10).

In situ rainwater harvesting is a method whereby the natural runoff is collected in an area of soil where the rainwater is most desired. *Ex situ* rainwater harvesting involves collecting the water in water tanks or dams away from the point where it is collected, namely from rooftops or other non-permeable surfaces (Hatibu & Mahoo, 1999: 162; United Nations Environment Program, 2009: 10-11).

1.6.8 RECYCLING

Recycling is the activity of turning waste into a usable product as an alternative to disposing of it (Stipanuk & Roffman, 1992: 226). It may therefore be implemented as the reuse of treated waste water or a food waste reduction programme, such as creating compost (Alexander, 2002: 7; Durham *et al*., 2005: 2).

Treating waste water for it to be of a potable standard currently requires the correct equipment and technology, such as using a membrane filter to extract the sewage from the water (Chapman, Leslie & Law, 2003: 1; Visvanathan & Ben Aim, 2000: 1). However, the researcher noted that this technology was not always available or was financially unattainable, therefore, a readily available source of water, namely rainwater run-off, would serve as the most suitable alternative to waste water recycling when harvested for future use.

Compost created by earthworm farms as part of a food waste reduction programme provides nutrients to a hotel's garden. This also reduces the amount of food waste which the hotel sends to landfills (Niir Board of Consultants and Engineers, n.d.: 140). However, the researcher noted that a hotel that does not have a garden that requires compost may alternatively benefit by selling the compost to the company that installs the earthworm farms.

1.6.9 SOUTH AFRICAN CLIMATE

De Villiers and de Wit (2010: 10); Jimenez *et al*. (2008: 161) and Woodford, Rosewarne and Girman (2006: 1) point out that South Africa has a typically arid climate which may be attributed to the 114 millimeters of rainwater runoff that the African continent receives annually, making it the driest continent in the world.

South Africa does, however, have a varying rainfall pattern with the highest humidity factor and rainwater runoff occurring along the eastern coastal areas (Jimenez *et al*., 2008: 161-166; UNESCO, 2006: 502; Woodford *et al*., 2006: 1).

1.6.10 SOUTH AFRICAN WATER ACT

Potable water is waste water which originates from raw drinking water sources and has been treated so that it is acceptably safe for drinking purposes (Durham *et al.*, 2005: 2). According to these authors, using potable water is a means of water conservation through replacing drinking water obtained from its source with treated water. This has been made possible through technological advancements which allow effective treatment of water contaminants (Durham *et al.*, 2005: 2).

The new Water Act 36 of 1998 stipulates that waste water should be reused for potable purposes by returning it to its source (Oelofse, Viljoen, Taljaard & Botes, 2004: 56; Van Wyk, Moodley, Brown & Viljoen, 2002: 1). However, the assimilative capacity of the water source should also be considered to ensure that the amount of waste water discharged does not deteriorate its quality to such a degree that it is no longer potable.

These regulations became necessary when, under the old Water Act 54 of 1956, waste water was required to be treated but there were no regulations governing its discharge back to its source (Oelofse *et al*., 2004: 56). This meant that the safe drinking standards of the water source could be exceeded.

1.6.11 VERMICOMPOSTING

Vermicomposting is the process of breaking down organic waste to produce compost by using earthworms (Niir Board of Consultants and Engineers, 2004: 4-5).

Earthworms eat, digest and excrete food waste and deposit this between the sub and topsoil (Niir Board of Consultants and Engineers, 2004: 4-8).

The importance of vermicomposting is in the managing of food waste. The effective management of food waste will decrease the effects such waste material will have on the environment, should it be disposed, and may also produce compost which is commercially valuable, especially for hotels with gardens (Niir Board of Consultants and Engineers, 2004: 4-7).

1.6.12 VERMICULTURE

This is the method of creating compost where earthworms, after organic waste is added, are cultured and are the primary end product (Niir Board of Consultants and Engineers, n.d. 142). According to the Niir Board of Consultants and Engineers (2004: 4-7), vermiculture is an earthworm breeding process by which their breeding conditions are artificially improved in order to ensure that they multiply as quickly as possible.

1.7 LITERATURE REVIEWED

Alexander (2002: 5-7) discusses topics regarding green developments in hotels as provided by the non-governmental organisation, Zero Waste Alliance. The topics included water conservation which investigates methods for reducing water consumption in hotels. In order to effectively conserve water, areas of high water consumption should firstly be identified for a system for the reduction of water use to be implemented, such as low-flow taps, low-flow shower heads and dual flush toilet systems. Solid waste reduction in hotels is also discussed, specifically food waste. It has been established that commitment is needed to reduce food waste as it may require extra attention from management but simple techniques, such as providing employees with an induction to environmental management, may be used.

Cape Nature (2007: 1), a public organisation governed by the Western Cape Nature Conservation Board Act 15 of 1998, is responsible for the promotion of nature conservation in the Western Cape.

Cape Nature has a responsibility towards many nature reserves in Cape Town and assists in protecting the environment through sustainable practices, such as its commentary role in the application process for EIA's which are used to determine the impact that a hotel's activities has on the environment.

Conti (2009: 36-37) discusses the methods used by eco hotels from across the world and serves as an effective guide for environmentally conscious travelers. Its discussion of the Ibo Island Lodge in Mozambique focuses on the methods used at the lodge to reduce its water consumption. This includes the use of run-off water from its showers for irrigation purposes. The lodge also uses treated rainwater as a source of drinking water.

The study by Durham *et al*., (2005: 1-7) supports the reuse of water by listing its possible applications and the benefits this has on the environment. The first application discussed is the use of treated wastewater for irrigation purposes, such as for agriculture or gardens.

The benefits of this application is the direct influence on the environment as the untreated wastewater is not disposed where it may contaminate clean surface water. It further serves as an alternative source of water in areas with water restrictions. The second application discusses the use of treated wastewater to substitute drinking water. Such water, however, will need to be properly treated to constitute potable water. The benefits of potable water is the strict regulations that ensure the quality of the water which prevents ground and surface water from becoming contaminated by incorrectly disposed wastewater.

Honey (1999: 430) discusses the founding of the Green Hotels Association (GHA) and its campaign to conserve water in hotels in Texas. The campaign provided hotel guests the opportunity of reusing dirty linen and towels by placing a card on the bed or in the bathroom. The success of the campaign is evident in the fact that these cards may now be found in hotels around the world to inform guests how they are contributing to saving the environment. The campaign carries financial benefits for the hotels as they conserve water, save on cleaning chemicals and increase the lifespan of their linen.

Lubbe (2005: 76-78) discusses tourism management in Southern Africa by providing recommendations for water recycling, specifically the installation of low flow shower heads and taps and dual flush toilet systems. The effectiveness of these systems are measurable through an unspecified hotel in Jamaica that found a monthly decrease in its water consumption of 1.9 million litres after installing low flow shower heads. Environmental management in terms of an EIA is also discussed. An EIA aims to determine the effect that a hotel's operations has on the environment and it has been mandatory for new developments in South Africa to conduct these assessments since 1998. An example of an EIA according to the International Hotels Environment Initiative is also provided.

The National Institute of Industrial Research (Niir) Board of Consultants and Engineers (2004: 2-10) is based in Delhi. The institute publishes the advantages of vermicomposting, which involves using earthworms to create compost, in terms of the nutritional and structural benefit this has for the soil. Earthworms are responsible for breaking down organic waste and, in doing this, aerating the soil with their movements. However, earthworms absorb roughly 10 % of the organic waste for their own growth before excreting the digested waste into the soil. The nutrient rich soil created by the earthworms is referred to as the cast, which also contains the majority of the earthworm population. Vermiculture is also examined as the process whereby earthworms are bred under controlled conditions with the aim of increasing the earthworm population in the shortest period of time.

South African Department of Environmental Affairs and Tourism (1998: 1) provides guidelines for applying for and implementing an EIA. The objectives of the document is to provide a uniform guideline for adhering to sections 21, 22 and 26 of the Environment Conservation Act of 1989, to provide details regarding the legislation that controls activities that are harmful to the environment; to assist with the application process and to acquaint the relevant decision-making authorities with their responsibilities.

1.8 LIMITATIONS TO THE STUDY

The selected hotels represented a sufficient sample of all the hotels located throughout Cape Town. The selected hotels, however, were found to lack initiatives implemented with a view to recycling for the researcher to investigate.

The researcher noted that departmentalisation within hotels caused information to be withheld or prevented from reaching specific departments. This resulted in conflicting information when interviews and questionnaires were conducted within the same hotel.

1.9 SIGNIFICANCE OF THE RESEARCH

Operations in a hotel are geared towards providing accommodation while supporting the tourism industry of the local area (Conti, 2009: 36; Honey, 1999: 430). By not having measures in place that ensure that a hotel's operations are eco-friendly, the negative impact of the hospitality industry on non-renewable natural resources means that the environment will continue to deteriorate (Alexander, 2005:2-3; Earth Day, 2011).

The researcher investigated the current eco initiatives of the selected hotels and has recommended new policies and procedures that may not have been implemented yet. The researcher also investigated the long-term success of these eco initiatives. The research study further served as an instrument to benefit hotels in that they may use the research to determine the effectiveness that implementing eco initiatives would have on their operations or how to upgrade their current environmentally friendly operations.

1.10 RESEARCH METHODS

The population investigated for the research included selected hotels in Cape Town. The sample was selected according to non-probability sampling, using purposive sampling (Welman, Kruger & Mitchell, 2005: 56-69). The researcher selected purposive sampling by which, as Welman *et al.* (2005: 56-69) explain, the sample is chosen according to the researcher's knowledge of the sample, in this case hotels situated in and around Cape Town.

A pilot study was conducted when pilot questionnaires were completed by a selected sample. The data analysis was completed by the researcher using a statistical program. The methods of research further included a case study. According to Welman *et al.* (2005: 25), a case study aims to understand the uniqueness of a particular case; the researcher investigated the effectiveness of eco initiatives of the selected hotels in Cape Town.

Case studies were conducted with a selected hotel and hotel school in Cape Town. This provided the researcher with a practical understanding of eco initiatives that were being integrated into operations. Lastly, interviews were utilised in order to enhance the responses received in the questionnaires. The responses from the questionnaires and interviews were corroborated in order to further increase the accuracy of the responses.

1.11 ETHICAL CONSIDERATIONS

Ethical considerations were taken into account as written consent from the selected hotels was obtained. The letters of consent allowed the researcher to conduct questionnaires and interviews with the relevant departments. Two questionnaires used during the study were moderated by the ethics committee before being submitted to the hotels to ensure that the contents were relevant to the study. Ethical clearance to conduct the research study was obtained from the Ethical Committee of the Business Faculty.

1.12 OVERVIEW OF THE STUDY

The study is reported as follows:

Chapter One – Orientation and Background to the Study

This chapter introduces the problem statement and sub problems, hypothesis, the objective and purpose of the study and a clarification of the concepts applied in the study, an explanation of the research methodology, the literature review, the significance of the study and the limitations of the research study.

Chapter Two – Literature review

The literature that was relevant to the research study is discussed and elaborated on in this chapter.

Chapter Three – Research Methodology

This chapter presents the researcher's explanation of the different research methods that were used. These comprise questionnaires that were sent out to selected hotels and recycling contractors; interviews with selected managers of hotels and a selected Hotel School and case studies of these selected properties.

Chapter Four – Data Analysis and Interpretation

The data gathered by means of the questionnaires were analysed via a statistical software program. The results of the questionnaires are discussed in terms of their relation to the main and the sub problems of the research. An analysis of the interviews is presented.

Chapter Five – Findings and recommendations

The findings derived from the questionnaires, interviews and case studies are discussed in this chapter and recommendations are made.

Chapter Six – Conclusion to the study

Chapter Six presents the concluding remarks to the study.

1.13 SUMMARY

The environmental movements that have raised concerns that led to water and food waste recycling in hotels was discussed. The research problem, sub problem and hypothesis to the study were presented and the purpose of the study has been explained; this concerns whether there is a relationship between implementing eco initiatives to recycle water and food waste and a reduction in this waste generated by selected hotels in Cape Town. Limitations to the study and delimiting factors that were determined were stated and concepts relevant to the study were defined.

In Chapter Two, the researcher discusses the literature review for the research study.

CHAPTER TWO
LITERATURE REVIEW

2.1 INTRODUCTION

Cullet (2003: 1) refers to the human right to be able to live a dignified life. Considering this, human environmental rights, such as enjoying a healthy environment, may be linked to the human rights of having access to fresh air, water and sufficient food as this will contribute towards living a dignified life (Cullet, 2003: 1-2).

In this chapter, the link between the environment, technology, economy and society is explained by investigating their common denominator, namely eco initiatives. Eco initiatives are discussed with reference to how such initiatives contribute to a clean environment and their impact on sustainable tourism. The political view of eco initiatives is investigated from a weak and strong ecological modernisation approach.

The researcher further investigated the quality of South Africa's available surface water and how, amongst others, it is being placed under increasing stress due to climate change. Water recycling was investigated with regard to direct and indirect methods of reuse and how the future of waste water reuse may be shaped by adopting a holistic view of the environment, economy and society.

Finally, the researcher investigated how earthworms may transform the future of landfills through the use of earthworm farms. Earthworm farms were discussed according to two processes, namely vermiculture and vermicomposting.

2.2 ECO INITIATIVES

Global trading poses legal challenges for organisations in South Africa. An increased focus on environmental initiatives within the international community has led the way for operational changes within organisations for a more sustainable approach (Acutt, 2002: 2-5; Bohdanowicz *et al*., 2005: 1643; Mahomed & Beires, 2011: 1-3). For the Hospitality Industry, this means that travelers are seeking out environmentally friendly hotels as part of their corporate travel policy (Storck, 2011: 22).

According to Acutt (2002: 4), the emerging environmental schemes within International organisations are challenging the South African government to enforce its own legal framework. Reasons for these challenges include a budget deficit, ambiguous policies and the lack of a trained workforce within the Department of Environmental Affairs and Tourism.

Although organisations are not restricted when implementing their own environmental initiatives, the need for a legal framework exists. The Department of Environmental Affairs and Tourism has realised this need by providing guidelines and legislation through their EIA Regulations (South Africa. Department of Environmental Affairs and Tourism, 1998: 1). These regulations serve as a positive step for new developments aimed at being environmentally friendly however, applicants have the responsibility of upholding all the requirements for the regulations as the local government only serves as the facilitator (Mahomed & Beires, 2011: 3).

By adopting the role of the facilitator, the local government creates a link between the economy, environment, technology and society (Hamele & Eckardt, 2006: 3; Mahomed & Beires, 2011: 3). Mahomed and Beires (2011: 3-4) point out that the environment consequently benefits when the economy invests in green technologies. Society, in turn, society benefits from a healthy environment through improved quality of life.

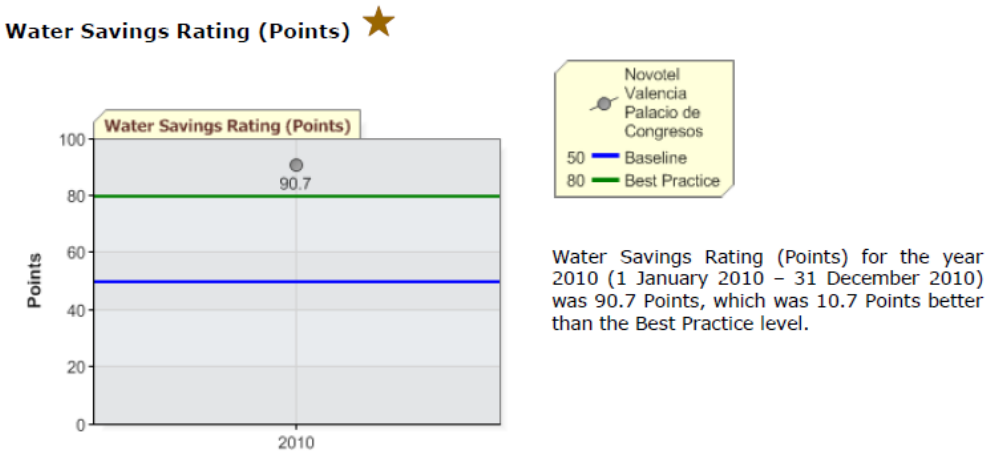
2.2.1 UNDERSTANDING HOW ECO INITIATIVES CONTRIBUTE TO A CLEAN ENVIRONMENT

Incorporating green technologies into a hotel's operations may not be enough to ensure that the environment benefits consistently (Storck, 2011: 24). A commitment is required from the hotel staff to be involved in the process and carry the objectives through. Environmental awareness has opened the doors to improvements in eco initiatives through benchmarking (Bohdanowicz *et al*., 2005: 1644). As a continuous process, benchmarking audits the current eco initiatives of an organisation in order to determine whether it meets its objectives. For a hotel, benchmarking ensures that it continuously improves on its environmental performance.

According to Bohdanowicz *et al*. (2005: 1644), two levels of benchmarking may be distinguished, namely:

- Internal
- External

Internal benchmarking is measured within an organisation's different departments where as external benchmarking is measured against outside organisations. There are three further levels of external benchmarking, namely the competitive, which is measured against opponents within the same industry; best practice, which is measured against a neutral organisation and sector benchmarking which is measured against organisations belonging to a specific sector, such as the tourism sector (Bohdanowicz *et al*., 2005: 1644).



Water Savings Measures	Frequency / Percentage Rating	Water Savings Rating (Points)
Check for leaks	Every month	73.9 Points
Low/dual flush toilets	100%	100.0 Points
Low flow tap fittings	80-99%	88.9 Points
Low flow shower fittings	100%	100.0 Points
Water sprinklers used after dark	Not Relevant / Available	-
Minimal irrigation landscaping	Not Relevant / Available	-
Use of recycle/grey/rain water	Not Relevant / Not Available	-
	Overall Rating:	**90.7 Points**

Figure 2.1: Benchmarking Assessment Report by Earth Check

Source: Earth Check (2011: 1)

Benchmarking should be an objective measurement and independent organisations have been established to provide tools for this, for instance Earth Check (Bohdanowicz *et al*., 2005: 1644-1649). Though different approaches may be used by organisations, questionnaires are the common tool used for data gathering and producing a benchmarking report. According to Murby (2008: 1), the report should summarise the organisation's level of performance in terms of its current eco initiatives and identify areas for improvement.

Figure 2.1 demonstrates a benchmarking report prepared by Earth Check for the Novotel Valencia Palacio de Congresos using a points system (Earth Check, 2011: 1). The baseline indicates the hotel's current level of operations and the best practice line is a manageable goal which should be reached within a period of one year. The table indicates areas where the hotel is able to improve on its daily operations in order to reduce its water consumption.

2.2.2 THE IMPACT OF ECO INITIATIVES ON SUSTAINABLE TOURISM

The concept of sustainable tourism is grasped once the link between the economy, environment and society is understood. According to Hamele and Eckardt (2006: 3) and Strange and Bayley (2008: 27), economic and therefore social development is limited to what the environment is able to provide.

The environment contributes to a healthy society by supplying its physiological needs in terms of water, food and even other aspects such as plants for the production of oxygen. The long-term success of a healthy society, in turn, depends on economic development to avoid poverty and contribute to social welfare (Strange & Bayley, 2008: 27). However, an economy that is entirely focused on growth and development which, at the same time, damages the environment will limit the capacity of the environment to provide society (Hamele & Eckardt, 2006: 3).

According to Alexander (2002: 5) and Hamele and Eckardt (2006: 3), hotels are dependent on the environment as a result of the nature of the service they provide. As an organisation that provides high standard accommodation to guests who, in turn, have high expectations of the service they receive, the use of water and production of waste is higher than what is usually produced domestically.

The World Tourism Organisation (WTO) and the United Nations Environment Program (UNEP) have established 12 aims to make tourism sustainable as guidelines for organisations that are environmentally committed (Hamele & Eckardt, 2006: 4). The aims provide perspective for organisations that wish to engage in a development that links the environment and society and ensure that their position in the economy is stable. These aims are illustrated in Figure 2.2. The aim of environmental purity draws a hotel's awareness to the importance of reducing water and solid waste generated during operations (Hamele & Eckardt, 2006: 4).

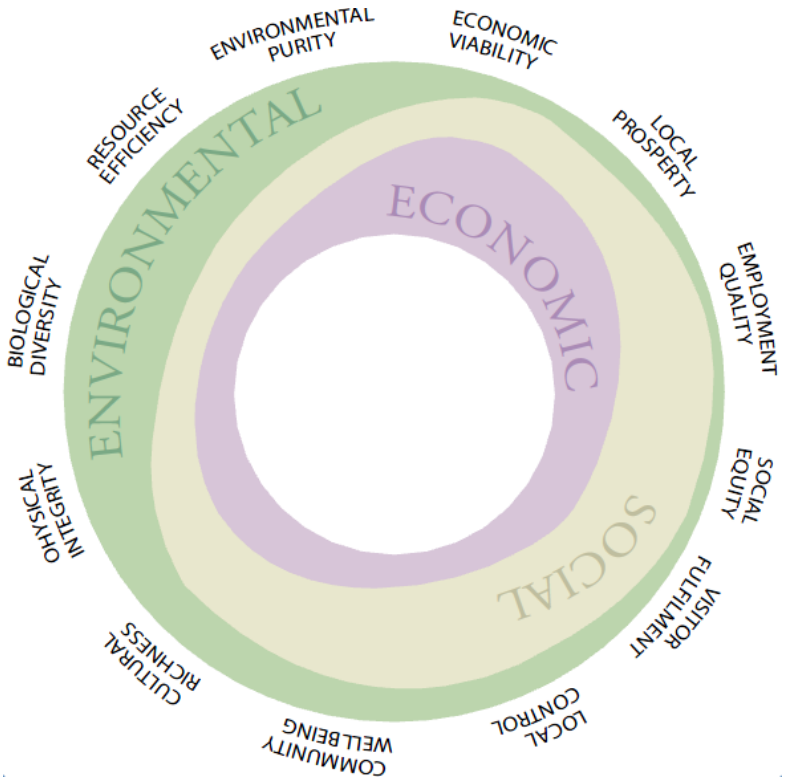


Figure 2.2: The 12 Aims of Sustainable Tourism

Source: Hamele, Eckardt (2006: 4)

According to Mahomed, Beires (2011: 3), the facilitative role played by the government with regards to the economy, environment and society is to regulate and provide policies for managing environmental issues. The approach adopted by the government determines whether the attitude towards ecological modernisation is strong or weak.

Ecological modernisation is the collective term used to describe the link between the economy, environment and society. Mahomed and Beires (2011: 3) state that strong ecological modernisation focuses on social and socio-economic systems towards greater sustainability. Weak ecological modernisation focuses on expertise and technology towards sustainability.

2.2.3 STRONG ECOLOGICAL MODERNISATION

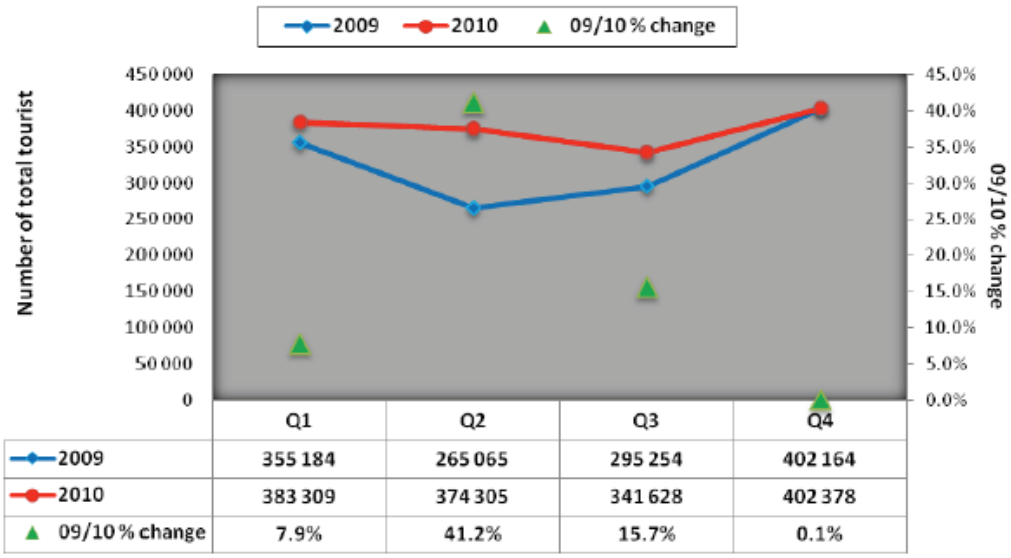
Mbaiwa (2003: 448), quantifies the size of tourism on a global scale as accounting for 5.5 % of the world's Gross National Product (GNP). The fast-paced growth of the tourism industry is encouraging to any local community as it encourages economic growth and employment (United Nations ESCAP, 2007: 32). However, according to Mbaiwa (2003: 448), any development in a region, including the growth of tourism, should encompass broader aspects than just economic development and should also focus on social considerations.

It has already been determined that hotels are largely dependent on the environment (Alexander, 2002: 5; Hamele & Eckardt, 2006: 3). Mbaiwa (2003: 448), however, explores a link between economic development and sustainable development whereby tourism is only sustainable when our physiological needs are met in the present without influencing our needs for the future.

That is, the present generation has the social responsibility to ensure the natural resources that we use on a daily basis should also be available for future generations. We should further ensure that the quality of these natural resources remains exactly the same.

The economy may be impacted on two levels, namely on a macroeconomic and microeconomic level. Colander and Gamber (2006: 2) explain that macroeconomics investigates which aspects impact the economy as a whole, such as employment and economic growth. Microeconomics therefore involves the impact that a single institution has on the economy.

According to the United Nations ESCAP (2007: 20), tourism may be assessed on a macroeconomic level and its impact is usually measured on a national level. According to Cape Town Routes Unlimited (South Africa, 2011: 22-23), tourist arrivals in South Africa increased by 15.1 % and the total tourist spending increased by 22.6 % between 2009 and 2010. These figures amounted to a 14.3 % increase in tourist arrivals and tourist spending increased by 30.7 % between 2009 and 2010 in the Western Cape (United Nations ESCAP, 2007: 20). This is graphically depicted in Figure 2.3.



	Q1	Q2	Q3	Q4
2009	355 184	265 065	295 254	402 164
2010	383 309	374 305	341 628	402 378
09/10 % change	7.9%	41.2%	15.7%	0.1%

Figure 2.3: Tourist Arrivals for the Western Cape

Source: Cape Town Routes Unlimited (2011: 23)

The benefits of tourism on a macroeconomic level is evident in the opportunities provided to the entrepreneur on a microeconomic level. According to Mbaiwa (2003: 448) and United Nations ESCAP (2007: 32), employment opportunities created by tourism is a good indicator of socio-economic growth for a specific region, especially for the poorer sector of the population.

Mbaiwa (2003: 448) also notes that poverty leads to the degradation of the environment as the poor turn to environmental resources for survival, such as using a clean river for domestic chores. Therefore, tourism is an opportunity to provide employment to the poor which leads to improved environmental and social welfare.

2.2.4 WEAK ECOLOGICAL MODERNISATION

The blueprints of weak ecological modernisation within South Africa may be traced to first world countries. According to Oelofse, Scott, Oelofse and Houghton (2006: 62), technology has been used during development in first world countries as a solution to ecological considerations, such as ensuring that a new development is environmentally sustainable. This approach to using technology has been institutionalised and has been passed on to the institutions of other developing countries, including South Africa, as the approach to environmental sustainability (Scott & Barnett, 2009: 4).

Supporters of weak ecological modernisation, namely the governments of countries that have institutionalised this approach, have relied on technology as a solution to environmental sustainability based on their views of society and the environment (Scott & Barnett, 2009: 4). According to Oelofse *et al*. (2006: 63), the view of this approach is that the environment and society are separate from each other. Furthermore, any issues related to the environment are viewed as being of a technical nature and responsibility for such issues falls on environmental managers with the necessary expertise.

Weak ecological modernisation may therefore be considered as positivistic (Oelofse *et al.*, 2006: 63). According to Oelofse *et al.* (2006: 63) and Scott and Barnett (2009: 5), positivism within an environmental context sees a fine line between scientific proof and the power to influence policies within a government. Therefore, the claims made by scientists regarding environmental sustainability, such as the rate at which the available surface water in Cape Town is decreasing and how this affects society, provides them with decision making authority regarding governmental policies. However, the link between science and policy is only possible with accurate scientific evidence (Scott & Barnett, 2009: 5).

The researcher noted that weak ecological modernisation may be the approach adopted by the South African government considering its role as the facilitator between the economy, environment and society. According to Oelofse *et al*. (2006: 62) and Acutt (2002: 4), the South African government's knowledge regarding the implementation of a policy framework for environmental sustainability is limited.

The researcher noted that the role of facilitator involved an open door invitation to private parties, such as scientific experts, to implement a weak ecological modernisation approach to managing environmental issues.

The gap between social considerations and a technological approach to addressing environmental sustainability issues is clearly defined once a government adopts weak ecological modernisation (Oelofse *et al*., 2006: 64). Oelofse *et al.* (2006: 64) as well as Scott and Barnett (2009: 4-5), declare that technology is able to make a measurable impact on the environment in order to provide the scientific evidence required to gain political power. It also provides the required data for determining whether the environmental issues are being dealt with successfully over a short term. An approach that considered social welfare could be seen as an approach that only produces results in the long-term (Oelofse *et al*., 2006: 64).

2.3 UNDERSTANDING THE STRESSES PLACED ON THE AVAILABLE SURFACE WATER IN SOUTH AFRICA

South Africa is considered a drought prone country with an arid climate over 69 % of its total surface area, which makes it one of the 20 driest countries in the world (De Villiers & De Wit, 2010: 10; Jimenez *et al*., 2008: 161; Woodford, *et al*, 2006: 1).

Although South Africa only represents 4 % of the African continent, its dry weather conditions may be associated with the 114 millimetres of water runoff that Africa receives annually that makes it the driest continent in the world (De Villiers & De Wit, 2010: 9).

LOCATION	% CONT AREA	PRECIP km³/a	EVAP km³/a	RUNOFF km³/a	RUNOFF mm	% CONT RUNOFF	RUNOFF/ PRECIP
GLOBAL (continents + oceans)		496 100	100 496				
CONTINENTS - Total	100.0	111 100	71 400	39 700	266	100	0.36
AFRICA	20.0	20 743	17 334	3 409	114	8.6	0.16
ANTARCTICA	9.4	2 376	389	1 987	141	5.0	0.84
NORTH AMERICA	16.2	15 561	9 721	5 840	242	14.7	0.38
AUSTRALIA	6.0	7 144	4 750	2 394	269	6.0	0.34
ASIA	29.6	30 724	18 519	12 205	276	30.7	0.40
EUROPE	6.7	6 587	3 761	2 826	282	7.1	0.43
SOUTH AMERICA	12.0	27 965	16 926	11 039	618	27.8	0.39
SOUTH AFRICA	0.8	576 (a)	527 (b)	49 (c)	40 (b)	0.12	0.09

Figure 2.4: Rainfall Runoff on a Global Scale

Source: De Villiers, De Wit (2010: 9)

The rainfall pattern in South Africa varies with regard to different regions, with high rainfall runoff in areas with high humidity, primarily along the eastern coastal areas. However the average annual rainfall may be as little as 450 millilitres compared to 860 millilitres globally (Jimenez *et al*., 2008: 161-166; UNESCO, 2006: 502; Woodford *et al*., 2006: 1). The rainwater runoff of Africa is illustrated in Figure 2.4.

According to De Villiers and De Wit (2010: 10), the level of water evaporation determines aridity. However, only a total of 9 % of South Africa's total water evaporation is converted back to rainwater to form part of the runoff which is returned to the available surface water.

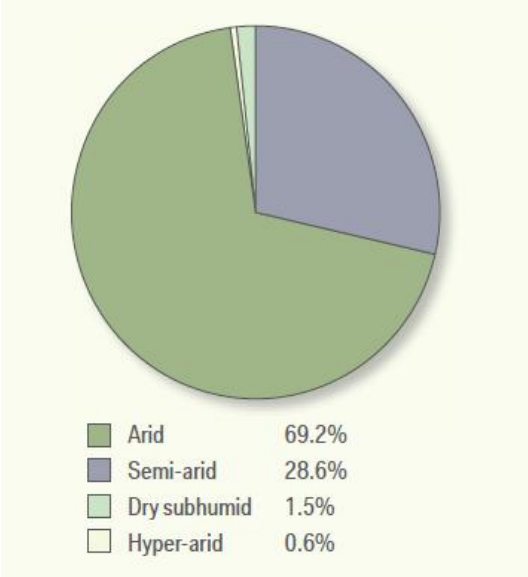


Figure 2.5: Climate Conditions of South Africa

Source: De Villiers, De Wit (2010: 10)

The predicted climate change resulting from global warming could increase water evaporation by 5 % should there be an increase in the climate's temperature of only one degree Celsius (De Villiers & De Wit, 2010: 10). South Africa currently relies on 77 % of its surface water. This could be placed under additional stress when the amount of precipitation occurring from evaporated water decreases (De Villiers & De Wit, 2010: 10; UNESCO, 2006: 502). South Africa's climatic conditions are illustrated in Figure 2.5.

The pressure on the surface water supply is already affecting the South African population of 48 million with an expected increase in the demand of water of up to 3.7 % annually in Cape Town alone (Mukheibir & Ziervogel, 2006: 27; UNESCO, 2006: 502). According to the Mukheibir and Ziervogel (2006: 27), the increase in demand for water in Cape Town may be more than the available water supply, creating a water deficit as early as 2013. This increase in demand is largely due to the population growth in urban areas consisting of 59 % of South Africa's population. This growth may largely be attributed to economic growth creating hotspots for living in Johannesburg, Durban and Cape Town, the largest metropolitan areas in South Africa (De Villiers & De Wit, 2010: 18, UNESCO, 2006: 502).

2.3.1 UNDERSTANDING THE INDIRECT REUSE OF WASTE WATER

Indirect reuse of waste water, according to Jimenez *et al*. (2008: 165), occurs when waste water has been returned to its source to be reused as potable water. This has been mandatory in South Africa since 1956 according to the South African Water Act 54 of 1956 (Mema, 2010: 1). Under the new Water Act 36 of 1998, this is currently accomplished through the mandate that the Act provides to the Department of Water Affairs and Forestry to implement the Receiving Water Quality Objective (RWQO) approach (Oelofse, Viljoen, Taljaard & Botes, 2004: 56; Van Wyk *et al.*, 2002: 1).

The objective of the Act is to regulate not only the quality of the water that is discharged back to its source, as with the old act, but also takes the assimilative capacity of the water source into consideration. According to Oelofse *et al.* (2004: 56), Jimenez *et al.* (2008: 167) and Van Wyk *et al*. (2002: 1), the assimilative capacity entails that only a controlled amount of waste water may be discharged back to its water source without the quality of the water deteriorating to such a point that it is no longer potable.

The importance of this may be linked to the quality of available surface water in communities that are experiencing a significant growth in population (De Villiers & De Wit, 2010: 20; Mema, 2010: 1; Thomson & Thomas, 2006: 2). One of the major causes of concern in these communities is the discharge of sewage into South Africa's water sources which creates the risk of diseases (Jimenez *et al*., 2008: 162).

In 2004 the Mail and Guardian confirmed nine cases of typhoid fever in Mpumalanga which resulted from sewage polluting the water supply; a further 18 babies died in the Eastern Cape from similar causes (Mema, 2010: 2).

The strategy adopted by the South African government with regards to the indirect reuse of waste water is further based on the climatic conditions of the country. According to Jimenez *et al.* (2008: 167), the scarcity of water supplies due to the country's arid climate has been the main focus of the government in implementing the RWQO approach.

Considering the scarce water supplies, the maximum amount of waste water should be returned to its source to be reused by downstream users (Oelofse *et al*., 2004: 57). However, the regulations of the RWQO may be observed in coastal areas where water was abstracted close to the sea. The RWQO requires that excess waste water that is discharged into the sea also receives adequate management as this impacts estuaries. The National Water Resource Strategy and Catchment strategy was developed to ensure that waste water is reused in every possible way. This further ensures that the least amount of waste water is discharged back to the sea (Oelofse *et al*., 2004: 57). South Africa's evolving water quality management approach is illustrated in Figure 2.6.

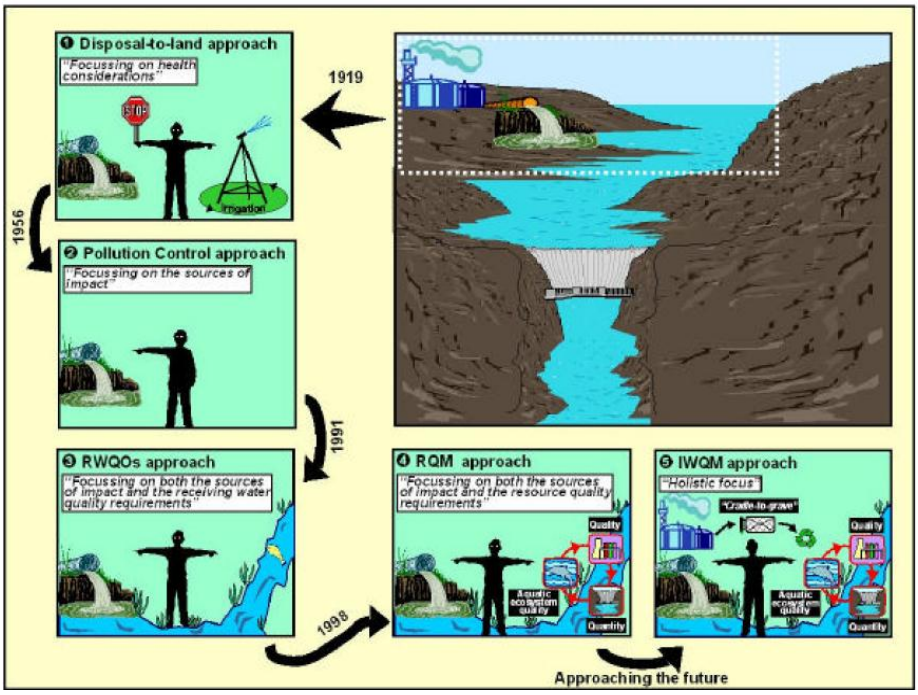


Figure 2.6: South Africa's Evolving Water Quality Management

Source: Van Wyk *et al*. (2002 : 1)

2.3.1.1 AN EYE TO THE FUTURE

Van Wyk *et al*. (2002: 1), state that the future of waste water management lies in implementing a holistic approach. This may be achieved through the Integrated Water Quality Management (IWQM) approach whereby reducing pollution one way, such as through manufacturing products that are eco friendly, will not cause damage in another way, such as polluting water or the environment. Should this occur, the aim of producing a product that is eco friendly is void as the environment is damaged through the production process.

The House of Lords in Great Britain (Great Britain: House of Lords, 2006: 69) and Thomson and Thomas (2006: 2) have indicated that waste water may be effectively purified for potable use in hotels with the use of a membrane filter known as a membrane bioreactor (MBR) for extracting the sewage from the waste water produced. The process of sewer mining does not remove harmful pathogens that may cause diseases such as cholera and typhoid fever, however, and additional treatment, namely the use of chlorine during the filtration process, is required.

An MBR consists of a thin porous wall that can allow certain particles to move through it while blocking other undesired particles (Chapman, *et al.,* 2003: 1; Visvanathan & Ben Aim, 2000: 1). This process is facilitated by microorganisms that carry out their natural function, such as attaching to a particle and converting it into another form, before filtration through the membrane occurs (Chapman *et al*., 2003: 2; Visvanathan & Ben Aim, 2000: 3). The pore diameter of the membrane may vary according to the level of filtration desired, ranging from conventional filtration for large particles to reverse osmosis which removes smaller particles (Visvanathan & Ben Aim, 2000: 2).

The advantages of a MBR are as follows:

- The filtration process is carried out from start to finish through the MBR, eliminating the need for a secondary and tertiary filtration process.
- The by-product produced during the filtration of the sewage is very low, leaving a small footprint on the environment.
- The MBR may be housed inside a building making it suitable to install in a hotel's basement (Chapman *et al*., 2003: 3).

2.3.2 UNDERSTANDING THE DIRECT REUSE OF WASTE WATER

Jimenez *et al*. (2008: 165) explains that water which is reused directly cannot serve a potable use, but may be used for irrigation or other non-potable purposes. Rainwater harvesting provides a suitable substitute to surface water supplies as it may be used for non-potable purposes without treatment (Maunsell, 2004: 3; Sivanappan, 2006: 11).

Che-Ani, Shaari, Sairi, Zain and Tahir (2009: 134) and the United Nations Environment Program (2009: 1) state that rainwater harvesting is an available technology that has been utilised for many generations without the need of sophisticated plumbing. The process involves storing rain water for future use, namely consumption and other human purposes, and this acts as a buffer to conserve the water available from the natural environment (Che-Ani *et al*., 2009: 134; United Nations Environment Program, 2009: 1).

This available technology serves as a possible alternative to managing natural resources in an arid environment which, in South Africa, is often combined with poverty and a decrease in the quality of available resources.

2.3.2.1 RAINWATER HARVESTING AND ITS ENVIRONMENTAL VIABILITY

It may be accepted that the largest challenge in a country with an arid climate is the change from its wet season to its dry season when additional pressure is placed on its available surface water (United Nations Environment Program, 2009: IX). The deterioration of environmental resources therefore requires technologies such as rainwater harvesting to be adopted as it is considered as a separate source of water supply to ground or surface water.

However, according to the United Nations Environment Program (2009: V), rainwater may be over abstracted resulting in an even greater reduction of surface water for downstream users. Rainwater which is left to soak into the ground will flow downstream as surface runoff and form a part of the ground or surface water (United Nations Environment Program, 2009: 6). Once it is over abstracted, the downstream supplies are unreplenished.

The impact of rainwater harvesting on a community in South Africa is represented by Figure 2.7 (United Nations Environment Program, 2009: 8). The intensity of the rainwater harvesting process was measured at a base line of zero which represents the natural level of water flow in millimeter without any intervention for downstream users; at 50 % intervention and at the maximum level of 100 % intervention.

According to the United Nations Environment Program (2009: 10), the left hand side table represents rainwater harvested by *in situ* technology, namely capturing and storing rainwater in the earth's soil. The right hand side table represents rainwater harvested by *ex situ* technology, namely capturing rainwater and storing it at a separate location from where it was harvested, such as from rooftops into a storage tank.

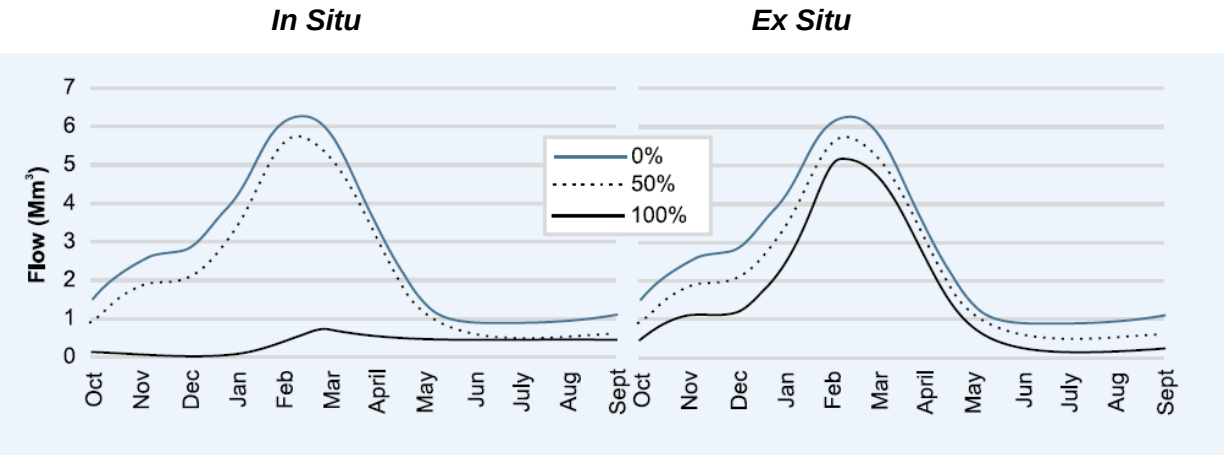


Figure 2.7: Rainwater Harvesting in South Africa and its Potential Impact on Stream Flow

Source: United Nations Environment Program (2009: 8)

Considering Figure 2.7, the researcher could determine that the natural surface runoff of rainwater was least affected when *ex situ* harvesting was used. The researcher speculated that the reason for this might be the nature of the harvesting process, namely rainwater runoff was collected from rooftops or other similar sources. The United Nations Environment Program (2009: 10) explains that these types of artificial surfaces were impermeable and therefore unable to store rainwater. The rainwater that was harvested was limited to what the artificial surface caught.

Once this moisture dried up in the soil in an arid climate, it was necessary for surface runoff to replenish the moisture levels in the soil without intervention. In order to understand this more effectively, *in situ* and *ex situ* rainwater harvesting are discussed in more detail.

2.3.2.1.1 UNDERSTANDING *IN SITU* RAINWATER HARVESTING

In situ rainwater harvesting is a method whereby the natural runoff is collected in an area of soil where the rainwater is most desired (Hatibu & Mahoo, 1999: 162; United Nations Environment Program, 2009: 10).

Through collecting the rainwater in a specific area, more time is allowed for it to infiltrate the soil. The second principle concerns the storage medium, namely the soil in which the rainwater runoff occurs. Hatibu and Mahoo (1999: 162-163) explain that increased infiltration may be achieved through various methods, namely deep tillage, contour farming and ridging and agronomic practices.

- Deep tillage increases the porosity of soil in order to increase its capacity for storing rainwater. The deeper the soil is tilled, the greater its storing capacity.
- Contour farming is used in soil in which the landscape slopes so as to create a barrier to capture rainwater runoff. Ridging aims to add a roughness to the surface of the soil which further acts as a method for increasing the moisture retention level of the soil.
- Agronomic practices aim to reduce the rate at which moisture evaporates from the soil, namely through methods such as mulching, in which dead organic materials are used to insulate the surface of the soil.

Hatibu and Mahoo (1999: 162) and the United Nations Environment Program (2009: 10), indicate that the main application of *in situ* rainwater harvesting is therefore for agricultural purposes and that it provides certain benefits in this regard. Water uptake for crops can range from anything between five to 60 days and *in situ* methods make it possible to control the recharge of water in the desired area. This allows sufficient moisture to be present for the crops according to their water needs.

Some of the methods, such as tillage, contour farming and ridging also serve as a method of soil conservation. By increasing the moisture levels of the soil through these methods, soil erosion may be prevented.

2.3.2.1.2 UNDERSTANDING *EX SITU* RAINWATER HARVESTING

When rainwater is harvested from semi to impermeable surfaces and is stored away from the point where it has been harvested the process is referred to as *ex situ* harvesting (Bunclark, 2010: 1; United Nations Environment Program, 2009: 10). Usually, soil is not used as a surface for the capture of this type of rainwater harvesting. However, should the soil have a low capacity for water infiltration, it may be included.

According to the United Nations Environment Program (2009: 10-11), the harvested rainwater may be stored in a number of manners including dams and water tanks. The volume of rainwater that is stored is determined by the volume of rainwater runoff that occurs at the capture point and the size of the storage medium. That is, *in situ* harvesting requires sufficient rainwater runoff to completely infiltrate the soil until it has reached its maximum moisture capacity whereas *ex situ* harvesting stores water according to the rate of rainwater runoff occurring at the capture point or as determined by the dam or water tank reaching its maximum storage capacity.

Ex situ harvesting has a dual purpose, namely for both agricultural and domestic use (Bunclark, 2010: 1; United Nations Environment Program, 2009: 10). These uses include irrigation and utilising the rainwater in a building's water distribution system. These methods of harvesting, conserving and using rainwater are illustrated in Figure 2.8.

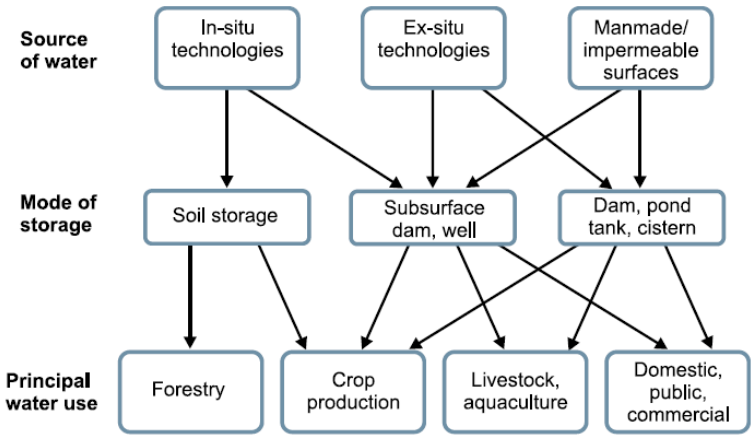


Figure 2.8: Methods of Rainwater Harvesting

Source: United Nations Environment Program (2009: 12)

Maunsell (2004: 14) explains that the most cost effective use for rainwater in a hotel is for irrigation of the hotel grounds. However, a smaller hotel may incorporate rainwater into other aspects of its operations by installing additional circulation systems which are otherwise expensive for larger hotels and will provide little yield.

Maunsell (2004: 5) and Sivanappan (2006: 6, 12) further explain that rainwater may be harvested for irrigation purposes by storing it in large water tanks or bladders. Pipes from the water tank should ideally lead underground to the plants, known as sub-surface irrigation. This prevents untreated water from coming into contact with passersby and further reduces the water needed as the pipes target the plant roots directly (Maunsell, 2004: 5).

Rainwater may further be reused through integrating it into the plumbing system of a hotel in order to substitute the water used for flushing toilets, taps and the first cycle of washing machines (Maunsell, 2004: 5; Sivanappan, 2006: 6). A second set of pipes will need to be installed to lead from the main rain water storage tank to a second header tank situated in the roof of the hotel. Water is pumped from the main storage tank to the header tank by means of a pump (Maunsell, 2004: 5). This is illustrated in Figure 2.9.

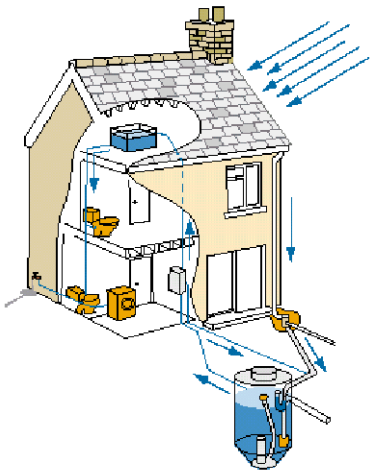


Figure 2.9: Dual Plumbing Using *Ex Situ* Rainwater Harvesting

Source: Maunsell (2004: 5)

2.4 EARTHWORM FARMS AS AN ALTERNATIVE TO LANDFILLS

Landfills as a method of disposing of waste has a harmful effect on the environment as non-biodegradable waste that is either buried or burnt releases toxic smoke (Niir Board of Consultants and Engineers, n.d.: 140). This necessitates an alternative to landfills to ensure the continued health of our environment and prevent communities from living in their own waste.

The potential of earthworms to convert biodegradable waste into compost at a rate that is fast enough to match the production rate was first utilised in Canada in the 1970's (Abbasi, 1998: 41; Niir Board of Consultants and Engineers, n.d.: 140).

The realisation that earthworms are able to convert up to 80 tons of organic waste into compost yearly was slow to develop largely due to the perception of the earthworm, namely that they are typically useful as bait and chicken feed (Abbasi, 1998: 41-42; Lourduraj & Yadav, 2005: 51; Niir Board of Consultants and Engineers, 2004: 1, 8, 9).

According to Abbasi (1998: 42), fertiliser production facilities are producing up to five million tons of nitrogen annually in order to meet the needs of the agriculture industry.

This figure is representative of the amount of nitrogen present in organic waste that is produced globally and may be extracted by earthworm farms, therefore providing the potential to either double or supplement the world's fertiliser production (Abbasi, 1998: 42).

McKelvey (2008: 32) and Jeffery *et al.* (2008: 163) explain that earthworm farms do not occupy a lot of space and commonly take the form of a worm bin for small-scale to personal use, such as in hotels. The small size of the bin allows it to be stored out of sight provided the earthworms receive constant feeding.

The worm bin is multi-layered, consisting of the top layer of soil to which food waste is added to feed the earthworms; the worm cast which is the rich soil produced by earthworms and initially contains the earthworms in the bin; and, lastly, a tray at the bottom of the bin that collects the fluid produced by the earthworms, as shown in Figure 2.10 (Jeffery *et al.*, 2008: 163; McKelvey, 2008: 32). The compost produced by the earthworm farm after approximately six months may be harvested once it has turned into a crumbly dark soil (Jeffery *et al.*, 2008: 163; Oliver, 2009: 144). The compost furthermore should be free of any foul odours and should have an earthy smell.

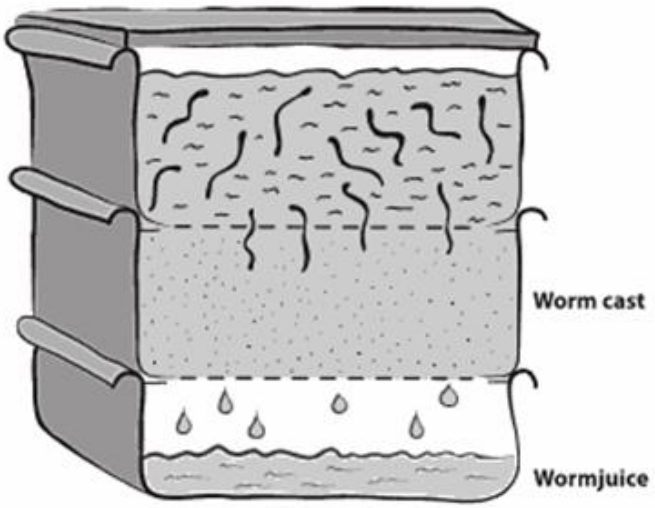


Figure 2.10: Earthworm Farm

Source: McKelvey (2008: 32)

2.4.1 UNDERSTANDING EARTHWORMS AND VERMICULTURE

The Niir Board of Consultants and Engineers (n.d.: 142) and Niir Board of Consultants and Engineers (2004: 6) describe vermiculture as a breeding programme using earthworms in a controlled environment to ensure that they multiply as much and as quickly as possible.

The type of earthworm that is most suitable for transforming humus, which is the organic waste they feed on, into compost is the red worm, a name based on the category of earthworms it belongs to (Gajalakshmi & Abbasi, 2004: 489; Lourduraj & Yadav, 2005: 52; Niir Board of Consultants and Engineers, 2004: 6).

According to Gajalakshmi and Abbasi (2004: 487) and Lourduraj and Yadav (2005: 51-52), earthworms may be classified into three categories according to their function and how they transform the soil they live in, namely:

- Epigeic earthworms that live on the surface of the soil and transform organic waste however, as they do not dig into the soil, they do not influence the soil structure.
- Anecic earthworms burrow vertically into the soil and carry organic waste into their burrows where they transform it into compost. They therefore play an important role in transporting organic waste found on the surface of the soil.
- Endogeic earthworms burrow horizontally in the soil and survive by ingesting the nutrient rich soil. They very seldom come to the surface of the soil and tend to reuse their burrows.

The red worm, scientifically classified as Eisenia Foetida, is categorised as an epigeic earthworm (Gajalakshmi & Abbasi, 2004: 489; Niir Board of Consultants and Engineers, 2004: 6). Anecic and endogeic earthworms contribute largely to the structure of the soil which is beneficial for plant life; however, epigeic earthworms concentrate solely on transforming organic waste into compost (Gajalakshmi & Abbasi, 2004: 489; Niir Board of Consultants and Engineers, 2004: 1). A single red worm is capable of consuming its own weight in organic waste daily, which means that an earthworm farm maintained in a controlled environment will require a constant supply of organic waste to feed the earthworms (Niir Board of Consultants and Engineers, 2004: 9).

Gajalakshmi and Abbasi (2004: 489) and the Niir Board of Consultants and Engineers (2004: 9) explains that the benefits of vermiculture are the large amounts of organic waste redworms are able to transform into compost.

Red worms are further able to multiply at a rapid rate, doubling their population within four months. Red worms furthermore are able to tolerate much higher temperatures than those in the remaining two categories. This allows earthworm farms to be housed in areas with temperatures ranging up to 43 degrees Celsius.

2.4.2 UNDERSTANDING EARTHWORMS AND VERMICOMPOSTING

According to the Niir Board of Consultants and Engineers (2004: 2), the number of living organisms present in soil determines whether soil is a living and fertile soil.

Though earthworms are able to store toxic pesticides and even fertilisers in their bodies, sometimes at a level that is up to 10 times higher than what is found in the soil, the application of these manmade chemicals kill the living organisms in soils (Lourduraj & Yadav, 2005: 55; Niir Board of Consultants and Engineers, 2004: 2). Earthworms may therefore be used as an indication of the fertility of soil based on their ecological role (Abbasi, 1998: 40; Lourduraj & Yadav, 2005: 52; Niir Board of Consultants and Engineers, 2004: 2).

Earthworms transform organic waste into compost through secreting an alkaline fluid through their skins, which softens the organic waste. This fluid partially digests the waste before the earthworm consumes it (Niir Board of Consultants and Engineers, 2004: 40). Often, when there is very little organic waste on the surface of the soil, the earthworm will consume the soil it lives in and feed on the nutrients found in the soil (Gajalakshmi & Abbasi, 2004: 487; Lourduraj & Yadav, 2005: 51-52; Niir Board of Consultants and Engineers, 2004: 40). Once the earthworm has digested the waste, it is excreted as a nutrient rich cast.

The cast may either be excreted on the surface of the soil, as with redworms, or in the earthworm's burrow and takes the shape of small pellets or long strands that look similar to soil (Abbasi, 1998: 41; Gajalakshmi & Abbasi, 2004: 488).

The soil benefits from the microorganisms and enzymes that are transferred into the cast during the digestion process. The presence of these microorganisms stimulates the decomposition of organic waste which contributes to the fertility of the soil (Abbasi, 1998: 41; Gajalakshmi & Abbasi, 2004: 488; Lourduraj & Yadav, 2005: 57).

Lourduraj and Yadav (2005: 57) explain that the benefit of vermicomposting in the production of microorganisms by the earthworms. The beneficial microorganisms reduce the potential development of diseases in the soil inhabited by the earthworms as the earthworms produce soil rich in oxygen through their burrowing. Harmful bacteria, on the other hand, may usually be found in soil deprived of oxygen.

2.5 SUMMARY

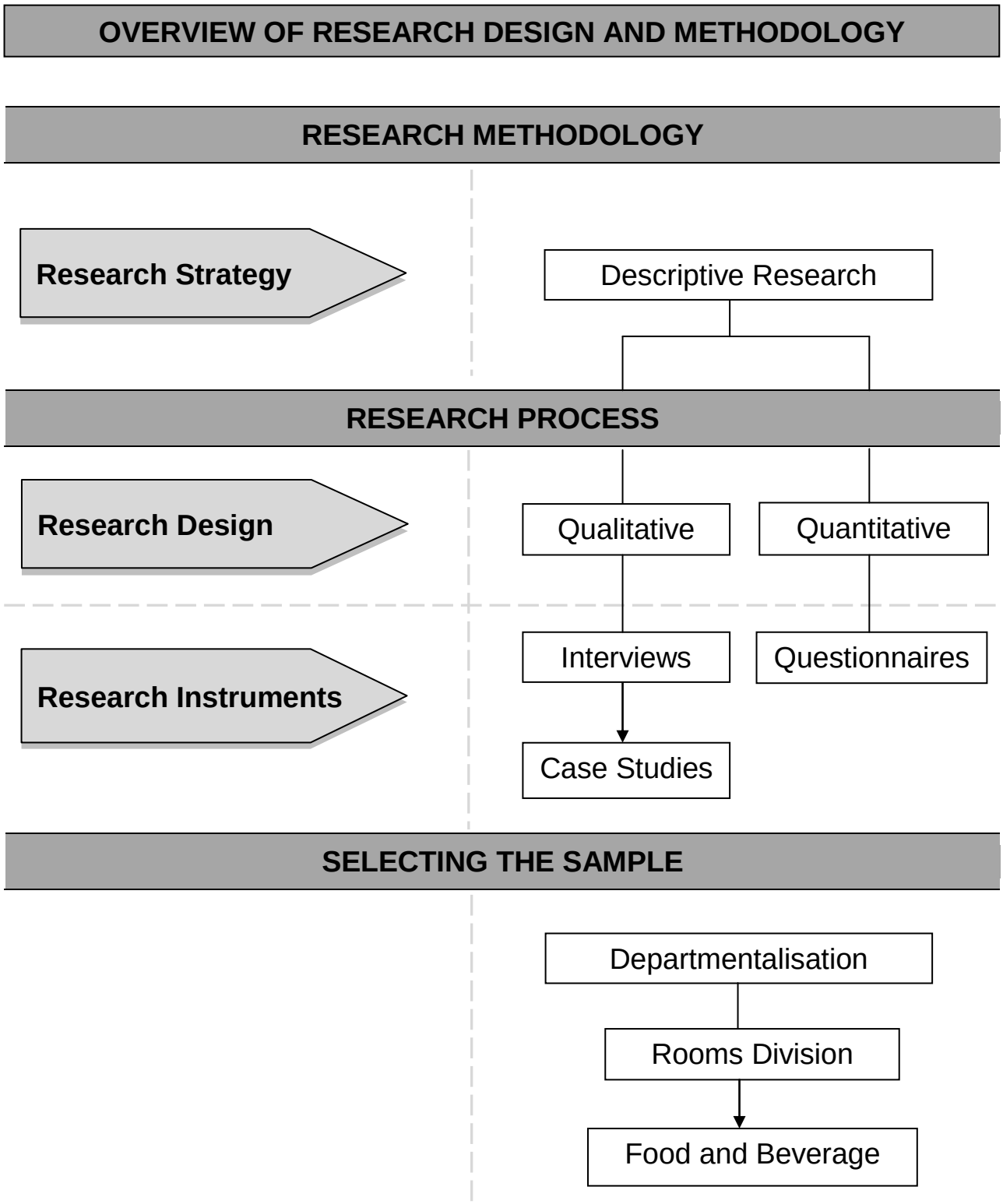
An investigation of eco initiatives and the link between the environment, technology, economy and society are discussed in the foregoing sections. Eco initiatives were further investigated in order to determine how they contribute to a clean environment and what their impact on sustainable tourism are. Weak and strong ecological modernisation was found to be a political influence, based on the scientific developments of first world countries.

The discussion on the available supply of surface water in South Africa was focused on the stresses placed on its supply due to the country's arid climate. The direct reuse of waste water was investigated with regard to a renewable source which is readily available for harvesting, namely rainwater. The different forms of rainwater harvesting, namely *in situ* and *ex situ* and their environmental viability were discussed. It was found that the indirect reuse of waste water should follow a cradle-to-grave approach whereby the reduction of pollution may not indirectly cause harm to the environment as a by-product in the future. Lastly, the discussion of alternatives to landfills focused on earthworm farms, and this branched out to vermiculture and vermicomposting.

In Chapter Three, the researcher discusses the research methods, the target population the sample, the structure of the questionnaires used and interviews conducted. The research methodology is elaborated on and an analysis of the results obtained from the questionnaires and interviews presented.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY



3.1 INTRODUCTION

According to Bryman (2006: 98), using multi strategy research by integrating both quantitative and qualitative research poses a challenge as few practical examples of this method exist. The framework for this method has largely been based on theory with few examples of how qualitative and quantitative research can be practically integrated. However, in this chapter the researcher highlights the connections that these strategies share in this study.

This was achieved by investigating the research strategy with regard to the research question. According to Blumberg, Cooper and Schindler (2005: 17), the research design should be planned carefully to produce results that are as objective as possible. The research design was investigated in terms of the data collection tools. These tools were relevant to both quantitative and qualitative methods of research gathering. Lastly, the sampling methods were investigated through determining how these methods were selected.

The aim of this chapter therefore is to present the approach to the research methodology and the objectives of this research study. The research methods that were used are elaborated on. These include interviews that were conducted and questionnaires that were distributed to participants who formed the sample of the study.

3.2 RESEARCH METHODOLOGY

De Vaus (2001: 1) and Gerhardt (2004: 4) make it clear that the research methodology defines the strategy that needs to be adopted for the specific research. The purpose of this strategy was to ensure that the research question, in this case *what* was researched, matches the research objectives. As expressed by Welman *et al.* (2005: 2), the research methodology considers and explains the logic behind the research methods and techniques.

Brynard and Hanekom (2005: 6) explain that descriptive research concerns information obtained through observation. It concerns what the researcher observes, analyses objectively and describes in words to formulate conclusions. The descriptive research approach was therefore one of the research approaches that the researcher adopted.

According to De Vaus (2001: 1), descriptive research is concerned with gathering facts; considering the objectives surrounding the methodology of the study, the researcher measured the data collected to answer the research questions.

De Vaus (2001: 1) elaborates, stating that the purpose of descriptive research is to collect, organise and summarise information through asking questions concerning the *what* of the research. In this case questions such as *"What is the conversion rate of organic waste into compost in earthworm farms?"* and *"What is the average annual rainfall in the City of Cape Town?"* were asked. These questions prompted the researcher to investigate the facts relevant to a theory as opposed to developing explanations to a theory. De Vaus (2001: 2) further explains that descriptive research prompts the researcher to ask *why,* which is the leading question to explanatory research, as in *"Why do earthworms convert organic waste into compost?"* and *"Why does the City of Cape Town receive that amount of annual rainfall?"*.

The commitment to eco initiatives by hotels in the City of Cape Town could not be determined through analysing only a single district. According to Grace (2001: 1), descriptive research collects data over a large geographic area by using the two instruments of measurement which were relevant to this study, namely questionnaires and interviews. Considering that the sample consisted of selected hotels situated in the City Centre, the Foreshore and the Atlantic Seaboard, the population included the entire City of Cape Town.

The data collected from the selected hotels were statistically analysed as the researcher measured the level of eco initiatives currently in place in these hotels. The researcher made us of inferential statistics for analysing the data, which, according to Jargowsky and Yang (2004: 2), means that statistical data is used to reach a conclusion regarding, for instance, the selected hotel's potential for implementing additional eco initiatives.

According to Grace (2001: 4-5), the advantages of descriptive research include gathering data that are relevant to the study, especially during interviews when the researcher may use leading questions to encourage specific answers. The researcher may also gather data over a large geographic area and, as in the case of questionnaires, when the respondents have adequate time to think about their responses.

Grace (2001: 4-5) also identifies disadvantages to this research method, such as the large amount of time spent on administering questionnaires and conducting interviews. This is specifically relevant when the sample covers a large geographic area such as the City of Cape Town. More attention also has to be given to designing questions that would receive an accurate response by everyone taking part in the study; technical questions can only be answered by respondents who are familiar with the particular field of expertise, whereas unspecific questions may not provide the researcher with adequate statistics.

Grace (2001: 1), points out that descriptive research cannot be defined as either qualitative or quantitative but usually uses elements from both. The researcher therefore investigated both approaches.

3.3 THE RESEARCH PROCESS

Multi strategy research integrates quantitative as well as qualitative approaches into the research design. This is based on the stages of data collection and data analysis (Bryman, 2006: 98). Creswell (2009: 14) describes multi strategy research as a concurrent mixed method approach whereby quantitative and qualitative methods are used and the researcher combines the quantitative and qualitative data to provide a comprehensive analysis of the research problem. Considering this, the researcher applied quantitative research through questionnaires as a research tool. Qualitative research was applied in the analysis of interviews and case studies.

Blumberg *et al.* (2005: 17) explain that the research process used should be described in sufficient detail to show that the results obtained are reliable. Omission of significant procedural details makes it difficult, or even impossible, to estimate the validity and reliability of the data. The data that the researcher collected was verified for reliability by conducting reliability tests. Reliability is concerned with the findings of the research and relates to the credibility of such findings (Welman *et al.,* 2005: 145). To determine whether findings are reliable, the researcher needs to ask whether the evidence and conclusions stand up to the closest scrutiny.

Brynard and Hanekom (2005: 48-49) state that during the process of data collection the researcher is busy with preliminary analysis of data. That is, the researcher discards that which is not relevant to the research study and retains only the relevant data. This will constitute the data that the researcher analyses and from which conclusions are drawn.

3.3.1 QUANTITATIVE RESEARCH

Quantitative research may be viewed as a deductive approach to validating the research theory (Meadows, 2009: 4-8). The focus of this type of approach was the characteristics surrounding eco initiatives. As the current impact of the operations of the selected hotels on Cape Town's environment was unknown to the researcher, statistical data was gathered regarding the effect that an eco initiative has on a hotel's operations.

The nature of an eco initiative is such that its impact on the environment should not be measured only within a hotel. External validity therefore means that statistical data gathered through questionnaires must be applicable to other research fields outside the sample (Meadows, 2009: 8). As such, eco initiatives are also applicable to corporate enterprises and private households, not specifically to hotels only.

3.3.1.1 QUESTIONNAIRES

Questionnaires may be classified under survey research, which, according to Grace (2001: 3), is one of the simplest forms of data gathering. Cross-sectional surveys were used according to one of the three sampling approaches, namely simple random, stratified or cluster sampling (Grace, 2001: 4). Other survey techniques include the longitudinal or Delphi technique. However, stratified random sampling was used for the purpose of the current research.

Stratified random sampling consists of the population, in this case, from one of the selected hotels within the City of Cape Town. The population was broken down into sub-populations (Welman *et al*., 2005: 61). Departmentalisation within the hotel represented the sub-population as questionnaires were distributed to both the Food and Beverage and Rooms Division departments of the selected hotels.

This ensured that eco initiatives were investigated throughout a selected hotel. As the questionnaires were not biased to a specific variable, such as the position of the employee within the hotel, they were also representative of the entire sub-population of each department (Welman *et al*., 2005: 61).

The questionnaires were categorised to ensure a logical flow and that questions concerning similar topics were answered at the same time. The categories included biographical details, recycling of food or water waste and the initiatives of the hotel.

Welman *et al.* (2005: 179) explain that this prevents the respondents from having to shift their focus between the various categories, allowing them to focus on the specific questions being asked and providing accurate responses.

The questionnaires further consisted of closed-ended questions by providing a list of multiple choice answers to choose from. The respondents were required to tick the box of the appropriate answers to each question. As the purpose of the questionnaires was to gather statistical data, the researcher aimed to gather specific responses from the respondents. The multiple choice questions were therefore able to extract the desired data.

The benefits of the sampling method that was used are twofold in that, the statistics gathered from the questionnaires accurately portrayed the insights of all the employees within a selected hotel and questionnaires could be distributed according to the staff complement. Fewer questionnaires could therefore be distributed to departments with fewer staff.

3.3.2 QUALITATIVE RESEARCH

The primary difference between qualitative and quantitative research is the type of data gathered. According to Ospina (2004: 2) and Brynard and Hanekom (2005: 29), qualitative data is derived from the insights that the participants provide. This is especially true for interviews and case studies that provide a lot of room for subjectivity on behalf of the respondents' reactions, however; the researcher's interpretation of such data should be objective and viewed within the context of the research study.

The open door that the researcher provided to the participants during the interviews and case studies aimed to determine the extent of the current eco initiatives implemented by the selected hotels. In this regard, the researcher made use of non-participant observation to minimise outside influence on the research process.

3.3.2.1 INTERVIEWS

Using interviews as a research tool requires the researcher to be more directly involved through face-to-face contact with the interviewee (Blumberg, 2005: 781). This guarantees that data are available to the researcher without the risk posed by questionnaires that there may be no response from the participants (Blumberg, 2005: 281; Kajornboon, 2008: 1). Semi-structured interviews were used as this method offers the researcher the freedom to use leading questions to guide the interview (Brynard & Hanekom, 2005: 32; Kajornboon, 2008: 1). This was particularly effective in a situation where the extent of the current eco initiatives of a hotel was unknown.

During the interview process, the interviewer is able to deviate from the list of main questions prepared for the research. This is beneficial as the interviewer is not limited to an interview guide, but has the opportunity to probe further into a topic (Kajornboon, 2008: 1; Welman *et al.*, 2005: 168). Kajornboon (2008: 1), however, makes it clear that the interviewer may not be able to do this if he or she is not familiar with the topic of the interview. Being unfamiliar with the topic may cause the researcher to miss out on an opportunity to gather relevant data.

The interviews were used to enhance the responses gained from the questionnaires by posing leading questions (Grace, 2001: 4). The responses from the questionnaires indicated to the researcher where he might probe further to determine the reason for a particular response was given. Should there be variance in the response to a specific question within the same department of a hotel, interviews may also be used to gather a more accurate response.

The following table represents the list of possible main questions that were considered for use. Each question provided the researcher with an opportunity to expand on the response through additional leading questions. The main questions were derived from the case studies.

Table 3.1: List of Possible Interview Questions

LIST OF POSSIBLE INTERVIEW QUESTIONS
Question 1: What initiatives have been implemented?
Question 2: How have these initiatives been implemented?
Question 3: Why were these initiatives implemented?
Question 4: What are the objectives of the initiatives?
Question 5: Who is the staff involved and why were these members chosen?
Question 6: What is the outcomes and success rate?

3.3.2.2 CASE STUDIES

According to Schell (1992: 1) and Welman *et al*. (2005: 25) case studies may be classified as descriptive research as they may be best used to answer the *why* question. Through using a case study, the researcher observes contemporary events as they unfold in reality. The researcher's aim was to interpret these events and thereby provide a detailed account of the specific case (Schell, 1992: 1).

Selecting the type of case study to implement was largely determined by the research question. According to Schell (1992: 1) (See Figure 3.1), *why* is the leading question for explanatory case studies which use additional data gathered through tools such as questionnaires to provide a more detailed account. The researcher used explanatory case studies.

Strategy	*Form of research question*	*Requires control over behavioural events?*	*Focuses on contemporary events?*
Experiment	how, why	yes	yes
Survey	who what, where, how many, how much	no	yes
Archival analysis	who what, where, how many, how much	no	yes/no
History	how, why	no	no
Case study	how, why	no	yes

Figure 3.1: Case Study Designs

Source: Schell (1992: 1)

Approaches used to gather data through case studies include using multiple case studies for comparison or using multiple sources of data (Blumberg, 2005: 375; Schell, 1992: 1). The researcher used multiple case studies for investigating eco initiatives implemented at the Cape Town Hotel School Restaurant and at the Mount Nelson Hotel.

The purpose of conducting the case studies with these two properties was to understand the uniqueness of the systems implemented at the different hotels and restaurants and the dynamics that were involved.

3.3.2.2.1 CAPE TOWN HOTEL SCHOOL RESTAURANT AND CULINARY LABORATORIES

The Cape Town Hotel School is a tertiary education institute which has its campus in Granger Bay. It forms part of the Cape Peninsula University of Technology and opened its restaurant in 1989. The restaurant is fully staffed by hotel school students who are supervised by trained chefs and their assistants who assist in maintaining the earthworm farms.

3.3.2.2.2 MOUNT NELSON HOTEL

The Mount Nelson Hotel is a five star property with a total of 209 rooms. Its eco initiatives have gained accreditation from the Heritage Environmental Program. These include the installation of earthworm farms and utilising spring water to irrigate its gardens.

3.4 SELECTING THE SAMPLE

According to Blumberg *et al*. (2005: 232-233) the ultimate test of a sample is how well it represents the characteristics of the population it purports to represent. The representativeness of a sample depends on accuracy and precision. According to Brynard and Hanekom (2005: 43), the reasons why a sample is used is to simplify the research, save time and to cut costs. Studying the entire population would be time-consuming, especially if the population is very large or spread over a large geographical area. It is better to study a representative sample of a population than to study the entire population.

Hotels were selected on the basis of the population which was predetermined by the researcher as the greater City of Cape Town. The regions were narrowed down to the City Centre, Atlantic Seaboard and Foreshore to represent the sample for the research study. The hotels were selected on the basis of the researcher's knowledge of the specific eco initiatives implemented at the individual properties. The sampling process was therefore based on a non-probability sampling method to obtain a purposive sample. Purposive sampling occurs when researchers rely on their experience and ingenuity to obtain units of analysis in such a manner that the sample they obtain may be regarded as being representative of the relevant population (Blumberg *et al*., 2005: 253; Teddlie & Yu, 2007: 80; Welman *et al.*, 2005: 69).

The purpose of non-probability sampling was to increase the scope of eco initiatives available to the study, though they may not each be implemented by all the hotels. This allowed comparison between the different eco initiatives, for example between the hotels with a garden and those without (Blumberg *et al*., 2005: 253; Teddlie & Yu, 2007: 80; Welman *et al*., 2005: 69).

The researcher determined that the surveys used to gather data, namely questionnaires and interviews, could be implemented after the sample had been selected. This simplified the task of selecting hotels as the researcher did not have to approach respondents and implement the data reduction technique. According to Tongco (2007: 152), data reduction is used in quantitative research to determine which variables, gathered using surveys, have the greatest influence on the objectives of the research. Data reduction would therefore be used to determine which hotels do in fact implement eco initiatives.

3.4.1 SAMPLING FOR QUESTIONNAIRES

Departmentalisation within a hotel represents clear subpopulations that are different from one another. As explained in 3.3.1.1, questionnaires were distributed to the Food and Beverage and Rooms Division departments of selected hotels. The researcher selected stratified random sampling as, according to Welman *et al*. (2005: 61), each subpopulation was differentiated according to a specific variable which was linked to the objectives of the study.

The Food and Beverage department was the most suitable for implementing earthworm farms considering its variable, namely the production of organic food waste. The Rooms Division department was most suitable for harvesting rainwater considering its variable, namely the large consumption of potable and non-potable water. The questionnaires were therefore distributed randomly to personnel within each department in order to obtain a random response.

3.4.2 SAMPLING FOR INTERVIEWS

According to Grace (2001: 1), descriptive research cannot be defined as either qualitative or quantitative because it usually uses elements from both. This became evident when selecting the sample for conducting interviews.

Interviews were conducted with departments within a hotel which did not form part of the two selected subpopulations, namely the Food and Beverage and Rooms Division departments.

Each subpopulation was able to provide an adequate response to the questions asked in the questionnaires. However, they referred the researcher to the Maintenance department to expand on their responses when they only had basic knowledge of what was being asked. The researcher noted that the Maintenance department has a hand in the general operations of a hotel, including all of the departments.

According to Welman *et al.* (2005: 69), snowball sampling is a technique whereby the researcher approaches respondents within each subpopulation. These respondents would then identify other respondents who ought to be included in the study but belong in a different department within the general population. The researcher therefore implemented snowball sampling.

In this way, both quantitative and qualitative research was used as questionnaires identified further respondents for the study, who consequently formed part of the interviews. The interviews were used for further enhancement of the responses gained from the questionnaires.

3.4.3 SAMPLING FOR CASE STUDIES

The sample for the case studies was based on simple random sampling. According to Brynard and Hanekom (2005: 44-45) and Welman *et al*. (2005: 59) this type of sampling has the greatest chance for any property within the population to be chosen. Once the samples were selected, the case studies were conducted according to the type of eco initiatives implemented at each property.

The researcher chose to use simple random sampling to select the sample as descriptive case studies should exercise the least amount of control over the objectives that were being studied (Schell, 1992: 1). As the researcher selected random properties to study without knowledge of their current eco initiatives, the case studies were representative of these initiatives as they occurred within the City of Cape Town.

3.5 FOCUS GROUPS

According to Johnson and Christensen (2004: 185), a focus group is a type of group interview in which a moderator leads a discussion with a small group of individuals, usually three to five participants. The purpose of this research method was to obtain general background information regarding the topic of interest. The researcher aimed to keep the group focused on the topic being discussed.

As with interviews conducted with a single participant, the focus group was structured around a list of main questions in order to explore particular topics. The researcher was able to deviate from these questions and utilise leading questions based on the responses received from the participants in order to guide the group discussion. A semi-structured approach to the focus group was therefore adopted.

A total of six participants formed part of the focus group. These included the maintenance managers from two of the selected Cape Town hotels and three faculty members from the Cape Town Hotel School. The researcher opened discussions with a power point slide show that summarised the findings of the study. This ensured that all the participants were familiar with the points of discussion. The purpose of the focus group was to formulate recommendations from the findings of this study, as well as to consider recommendations for future research.

The advantages and disadvantages of focus group interviews are identified as follows (Welman *et al*., 2005: 203-204). The advantages include a direct line of communication between the researcher and the participants which allows ambiguity in responses to be clarified immediately. The group interaction further allows a consensus to be reached regarding the opinions among the participants with regards to particular points of discussion. Lastly, participants were selected from the entire sample selected for the study, which allowed the researcher to draw from a large amount of expertise in the selected hotels. The disadvantage mainly concerned a lack of interaction by participants who may have felt uncomfortable about expressing their opinions in a group, which ultimately decreases the effectiveness of the focus group.

3.6 SUMMARY

This chapter was focused on presenting the researcher's explanation of how both quantitative and qualitative research was used during the research process.

This was achieved by investigating the research strategy and determining the leading research question, namely *what*? Descriptive research and, therefore, a fact-gathering approach was established as the basis for the strategy.

The research design focused on three data collection tools, namely questionnaires interviews and case studies. This particularly highlighted how both quantitative and qualitative research may be integrated. A connection was established between questionnaires and quantitative research, and interviews and qualitative research, in order to broaden on the data that were collected for the study.

The sampling methods for the study were discussed. This was based on the study as a whole, as well as on how samples for the data collection tools were determined. Lastly, the researcher investigated how focus groups were utilised in order to determine recommendations from the study, as well as recommendations for future research. In Chapter four, the researcher presents the analysis of data gathered via the questionnaires and interviews and an interpretation of the data.

CHAPTER FOUR

DATA ANALYSIS AND INTERPRETATION

4.1 INTRODUCTION

Data analysis is a process that aims to bring order, structure and meaning to a large amount of data that has been collected (De Vos, Strydom, Fouche & Delport, 2005: 333). According to Shank (2006: 225), this may be referred to as data grading which serves as a model for understanding the data collection process.

Data analysis therefore focuses on the investigation of the variables involved in the study and the relationship they share with the hypothesis in a practical environment (Welman *et al.*, 2005: 211). This chapter focuses on the analysis of the information gathered from the questionnaires that were distributed and interviews that were conducted with the selected Cape Town hotels.

The quantitative and qualitative findings are investigated according to the research methodology as set out and discussed in Chapter three. The structure of the interviews and questionnaires and how the data was gathered was discussed. The distribution process of the questionnaires followed ethical considerations in order to ensure the welfare of the respondents and all the questionnaires were confidential. The respondents were further informed regarding the nature of the study, the possible benefits and the risks. The questionnaires were analysed from two angles, namely the reason the researcher asked the specific questions and the responses obtained from the respondents. The quantitative responses were graphically represented in a bar graph.

4.2 STRUCTURE OF INTERVIEWS

According to Kajornboon (2008: 1), a semi-structured approach to the interview process does not aim to test the hypothesis of the study but to explore the variables involved. This approach was based on utilising leading questions which provided the researcher with the flexibility to gain a comprehensive picture of the initiatives implemented by each hotel.

This approach may further be linked to the descriptive nature of the study which ensured the aim of the interviews, which was to investigate the characteristics of these initiatives. According to De Vaus (2001: 1), a descriptive approach revolves around fact gathering. This allowed the researcher to find common ground resulting from similarities in the hotels' initiatives.

Unstructured interviews further added value to the responses gained from the questionnaires as they were able to target the respondent's personal experience regarding the management of the initiatives, as Welman *et al*. (2005: 198) explain.

4.3 STRUCTURE OF QUESTIONNAIRES

The structure of the questionnaires was different from those of the interviews as they were largely based on the hypothesis of the research study and how the hypothesis ties in with the variables involved (Welman *et al.*, 2005: 174). That is, the researcher formulated the questionnaires through examining quantitative research designs based on the research obtained on eco initiatives. The researcher therefore avoided using a list of predetermined questions for inclusion in the questionnaires which may have held no relevance for the variables of the hypothesis.

In order to understand the relationship between these variables and the hypothesis, it was necessary to first define the field of interest, namely what the population of the study was. According to Welman *et al*. (2005: 52), the main object that questionnaires are aimed at is referred to as the population; in this case, it concerned all the hotels situated in the City Centre, on the Atlantic Seaboard and at the Foreshore. However, it was also necessary for the researcher to identify the departments within the hotels that were relevant to the variables of the hypothesis.

A sample of 25 hotels was selected. The reasons for selecting the sample concerned greater accuracy of the results, greater speed of data collection and availability of population elements. Departmentalisation within the selected hotels helped to determine this sample and questionnaires were distributed to the Food and Beverage and Rooms Division departments. These two samples were determined considering the variables of the hypothesis, namely recycling water and food waste.

4.4 DATA COLLECTION METHODS

The different data collection methods that were used for the study was discussed separately. Questionnaires and interviews were used to collect data for analysis.

4.4.1 QUALITATIVE

Mouton (2001: 161) defines the qualitative approach as research that describes and evaluates a phenomenon in its natural state. Typical of this research approach is that it produces research findings not arrived at by statistical procedures (Strauss & Corbin, 1996: 7), but focuses on one phenomenon which the researcher selects to understand in depth (MacMillan & Schumacher, 1997: 375). Qualitative research is typically used to answer questions about the complex nature of the phenomenon, often with the purpose of describing the understanding of the phenomenon from the participants' point of view (Leedy & Ormond, 2001: 101).

The hotels at which initiatives that were relevant to the variables of the hypothesis had been implemented were selected for interviewing respondents. The interviews were conducted with the staff of selected hotels in Cape Town during the month of April 2012. These interviews were conducted after the data from the questionnaires had been gathered in order to expand on the respondents' answers and the specific respondents responsible for completing the questionnaires were contacted for interviewing.

A list of three main questions that were derived from the case studies were used to guide the interviews, after which leading questions were used to explore the uniqueness of each hotel's initiatives.

4.4.2 QUANTITATIVE

The questionnaires were distributed to the selected hotels in Cape Town during the month of March 2012 and responses were returned within the same month. The relevant department heads of the Food and Beverage and the Rooms Division departments were requested to complete the questionnaires.

A total of 50 questionnaires were distributed to 25 hotels out of a possible 40 hotels situated in the City Centre, Atlantic Seaboard and Foreshore. A total of 25 questionnaires were distributed to the Food and Beverage departments and 25 questionnaires to the Rooms Division departments of the selected hotels. A total of 36 questionnaires were received back by the researcher; 18 questionnaires were from the Food and Beverage departments and 18 from the Rooms Division departments. This brought the response rate to a total of 45 %.

Once the questionnaires had been distributed, the researcher confirmed with each hotel that they had been received. A total of two weeks was generally allowed for each hotel to send back the completed questionnaires. A follow-up telephone call was made once a week to trace the progress of the respondents.

Telephone calls were made once a week to the respondents who exceeded the two-week response period to follow up on their progress in completing the questionnaires. A total of one month, from the 1st March until the 31st March 2012 was allotted to collect all the questionnaires that would form part of the study.

The questionnaires were categorised to ensure a logical flow and also that questions of a similar topic were answered at the same time. The categories concerned biographical details, recycling of food waste or waste water and the initiatives of the hotel. The questionnaires further consisted of closed-ended questions by providing a list of multiple choice answers to choose from. The respondents were required to tick the boxes indicating the appropriate answers to each question.

Certain themes or questions that were present throughout the questionnaires were repeated for both the Food and Beverage and Rooms Division departments. The researcher utilised this method of cross-questioning in order to increase the accuracy of the responses received from the respondents of the two departments.

4.5 PROGRAM USED FOR DATA ANALYSIS

Once the researcher received the 36 completed questionnaires, the results were entered into the statistical solution computer program. The data produced by the statistical solution program were converted into bar graphs.

4.6 ANALYSIS OF INTERVIEWS

A total of four interviews were analysed. There were leading questions and the participants had to elaborate on their responses. McMillan and Schumacher (2006: 351) state that interview probes can increase comprehensiveness. The researcher probed the respondents in the interviews and was therefore able to comprehend and understand their responses much better.

4.6.1 WHAT INITIATIVES HAVE BEEN IMPLEMENTED?

A total of four hotels indicated in the questionnaires that eco initiatives to recycle waste water and food waste had been implemented. Three of these hotels were implementing earthworm farms to turn organic food waste into compost and two of the hotels were harvesting rainwater for irrigating their gardens.

4.6.2 HOW HAVE THESE INITIATIVES BEEN IMPLEMENTED?

Hotel number one implemented earthworm farms. An expansion project has brought its total number of earthworm farms in operation close to 100. The hotel was implementing a further initiative to grow a herb garden on its roof. The compost produced by the earthworm farms was used to nourish its grounds as well as the herb garden which further provided sustainable ingredients to use in the kitchens. The worm juice which was produced by the earthworm farms was diluted with water as it was high in acidity. The diluted mixture was further used as a liquid compost for either the herb garden or the rest of the grounds. The interviewer determined, through probing, that Bokashi Bran was used to compost food waste which could not be broken down by earthworms.

Hotel number two implemented a single earthworm farm, housed in a disused bathtub with a volume of approximately 159 litres, in conjunction with a compost heap. The compost heap was contained in 30 water bins each weighing 130 kilograms once filled with the food waste. The food waste was composted using Bokashi Bran in order to fertilise the onsite garden. A total of two weeks was required for the food waste to be completely broken down into usable compost. The worm juice produced was diluted with water and further used as a liquid compost.

Hotel number three implemented two earthworm farms in conjunction with their recycling drive. Their recycling drive was aimed at dry waste, such as paper and cardboard and other recyclable materials, as well as the food waste produced by their Food and Beverage outlets.

Hotel number four implemented an initiative to harvest rainwater in a water tank with a capacity of 146 kilolitres. The interviewee was probed to determine whether the hotel supplemented the harvested rainwater with municipal water in order to irrigate its garden. During the dry summer months, the hotel did supplement the rainwater with municipal water.

Hotel number one further harvested rainwater. The hotel did not use water from its municipal pipelines at all for irrigation purposes. Instead, the hotel used a water tank for capturing rainwater to use for irrigating its herb garden as well as the rest of the grounds. The tank could store up to 120 kilolitres of harvested rainwater. The water tank was also used to store water from a natural spring running through the grounds of the hotel. Should the amount of harvested rainwater subside during the warmer summer months, the tank was refilled using the spring water.

4.6.3 WHAT ARE THE OUTCOMES AND SUCCESS RATE?

Hotel number one collectively produced 50 kilograms of food waste from its Food and Beverage outlets daily. This waste was enough to fill roughly three wheeled dustbins and was distributed throughout the earthworm farms to be converted into compost. However, the amount of dustbins that were filled could vary according to what type of organic food waste was produced as certain types of waste were lighter but greater in volume.

Hotel number two was able to recycle up to 3900 kilograms of food waste in two weeks when all the bins were operational at one time. However, an average of one ton of food waste was being recycled each month. Limitations to the composting bins were implemented as the total compost produced was exceeding the demand of the hotel's small garden. The earthworm farm served as an initiative by the hotel to showcase its commitment to the environment and the diversity of its methods.

Hotel number three did not have a garden for which the compost produced by the earthworm farms could be used. Instead, it formed part of the hotel's initiative to implement a recycling drive that showed its commitment toward a healthy environment. The compost produced was collected by Waste Plan, the company that managed the earthworm farms, to be used offsite.

Hotel number four watered its garden using the harvested rainwater only during the warmer summer months. The natural rainfall during the winter months was sufficient for the garden's watering needs. Even though the rainwater was supplemented with municipal water, the hotel was successfully utilising an alternative source to surface water.

Hotel number one only watered its garden using the harvested rainwater from the water tank during the hot summer months, as the annual winter rainfall was sufficient for the garden's water needs. The water tank was connected to a sprinkler system that was used to irrigate the grounds. A water canister was used for watering the herb garden. This initiative allowed the hotel to rely solely on substitute sources of surface water, namely rainwater and the natural spring, for its irrigation needs.

4.7 ANALYSIS OF QUESTIONNAIRES

The data gathered from the questionnaires were analysed and this was represented in bar graphs. Explanations were provided for the data. They were analysed question by question. The questionnaires entailed the following:

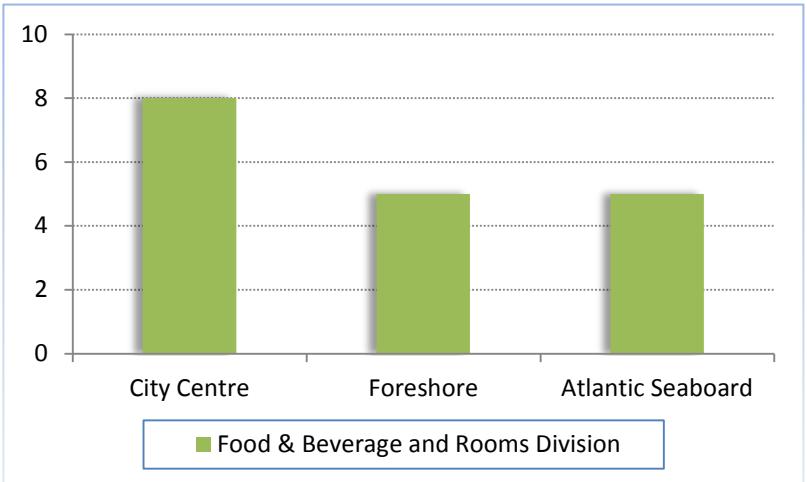
4.7.1 BIOGRAPHICAL DETAILS

The data from the biographical questions provided an indication of the demographics of the participants (Blumberg *et al*., 2005: 505). The data could then be correlated with the responses of the participants. The biographical details included questions one to five of the questionnaires that were distributed to the Food and Beverage and Rooms Division departments.

4.7.1.1 QUESTION 1

WHERE IS YOUR HOTEL LOCATED?

The researcher asked this question to determine where the hotels were located in the City of Cape Town. The hotels were selected on the basis of their location in order to include the entire city in the research. The researcher could determine that by considering all the hotels that formed part of the sample: eight of the hotels were situated in the City Centre, five of the hotels were situated on the Foreshore and five of the hotels were situated on the Atlantic Seaboard.



Measurement	Total Count	Percentage
City Centre	8	44
Foreshore	5	28
Atlantic Seaboard	5	28

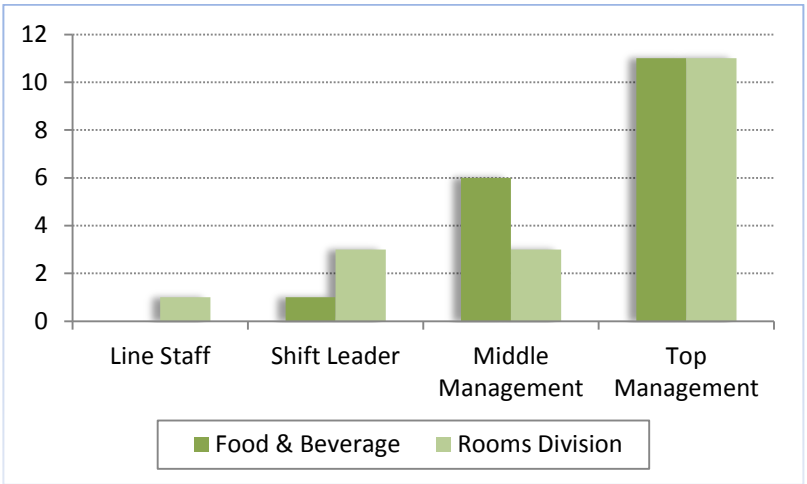
Figure 4.1: Location of hotels

4.7.1.2 QUESTION 2

WHAT IS YOUR POSITION IN THE HOTEL?

The researcher asked this question to determine what the respondents' positions within the hotels were. The responses provided an indication of how knowledgeable the respondents were in terms of their degree of involvement in the operations of their departments and how accurately they were able to answer all the questions.

In the Food and Beverage department, the researcher could determine that one of the respondents was a shift leader, six respondents were in middle management and 11 respondents were in top management positions. In the Rooms Division department, the researcher could determine that one of the respondents were line staff, three respondents were shift leaders, three respondents were middle management and 11 respondents were in a top management position.



Measurement	Total Count F&B	Total Count Rooms	Percentage F&B	Percentage Rooms
Line Staff	0	1	0	5
Shift Leader	1	3	6	17
Middle Management	6	3	33	17
Top Management	11	11	61	61

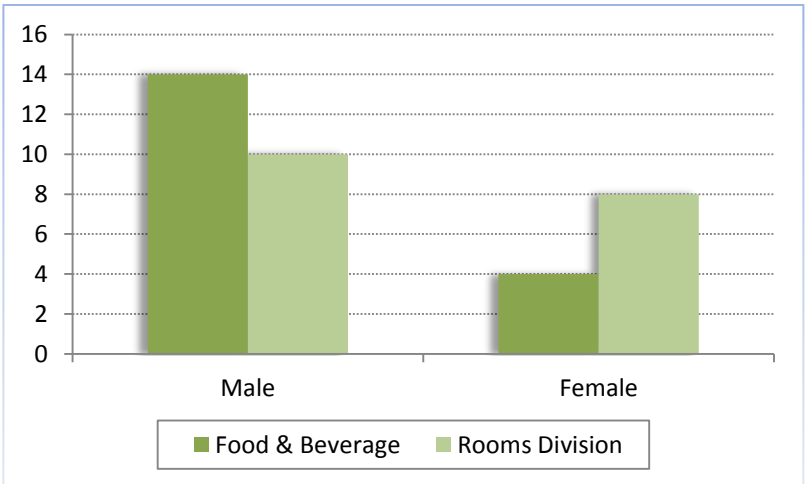
Figure 4.2: Positions held by respondents

4.7.1.3 QUESTION 3

WHAT IS YOUR GENDER?

The researcher asked this question to determine what the gender of the respondents were. This could serve as an indication of the tendencies of a specific gender to be more consciously aware of the link shared between the environment and the hotel's operations and the likelihood that they would implement eco initiatives.

The researcher could determine that 14 respondents from the Food and Beverage department were male and four respondents were female. In the Rooms Division department, ten respondents were male and eight respondents were female.



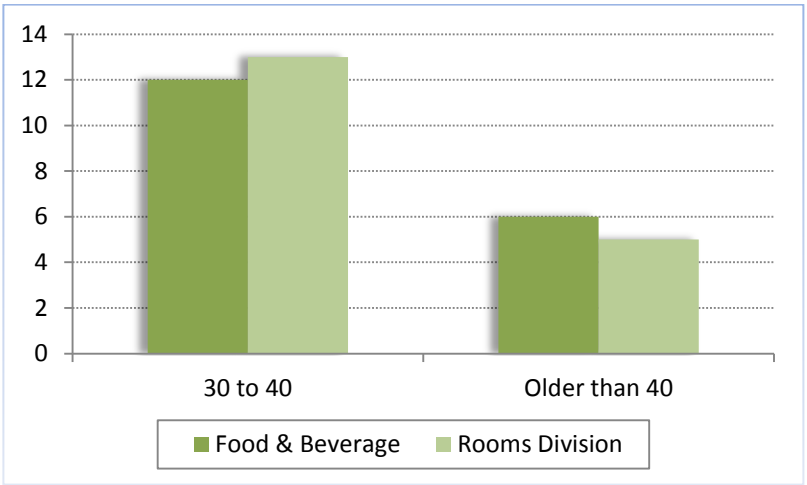
Measurement	Total Count F&B	Total Count Rooms	Percentage F&B	Percentage Rooms
Male	14	10	78	56
Female	4	8	22	44

Figure 4.3: Gender of participants

4.7.1.4 QUESTION 4

WHICH AGE GROUP CATEGORY DO YOU BELONG TO?

The researcher asked this question to determine what age group category the respondents belonged to. This would further allow the researcher to determine whether age played a role in understanding the concept of eco initiatives as maturity lends perspective to the link shared between the environment and society. In the Food and Beverage department, the researcher could determine that 12 respondents were between the ages of 30 and 40 and six respondents were over the age of 40. In the Rooms Division department, 13 respondents were between the ages of 30 and 40 and five respondents were over the age of 40.



Measurement	Total Count F&B	Total Count Rooms	Percentage F&B	Percentage Rooms
30 to 40	12	13	67	72
Older than 40	6	5	33	28

Figure 4.4: Age of respondents

4.7.1.5 QUESTION 5

WHAT IS YOUR PREFERRED LANGUAGE?

The researcher asked this question to determine what language the respondents preferred to speak. The English jargon associated with eco initiatives may be a challenge to grasp should English not be the respondent's first language. In the Food and Beverage department, the researcher could determine that all 18 respondents selected English as their preferred language. In the Rooms Division department, the researcher could determine that 16 respondents selected English as their preferred language and two selected Afrikaans as their preferred language.

4.7.2 RECYCLING OF FOOD WASTE

This category of questions provided the researcher with data on how the hotels recycled their food waste. Deductions could be made as to how hotels implement the eco-initiatives in their hotels. The questions regarding the recycling of food waste included question six to 15 of the questionnaire distributed to the Food and Beverage department.

4.7.2.1 QUESTION 6

HOW MANY RESTAURANTS DOES YOUR HOTEL HAVE?

The researcher asked this question in order to determine the number of restaurants that the hotel had on site. This indicated the scale of their operations and the amount of food waste they generated. The researcher could determine that nine of the hotels had one restaurants on site, four of the hotels had two restaurants on site, two of the hotels had three restaurants on site and three of the hotels had more than three restaurants.

Measurement	Total Count	Percentage
1	9	50
2	4	22
3	2	11
More than 3	3	17

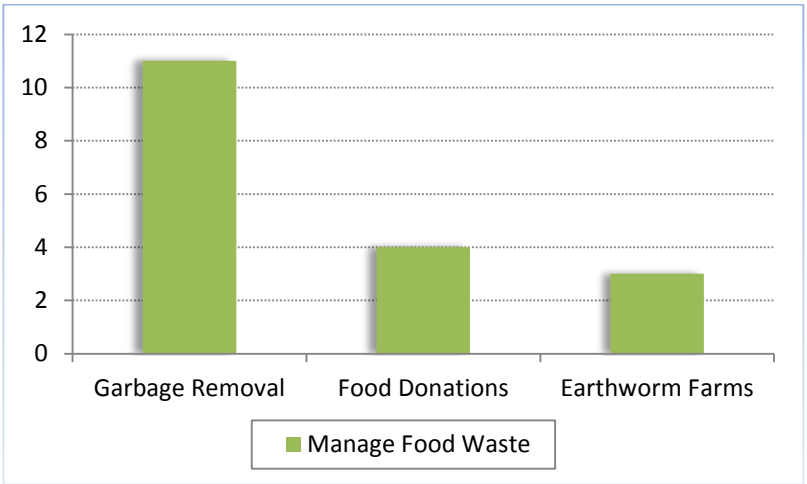
Figure 4.5: Number of restaurants on site

4.7.2.2 QUESTION 7

HOW DO YOU MANAGE YOUR FOOD WASTE?

The researcher asked this question to determine how the hotel disposed of its food waste. This question identified any alternative initiatives used apart from the conventional municipal waste removal company.

The researcher could determine that 11 of the hotels used a waste removal company to manage their food waste, four of the hotels donated their leftover food as part of their corporate social initiative and three of the hotels used earthworm farms to convert their organic food waste into compost.



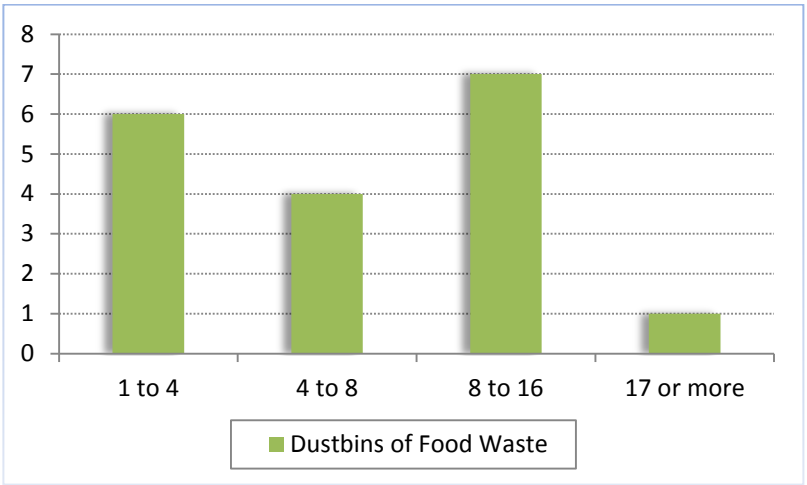
Measurement	Total Count	Percentage
Garbage Removal	11	61
Food Donations	4	22
Earthworm Farms	3	17

Figure 4.6: Disposal of food waste

4.7.2.3 QUESTION 8

HOW MANY WHEELED DUSTBINS OF FOOD WASTE DO YOU PRODUCE ON AN AVERAGE DAILY BASIS?

The researcher asked this question to determine the number of dustbins filled with food waste that the hotel produced on average every day. The researcher could determine that six of the hotels produced one to four dustbins, four of the hotels produced four to eight dustbins, seven of the hotels produced eight to 16 dustbins and one of the hotels more than 17 dustbins filled with food waste on an average daily basis.



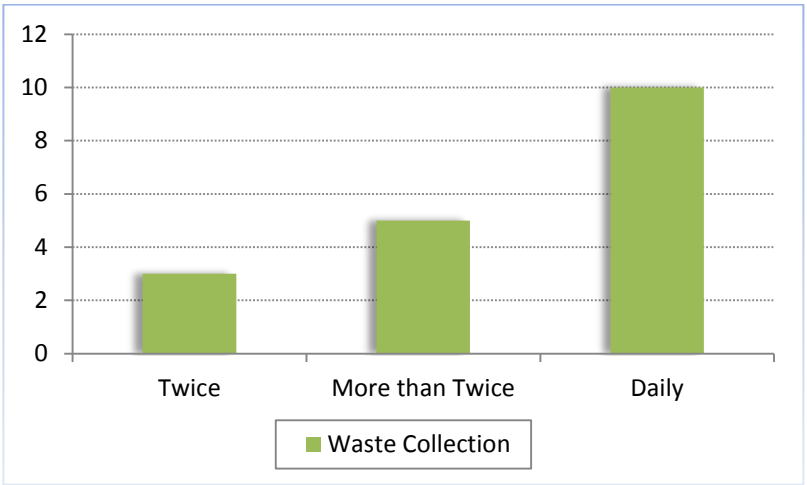
Measurement	Total Count	Percentage
1 to 4	6	33
4 to 8	4	22
8 to 16	7	39
17 or more	1	6

Figure 4.7: Number of waste bins filled with food waste daily

4.7.2.4 QUESTION 9

HOW OFTEN IS THE HOTEL'S FOOD WASTE COLLECTED ON A WEEKLY BASIS?

The researcher asked this question to determine how many times on average the hotel required a waste removal company to empty their dustbins filled with food waste every week. This further indicated to the researcher what the volume of food waste was that the hotel produced every week. The researcher could determine that three of the hotels had their food waste collected twice every week, five of the hotels had their food waste collected more than twice every week and ten of the hotels had their food waste collected daily.



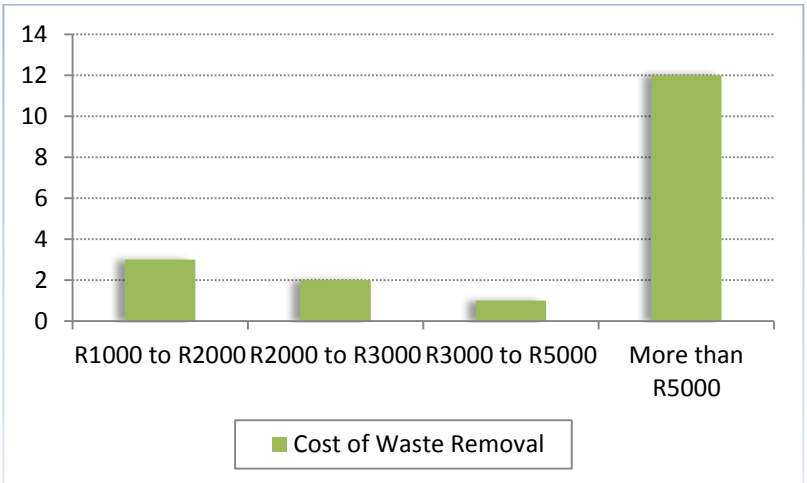
Measurement	Total Count	Percentage
Twice	3	17
More than Twice	5	28
Daily	10	55

Figure 4.8: Weekly collection of food waste by a waste removal company

4.7.2.5 QUESTION 10

HOW MUCH DO YOU SPEND ON WASTE REMOVAL ON A MONTHLY BASIS?

The researcher asked this question to determine the hotel's monthly financial cost incurred for a waste removal company to empty its dustbins filled with food waste. The researcher could determine that three of the hotels spent R1000-R2000 every month, two hotels spent R2000-R3000 every month, one hotel spent R3000-R5000 every month and twelve of the hotels spent more than R5000 every month.



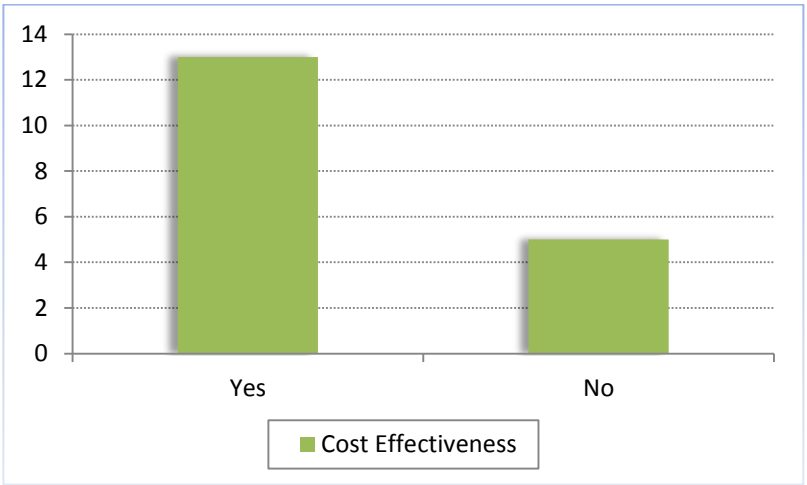
Measurement	Total Count	Percentage
R1000 to R2000	3	17
R2000 to R3000	2	11
R3000 to R5000	1	5
More than R5000	12	67

Figure 4.9: Cost incurred for the removal of food waste per month

4.7.2.6 QUESTION 11

DO YOU BELIEVE YOUR METHOD OF WASTE REMOVAL IS COST EFFECTIVE?

The researcher asked this question to determine whether the respondents were aware of the costs involved in waste removal at the hotel. This question was designed to make the respondent evaluate whether these costs were justifiable or if alternatives that were ecologically and financially more viable were available. The researcher could determine that 13 respondents believed that their method was cost effective and five respondents did not believe that their method of waste removal is cost effective.



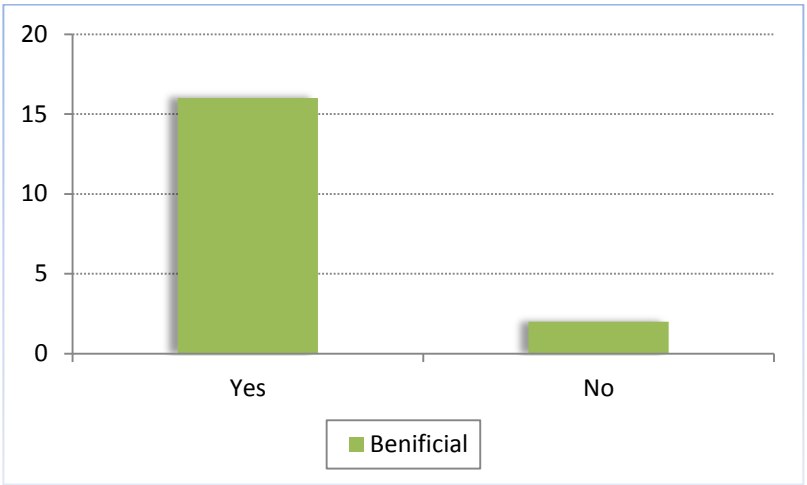
Measurement	Total Count	Percentage
Yes	13	72
No	5	28

Figure 4.10: View concerning cost-effectiveness of waste removal solution

4.7.2.7 QUESTION 12

DO YOU BELIEVE THAT IMPLEMENTING FOOD RECYCLING INITIATIVES IN YOUR WORK ENVIRONMENT WILL BENEFIT THE LOCAL COMMUNITY AND NATURAL ENVIRONMENT?

The researcher asked this question to determine what the respondent's opinion was concerning introducing eco initiatives within his/her department. The researcher could determine that 16 respondents believed that food recycling initiatives would have a positive impact and two respondents did not believe that food recycling initiatives would have a positive impact on the environment and society.



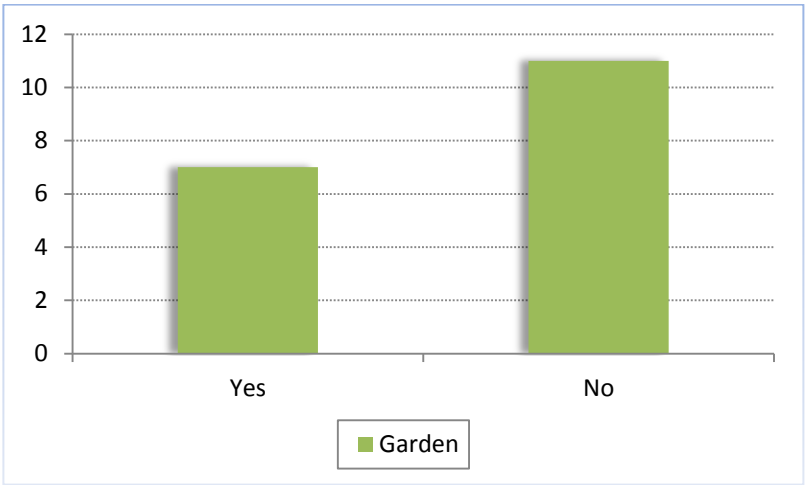
Measurement	Total Count	Percentage
Yes	16	89
No	2	11

Figure 4.11: View of the impact of introducing food recycling initiatives

4.7.2.8 QUESTION 13

DOES YOUR HOTEL HAVE A GARDEN?

The researcher asked this question to determine whether there was a garden on the premises under the care of the hotel. The researcher further used this question to determine whether a quota for the water used in the hotel could be established based on the garden's watering needs. The researcher could determine that seven of the hotels had a garden and 11 of the hotels did not have a garden.



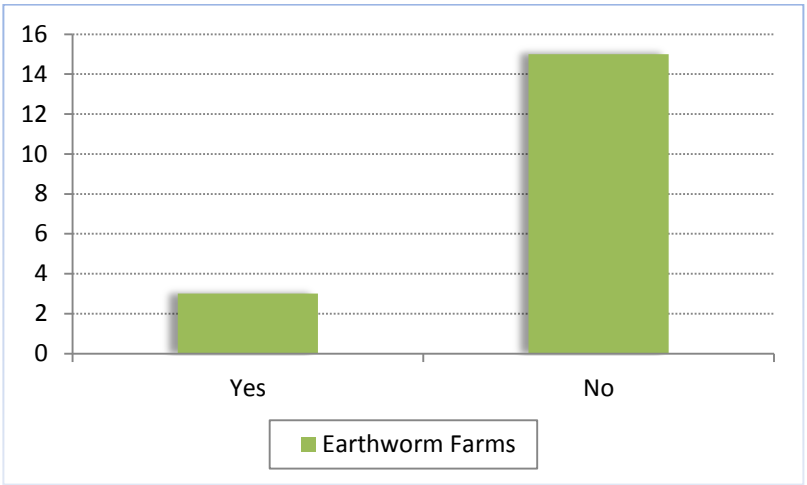
Measurement	Total Count	Percentage
Yes	7	39
No	11	61

Figure 4.12: Presence of a garden at the hotel

4.7.2.9 QUESTION 14

DOES YOUR HOTEL USE EARTHWORM FARMS TO RECYCLE ORGANIC FOOD WASTE?

The researcher asked this question to determine whether earthworm farms were being used by the hotel to convert organic food waste into compost. This question further served as a means of determining how knowledgeable the respondents were regarding the use of earthworm farms as a method of recycling organic food waste. The researcher could determine that three of the hotels used earthworm farm and 15 of the hotels did not use earthworm farms to recycle their organic food waste.



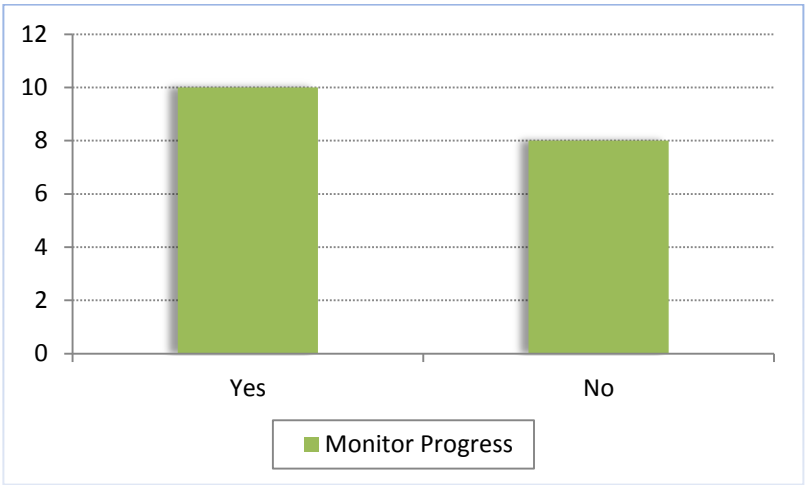
Measurement	Total Count	Percentage
Yes	3	17
No	15	83

Figure 4.13: Use of earthworm farms by surveyed hotels

4.7.2.10 QUESTION 15

DO YOU BELIEVE THAT HAVING FOOD RECYCLING INITIATIVES IN PLACE WILL BE SUFFICIENT, OR WOULD YOU CONSTANTLY NEED TO MONITOR YOUR PROGRESS?

This question was related to benchmarking practices within the hotel. The researcher asked this question to determine whether, should the hotel be implementing food recycling initiatives, these should form part of the standard operating procedures as opposed to a short-term trial. The researcher could determine that ten respondents believed that any initiatives to recycle their food waste would require constant monitoring and eight respondents did not believe that these initiatives required constant monitoring.



Measurement	Total Count	Percentage
Yes	10	56
No	8	44

Figure 4.14: View of demands of initiatives to recycle food waste

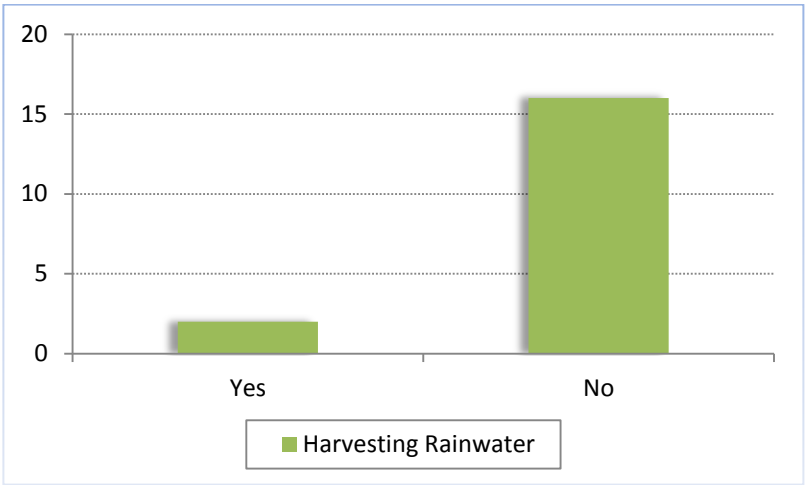
4.7.3 RECYCLING OF WASTE WATER

The data of this category of questions enabled the researcher to find out if recycling of water was taking place in the hotels and how it is being done. The recycling of waste water included questions six to 15 of the questionnaires that were distributed to the Rooms Division departments.

4.7.3.1 QUESTION 6

ARE YOU CURRENTLY HARVESTING RAINWATER FOR REUSE IN THE HOTEL?

The researcher asked this question to determine whether the hotel utilised facilities for capturing and storing rainwater runoff for future use. This question also served as an indication of the respondent's opinion of rainwater as an alternative source of available surface water. The researcher could determine that two of the hotels were harvesting rainwater and 16 of the hotels were not harvesting rainwater for future use.



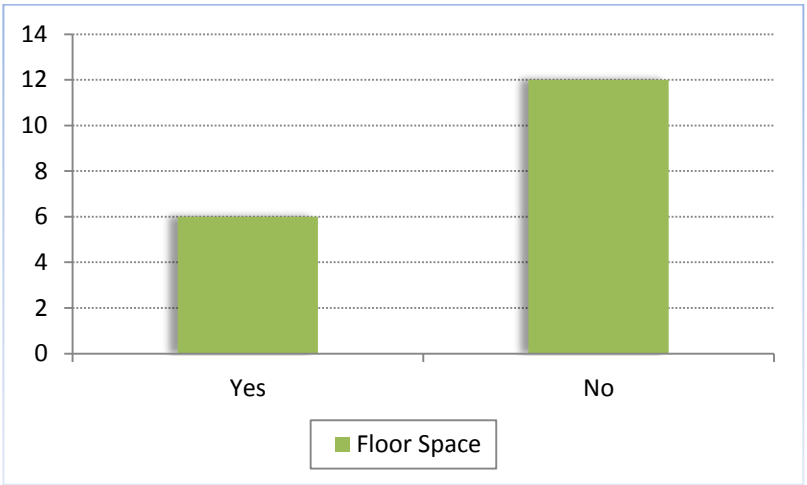
Measurement	Total Count	Percentage
Yes	2	11
No	16	89

Figure 4.15: Existing facilities for harvesting rainwater

4.7.3.2 QUESTION 7

DO YOU HAVE AVAILABLE FLOOR SPACE TO INSTALL A WATER BLADDER OR WATER TANK?

The researcher asked this question to determine whether the hotel had the necessary space required to house a water bladder or water tank as a storage medium for rainwater. The respondent's answer also served as an indication of the hotel's willingness to adopt a strategy for harvesting rainwater for future use. The researcher could determine that six respondents believed they had sufficient space and 12 respondents did not believe they had sufficient space to install a water bladder or water tank to harvest rainwater.



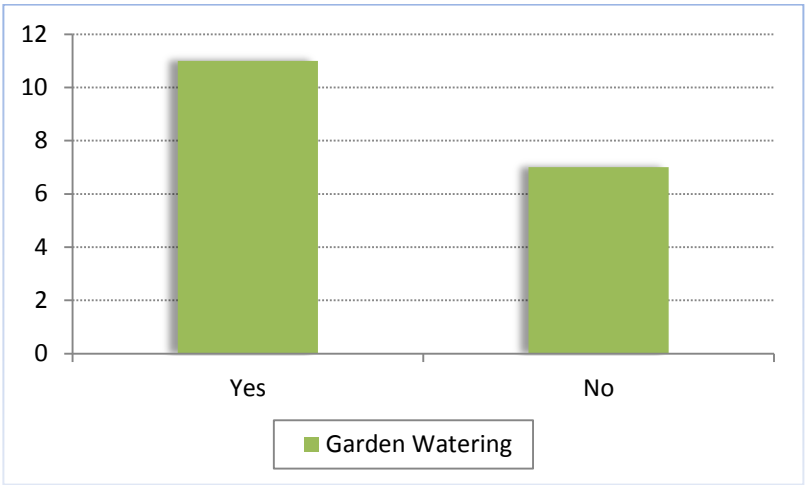
Measurement	Total Count	Percentage
Yes	6	33
No	12	67

Figure 4.16: Availability of floor space for water storage

4.7.3.3 QUESTION 8

DOES THE HOTEL HAVE A GARDEN THAT REQUIRES REGULAR WATERING?

The researcher asked this question to determine whether there was a garden on the premises under the care of the hotel. The researcher further used this question to determine whether a quota for the water use in the hotel could be established based on the garden's watering needs. The researcher could determine that 11 of the hotels had a garden on the premises and seven of the hotels did not have a garden on premises that required regular watering.



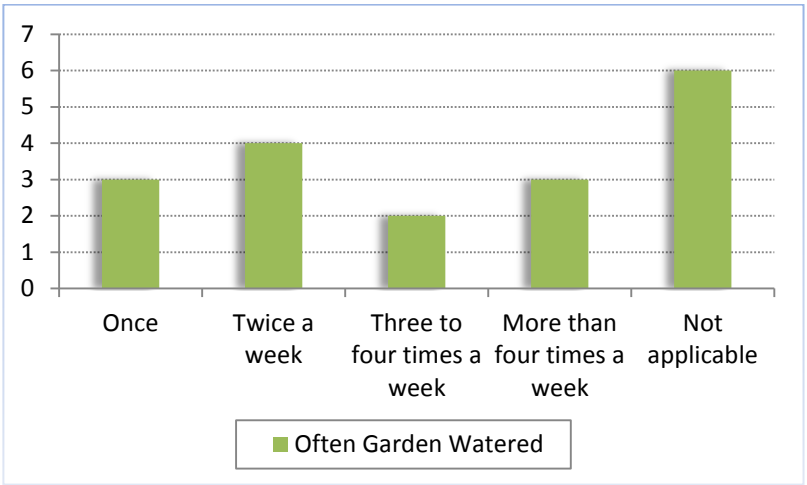
Measurement	Total Count	Percentage
Yes	11	61
No	7	39

Figure 4.17: Existing gardens requiring watering

4.7.3.4 QUESTION 9

HOW OFTEN IS THE GARDEN WATERED ON AN AVERAGE WEEKLY BASIS?

The researcher asked this question to determine how often the hotel was required to water its garden on average every week. This question was designed to provide the researcher with an indication of the size of the garden and its water demand. The researcher could determine that three of the hotels watered once, four of the hotels watered their garden 2 to 3 times, two of the hotels watered their garden 3 to 4 times, three of the hotels watered their garden more than four times and six of the hotels did not have a garden that required watering.



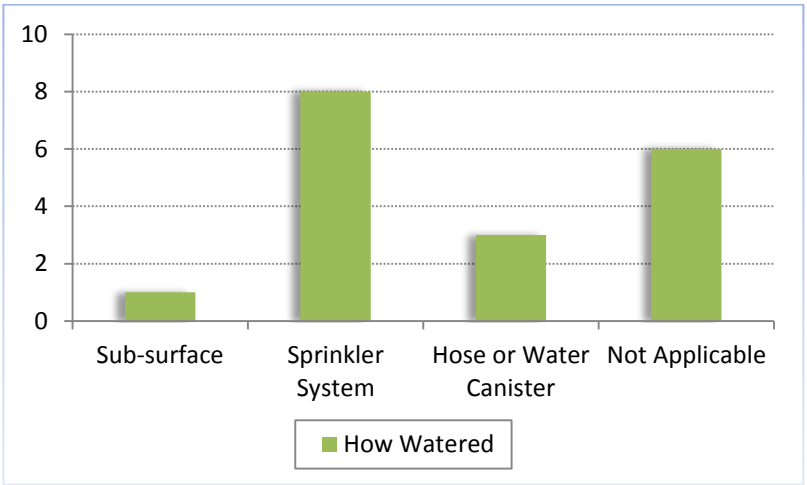
Measurement	Total Count	Percentage
Once	3	17
Twice a week	4	22
Three to four times a week	2	11
More than four times a week	3	17
Not Applicable	6	33

Figure 4.18: Weekly demand for watering of the garden

4.7.3.5 QUESTION 10

HOW IS THE GARDEN WATERED?

The researcher asked this question to determine which method the hotel used to water its garden. This question aimed to determine how the water reached the plants, with each method varying on how directly it targets the roots of the plant. The researcher could determine that one of the hotels used sub-surface watering, eight of the hotels used a sprinkler system, three of the hotels used a hose and six of the hotels did not have a garden that required watering.



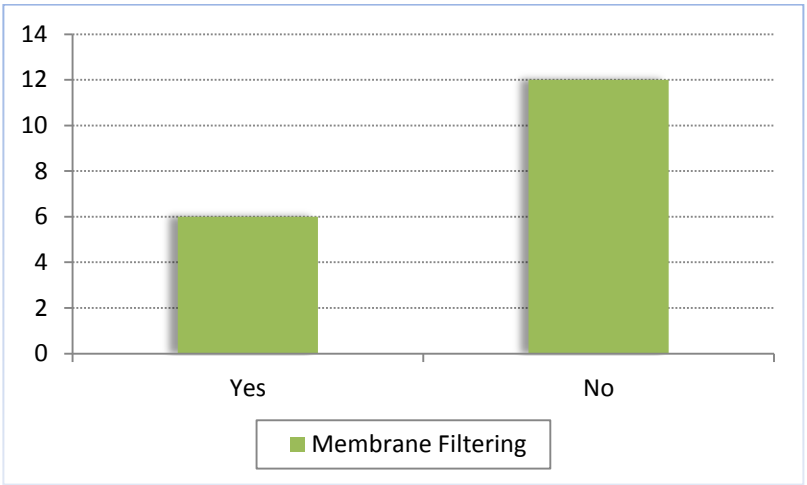
Measurement	Total Count	Percentage
Sub-surface	1	6
Sprinkler System	8	44
Hose or Water Canister	3	17
Not Applicable	6	33

Figure 4.19: Method used for watering the garden

4.7.3.6 QUESTION 11

ARE YOU FAMILIAR WITH MEMBRANE FILTERING TO RECYCLE WASTE WATER?

The researcher asked this question to determine whether the respondents were familiar with some of the latest technologies available that could form part of the future of the indirect reuse of waste water. The researcher could determine that six respondents were familiar with membrane filtering and 12 respondents were not familiar with membrane filtering as a method of indirect water reuse.



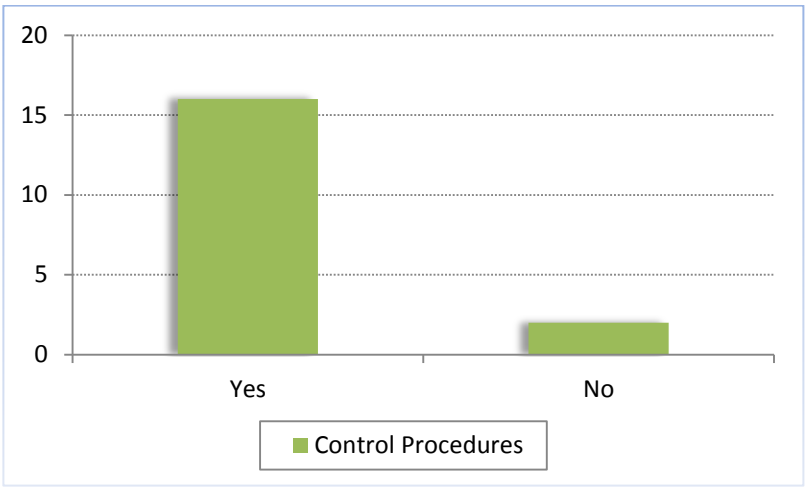
Measurement	Total Count	Percentage
Yes	6	33
No	12	67

Figure 4.20: Familiarity of membrane filtering as a method of indirect water reuse

4.7.3.7 QUESTION 12

DO YOU HAVE CONTROL PROCEDURES IN PLACE TO REGULATE THE HOTEL'S WATER USE?

The researcher asked this question to determine whether control procedures, such as using benchmarking to regulate the water consumption, were used at the hotel. The researcher could determine that 16 of the hotels had control procedures in place and one hotel did not have control procedures in place to regulate their water consumption.



Measurement	Total Count	Percentage
Yes	16	89
No	2	11

Figure 4.21: Use of control procedures to regulate water use

4.7.3.8 QUESTION 13

DO YOU HAVE MEASURES IN PLACE TO REGULARLY DETERMINE HOW MUCH THE HOTEL'S WATER CONSUMPTION IS?

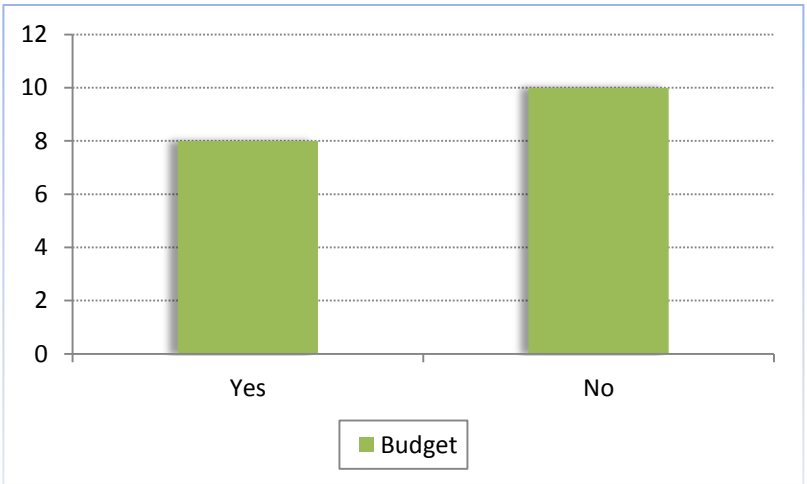
This question was related to benchmarking. In order for the hotel to regulate its water use as in Question 12, it would be necessary for it to determine its level of water consumption. The researcher could determine that seventeen of the hotels kept track of their water consumption and one hotel did not keep track of its water consumption.

4.7.3.9 QUESTION 14

DO YOU HAVE AN ANNUAL BUDGET FOR IMPLEMENTING ECO INITIATIVES WITHIN THE HOTEL?

The researcher asked this question to determine whether the hotel provided a budget for the department to identify and implement viable eco initiatives. Budgetary constraints may be the reason why a hotel is unable to implement eco initiatives, despite its willingness to conserve the environment.

The researcher could determine that eight of the hotels were allocated with an annual budget and ten of the hotels were not allocated with an annual budget for implementing eco initiatives.



Measurement	Total Count	Percentage
Yes	8	44
No	10	56

Figure 4.22: Budgeting for identifying and implementing viable eco initiatives

4.7.3.10 QUESTION 15

ARE YOU AWARE THAT CAPE TOWN CURRENTLY HAS A SHORTAGE OF AVAILABLE SURFACE WATER?

The researcher asked this question to determine how knowledgeable the respondents were regarding the climatic conditions of Cape Town. If the researcher could determine the level of awareness of the respondents regarding the draught prone climate of Cape Town, it would be possible to determine how willing they would be to implement future initiatives to recycle waste water. The researcher could determine that all 18 respondents were aware that Cape Town currently has a shortage of available surface water.

4.7.4 INITIATIVES

This category of questions provided the researcher with data on the initiatives that were implemented by the hotels. The initiatives included questions 16 to 20 of the questionnaires that were distributed to the Food and Beverage and Rooms Division departments.

4.7.4.1 QUESTION 16

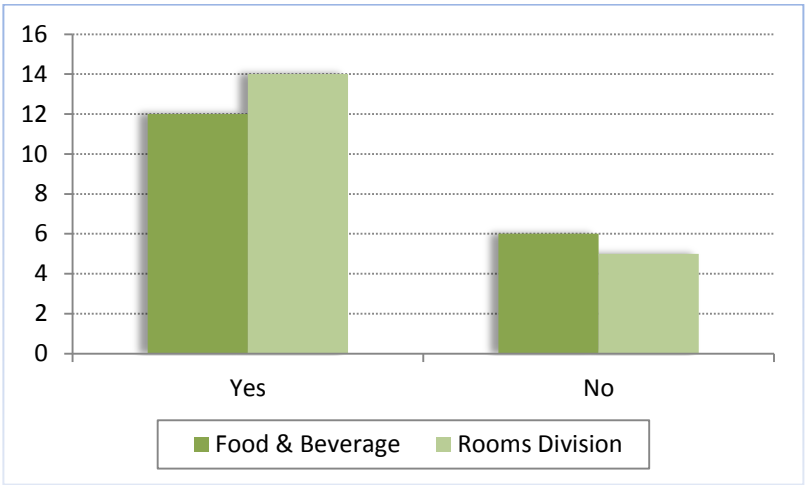
DO YOU BELIEVE THERE IS A LINK BETWEEN SOCIETY AND THE ENVIRONMENT?

The researcher asked this question to determine whether the respondents believed that our wellbeing is linked to a healthy environment. In the Food and Beverage department, the researcher could determine that all 18 respondents believed that the environment and society shared a link. In the Rooms Division department, the researcher could determine that all eighteen respondents believed that the environment and society shared a link.

4.7.4.2 QUESTION 17

DO YOU FEEL THAT THE GOVERNMENT SHOULD BE PLAYING A PREDOMINANT ROLE IN ENSURING YOUR HOTEL'S OPERATIONS ARE BENEFITING THE ENVIRONMENT?

The researcher asked this question to determine whether the respondents felt the government should be supporting eco initiatives in establishments through protocols. This further indicated whether the respondents felt that government involvement was a prohibiting factor or whether it provided valuable assistance. In the Food and Beverage department, the researcher could determine that 12 respondents felt that the government should be supporting the hotels' operations and six respondents felt that the government should not be supporting the hotel's operations. In the Rooms Division department, the researcher could determine that 14 respondents felt that the government should be supporting the hotels' operations and four respondents felt that the government should not be supporting the hotel's operations to ensure they are benefiting from the environment.



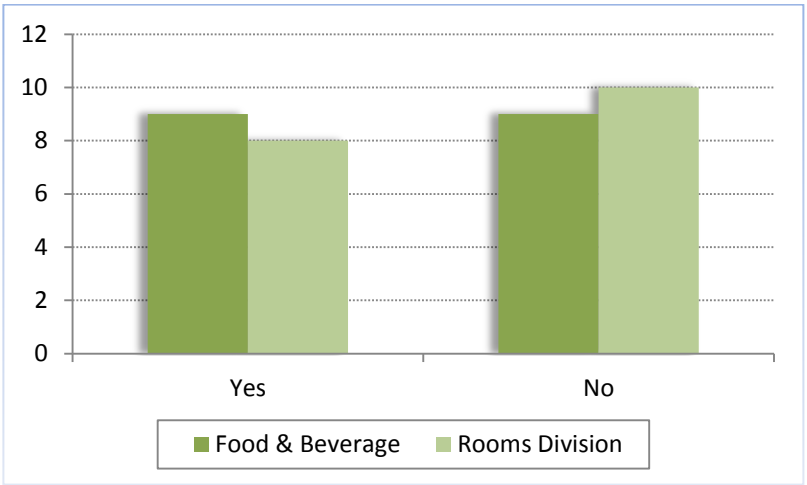
Measurement	Total Count F&B	Total Count Rooms	Percentage F&B	Percentage Rooms
Yes	12	14	67	78
No	6	4	33	22

Figure 4.23: Opinions regarding government support for eco initiatives

4.7.4.3 QUESTION 18

DO YOU RECEIVE TRAINING TO REALISE THE ADVANTAGES OF RECYCLING FOOD AND WASTE WATER?

The researcher asked this question to determine whether the hotel trained the respondents to minimise food waste or waste water in their department. The response was also a good indication of whether the hotel implemented eco initiatives as, should they in fact have been implementing these initiatives, training would form an essential part of the process. In the Food and Beverage department, the researcher could determine that nine respondents received training and nine respondents did not receive training. In the Rooms Division department, the researcher could determine that eight respondents received training and ten respondents did not receive training.



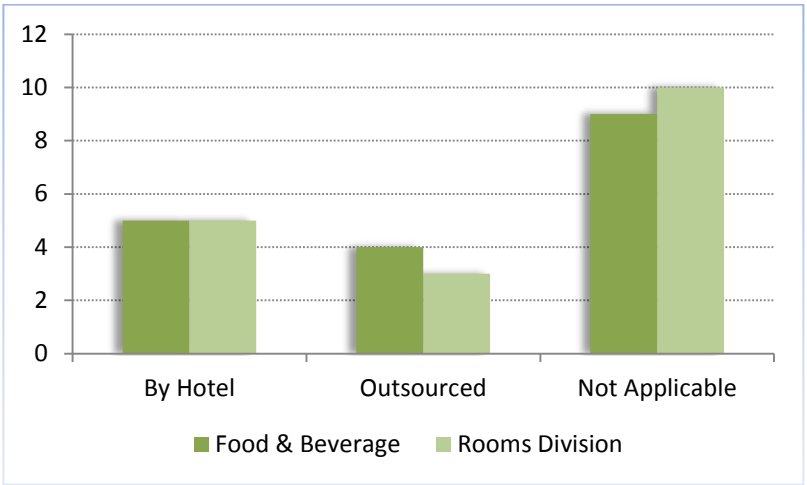
Measurement	Total Count F&B	Total Count Rooms	Percentage F&B	Percentage Rooms
Yes	9	8	50	44
No	9	10	50	56

Figure 4.24: Availability of training in minimising food waste or waste water

4.7.4.4 QUESTION 19

IS THIS TRAINING PROVIDED BY THE HOTEL OR OUTSOURCED?

The researcher asked this question to determine whether, if training was provided, it was conducted by the hotel or an outside company. This further indicated to the researcher whether the hotel was taking its own steps to implement eco initiatives or whether it was contracting outsourced companies. In the Food and Beverage department, the researcher could determine that five respondents received training that was outsourced, four respondents received training provided by the hotel and nine respondents did not need to receive training at all. In the Rooms Division department, the researcher could determine that five respondents received training that was outsourced, three respondents received training provided by the hotel and ten respondents did not need to receive training at all.



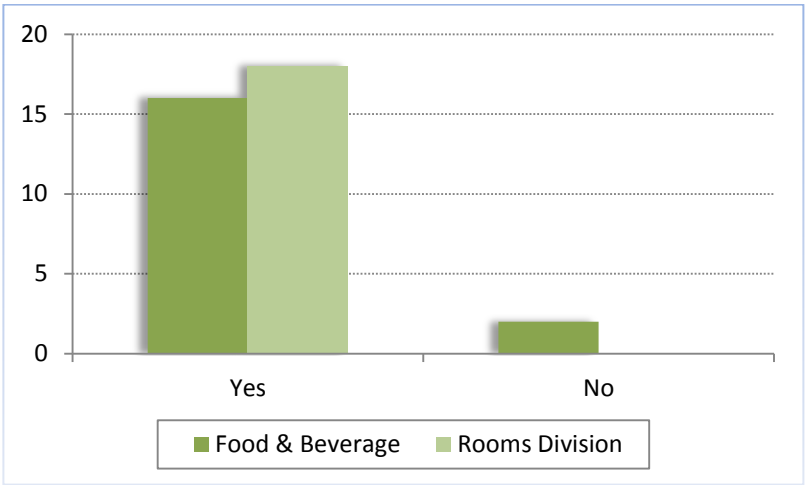
Measurement	Total Count F&B	Total Count Rooms	Percentage F&B	Percentage Rooms
By Hotel	5	5	28	28
Outsourced	4	3	22	17
Not Applicable	9	10	50	55

Figure 4.25: Source of training in eco awareness

4.7.4.5 QUESTION 20

DO YOU BELIEVE THAT RECYCLING FOOD WASTE AND WATER WASTE WILL MAKE A DIFFERENCE TO REDUCING WASTE AT YOUR HOTEL?

The researcher asked this question to determine whether the respondents felt food or waste water recycling was a worthwhile activity to reduce the hotel's production of this waste. In the Food and Beverage department, the researcher could determine that 16 respondents believed that recycling initiatives reduce the waste produced and two respondent did not believe that food waste recycling initiatives would reduce the food waste produced by the hotel. In the Rooms Division department, the researcher could determine that all 18 respondents believed that waste water recycling initiatives will reduce the waste water produced by the hotel.



Measurement	Total Count F&B	Total Count Rooms	Percentage F&B	Percentage Rooms
Yes	16	18	89	100
No	2	0	11	0

Figure 4.26: Opinions regarding the reduction of waste through recycling

4.8 SUMMARY

This chapter has presented the findings from the quantitative and qualitative investigation related to the research methodology by analysing the responses received from the questionnaires and interviews conducted with the relevant respondents. A descriptive approach was employed with the aim was to gather facts relating to the eco initiatives implemented by the selected hotels.

The quantitative findings are graphically represented in the form of bar graphs. An explanation regarding each question is provided in order to clarify its importance and how it was linked to the research theory. The qualitative findings are discussed at length and the uniqueness of the eco initiatives implemented by each relevant hotel are highlighted.

Chapter five provides an interpretation of the findings reported in this chapter. Recommendations derived from the findings elicited through questionnaires and interviews are provided.

CHAPTER FIVE

FINDINGS AND RECOMMENDATIONS

5.1 INTRODUCTION

Sustainable tourism is fast becoming a global standard with emphasis on the environmental impact of the hospitality industry (Acutt, 2002: 2-5; Bohdanowicz, *et al.,* 2005: 1643; Mahomed & Beires, 2011: 1-3; Storck, 2011: 22). That is, the effect that tourism has on the environment is regarded as a result of its operations that are linked with the environment.

This chapter offers a discussion on the findings and results of the data analysis as set out in Chapter Four. A total of 18 questionnaires and interviews conducted with four hotels contributed to proving the hypothesis and the main and sub problem to this research study.

The hypothesis was investigated in terms of the relationship between implementing eco initiatives and reducing waste within hotels. The concept of an eco initiative and the purpose for which it is applied was the main focus of the research study. This allowed the researcher to determine whether the goal of this initiative, namely reducing the waste generated by hotels, may be theoretically attained.

The main problem was investigated in terms of whether eco initiatives in fact do reduce the waste generated by hotels. In order to prove the main problem, case studies were conducted in a practical environment and this formed part of the investigation. The sub problem was investigated in terms of the future success of eco initiatives implemented by hotels in South Africa. The success of eco initiatives that form part of hotel operations may be based on the degree of commitment from the hotel staff, which was the main focus of the research.

5.2 FINDINGS AND DISCUSSION OF RESULTS

The findings from the results analysed in Chapter Four have been applied to solving the research problem and proving the hypothesis.

5.2.1 PROVING THE HYPOTHESIS

The hypothesis states that there is a relationship between implementing eco initiatives to recycle water and food waste and a reduction in this waste generated by selected Cape Town hotels.

According to Mohamed and Beires (2011: 3-4), an eco initiative may be defined according to four tiers, namely the economy, technology, environment and society. The link between these tiers is evident when the economy invests in green technologies, as the environment consequently benefits. Society, in turn, will benefit from a healthy environment due to an improved quality of living.

However, the researcher noted that eco initiatives were considered beneficial only once a balance between these tiers was established. According to Hamele and Eckardt (2006: 3), a developing economy is beneficial to its society but may damage the environment at the same time, consequently limiting the environment's ability to meet society's physiological needs. The analysis of an eco initiative led the researcher to investigate the link it has with ecological modernisation, government policy and tourism.

The global environmental movement largely focused on two approaches, namely strong and weak ecological modernisation. In the context of this study, private parties namely industry professionals and tourism are considered the instigators. According to Oelofse *et al*. (2006: 64), these two approaches were able to make an impact on environmental sustainability, through either utilising technology for timely results or opting to focus on society's welfare over a longer period of time.

With regards to government policy, no constant variables resulting from the South African government's role as facilitator are currently present in hotel operations. The government, as the facilitator, seeks to provide guidelines to hotels that aim to conduct environmentally friendly operations.

The responsibility for these initiatives, however, reside strictly with the hotel (Mahomed & Beires, 2011: 3; South Africa. Department of Environmental Affairs and Tourism, 1998: 1). Therefore, it is not possible to measure results from hotels implementing eco initiatives with any consistency.

The researcher's investigation regarding eco initiatives within tourism was narrowed down to focus on two factors, namely the environment and society and the link between them. The nature of the service provided by hotels dictates that they are largely dependent on what the environment is able to provide (Alexander, 2002: 5; Hamele & Eckardt, 2006: 3). This involves that hotel guests have an expectation that their physiological needs will be met in excess, resulting in a higher than average use of water and production of food waste.

From the responses to question 4.6.3 in Chapter Four, the researcher determined that one of the aims of implementing eco initiatives by the selected hotels in Cape Town was to showcase their commitment towards the environment. Their recycling drives further promoted a sustainable approach to tourism.

From the responses to question 4.7.2.2 in Chapter Four, the researcher determined that a total of three hotels implemented earthworm farms in order to manage their food waste. This initiative ensured that the hotels were able to recycle organic food waste and prevent it from reaching landfills. A further 11 of the hotels used a waste removal company to manage their food waste and four of the hotels donated their leftover food as part of their corporate social initiative.

From the responses to question 4.7.2.9 in Chapter Four, the researcher further determined that a total of three hotels implemented earthworm farms to convert organic food waste into compost. A total of 15 hotels did not implement earthworm farms as per the responses from the remaining hotels' to question 4.7.2.2 in Chapter Four.

From the responses to question 4.7.3.1 in Chapter Four, the researcher determined that a total of two hotels were harvesting rainwater for irrigation purposes. This initiative ensured that the hotels utilised an alternative source of available surface water.

The researcher determined that 16 hotels did not implement this initiative as, considering the responses to question 4.7.3.3 in Chapter Four, seven hotels did not have a garden on site that required irrigation and water from municipal pipelines was utilised instead.

An eco initiative by a hotel to implement a recycling drive will impact environmental sustainability. The hotel may consequently be regarded as adopting a stance to independently support ecological modernisation, according to the South African government's political strategy. The relationship between an eco initiative and a recycling drive to reduce waste and contribute to environmental sustainability has been highlighted. The researcher therefore determined that there is a relationship between implementing eco initiatives to recycle water and food waste and a reduction in this waste generated by a hotel, thus proving the hypothesis.

5.2.1.1 TESTING THE RELIABILITY OF THE FINDINGS

The reliability of the hypothesis is determined by the ability of other researchers to replicate the researcher's findings as set out in the study (Welman *et al*., 2005: 145). That is, other researchers should be able to obtain the same results as those provided in this study through investigating a similar sample.

The researcher was able to estimate the reliability of the findings through two approaches, namely parallel-form and inter-rater reliability. Welman *et al*. (2005: 145) explain that these kinds of reliability form part of systematic sources of variation, a method for determining which factors will be investigated by the researcher as well as serving as the object of measurement, such as forms and persons or raters.

Parallel-forms of reliability uses different kinds of forms to measure the same sample (Welman *et al*., 2005: 146). In the present instance, questionnaires and interviews were utilised by the researcher as the two forms of measurement. The object of measurement was the sample, namely the selected hotels in Cape Town. The interview questions were compiled according to the responses received from the questionnaires. This allowed the researcher to enhance the results obtained from the questionnaires by means of interviews.

Inter-rater reliability is used to measure the level of agreement among the raters that score the object of measurement (Welman *et al*., 2005: 147-148). That is, questionnaires served as the form being measured. The responses received by all the raters to each question of the questionnaires were consequently added up.

This form of reliability works well with questionnaires considering the inconsistency in the responses obtained from each hotel (Welman *et al*., 2005: 147). This inconsistency serves as an indication of the raters independence of each other.

5.2.2 PROVING THE MAIN RESEARCH PROBLEM

The main problem concerned whether implementing eco initiatives to recycle water and food waste in selected Cape Town hotels could reduce such waste generated by the hotels.

Case studies of the Cape Town Hotel School and the Mount Nelson Hotel were conducted by the researcher in order to investigate the main research problem in the context of a practical environment.

5.2.2.1 ANALYSIS OF CASE STUDIES AND FINDINGS

The information gained from the case studies that were conducted are presented in the following tables:

Table 5.1: Case Study with the Cape Town Hotel School

CASE STUDY 1 **CAPE TOWN HOTEL SCHOOL RESTAURANT AND CULINARY LABORATORIES**
Question 1: What initiatives have been implemented?
Earthworm farms were installed at the beginning of 2011 to recycle organic food waste produced by the restaurant and the culinary laboratories.
Question 2: How have these initiatives been implemented?

The hotel school approached FullCycle who assessed the recycling capacity of the kitchens and culinary laboratories. Earthworm farms were consequently installed in the garden of the hotel school and these consist of six worm basins, determined to be sufficient for the amount of organic food waste produced. FullCycle provided training to the senior staff and chefs regarding the maintenance of the earthworm farms and provided on-site support for the first few months of the operation.
Question 3: Why were these initiatives implemented?
The hotel school has named the introduction of the earthworm farms their “Green Revolution”. They realised that the hospitality industry produces more waste than the average household. The earthworm farms are an initiative to educate the students regarding recycling as it is an emerging facet of the industry.
Question 4: What are the objectives of the initiatives?
The hotel school aims to educate the students regarding sustainable living and food waste management.
Question 5: Who are the staff involved and why were these members chosen?
The culinary lecturers and laboratory assistants presented the initiative to the hotel school management. The responsibility of managing the earthworm farms and educating the students regarding their use was therefore allocated to these staff members.
Question 6: What are the outcomes and success rate?
The “Green Revolution” has not yet received the necessary support from the hotel school syllabus. The earthworm farms require dedication from lecturers and students alike to achieve tangible results. With increased support and involvement from students and staff, the culinary lecturers aim to achieve higher results from the revolution.

Table 5.2: Case Study of the Mount Nelson Hotel

CASE STUDY 2 **MOUNT NELSON HOTEL**
Question 1: What initiatives have been implemented?
Earthworm farms were installed in approximately 2006 to recycle organic food waste produced by the hotel’s kitchens. Water from the Hof mountain spring is further used to irrigate the hotel’s garden.
Question 2: How have these initiatives been implemented?

The earthworm farm operation is currently managed by Why Waste who is also involved in expanding the number of worm basins at the hotel. Why Waste provided training to the chefs regarding the maintenance of the earthworm farms and provided onsite support for the first few months of the operation. Organic food waste which cannot be digested by the earthworms is broken down using Bokashi Bran, consisting of wheat bran and microorganisms, in large bins. The end product is collected by Why Waste, processed off site and the remaining compost is returned to the hotel. The hotel's garden is watered using the spring water from Table Mountain. The captured water is only used during summer months with low rainfall.
Question 3: Why were these initiatives implemented?
The hotel's gardens cover an area of seven hectares and the hotel management has further plans to grow a herb garden which will cover the roof of the hotel. The earthworm farms provide the necessary compost and worm juice to supplement the compost needs of the gardens. The initiative further prevents a total of 50 kilograms of food waste from reaching landfills on a weekly basis. The water from the Hof mountain spring is captured in a 120 kilolitre water tank as a sustainable source of water which is readily available. The spring runs through the grounds of the hotel and the water would otherwise run downstream. The water tank is used to redirect the path of the water to the hotel's gardens.
Question 4: What are the objectives of the initiatives?
These initiatives illustrate the hotel's responsibility to the environment and its sustainability as a hospitality provider.
Question 5: Who are the staff involved and why were these members chosen?
Two chefs were selected by the hotel and trained by Why Waste to control the earthworm farm operation. A section of the kitchen fridge is demarcated for the organic food waste which is stored until needed for the worm basins.
Question 6: What are the outcomes and success rate?
The initiatives were implemented for the future sustainability of the hotel. To ensure a healthy environment, management aims to implement individual efforts which eventually add to the larger outcomes.

The case studies provided the researcher with the opportunity to investigate the uniqueness of eco initiatives concerning recycling waste water and food waste at two separate properties and to determine how they have been incorporated into the daily operations of these facilities. The data gathered provided a base for the researcher to compare results in order to determine the effectiveness of each property's initiatives.

The researcher found that the Cape Town Hotel School utilised earthworm farms as part of their “Green Revolution” in order to convert organic food waste into compost. However, the initiative was in its initial stages of implementation and statistics regarding its effectiveness to reduce the kitchen’s waste were not yet available.

The Mount Nelson Hotel implemented initiatives to recycle waste water and food waste. The hotel was reusing its water directly through harvesting rainwater for future use. The harvested rainwater, captured in a 120 kilolitre water tank, which is substituted with water from the Hof spring running directly through the grounds of the hotel in the dry season. The direct reuse of waste water allows the hotel to irrigate its garden solely through this initiative, eliminating its need to utilise municipal water. The hotel’s water recycling initiative effectively allowed it to utilise an alternative source of surface water.

The Mount Nelson Hotel further utilises earthworm farms and Bokashi bran in order to convert organic food waste into compost. A total of 100 worm bins are converting 50 kilograms of organic food waste into compost on a weekly basis. This initiative provides a source of compost for its garden, namely through the organic compost and liquid worm juice produced. Bokashi bran is utilised to break down food waste that the earthworms are unable to digest, namely bones or waste high in acidity, and to convert it into compost. Considering that a standard wheeled dustbin weighs 26 kilograms once filled with food waste, the hotel’s recycling initiative prevents roughly two wheeled dustbins of food waste per week from reaching landfills.

The aim of both these properties with implementing these initiatives may be identified as facilitating the sustainability of their operations within the tourism industry. The Cape Town Hotel School only recently identified sustainable operations as an emerging facet of tourism while the Mount Nelson Hotel was focusing on adapting their operations in order to ensure the future sustainability of the tourism industry.

The analysis of the interviews indicated to the researcher that a total of four hotels were implementing eco initiatives to recycle waste water and food waste. A summary of the findings is provided through interpreting the bar graphs relating to the questionnaires.

The researcher determined that hotel number one implemented both earthworm farms and rainwater harvesting initiatives, hotels number two and three implemented only earthworm farms and hotel number four implemented rainwater harvesting initiatives. However, the Mount Nelson Hotel was included in both the analysis of the case studies and the qualitative and quantitative data collection process. Hotel number one, namely the Mount Nelson Hotel, will not be considered for the purpose of analysing the questionnaires and interviews.

Hotel number two implemented a single earthworm farm in conjunction with utilising Bokashi bran with 30 bins of food waste. The initiative allowed the hotel to convert up to a ton of organic food waste into compost each month. The limitation the hotel placed on the production of compost ensured it produced an amount that it was productively able to manage. Should the hotel's composting initiative be in full operation, it will be able to recycle up to 3 900 kilograms of food waste each month. The recycling initiative of the hotel prevented roughly 38 wheeled dustbins of food waste per month from reaching landfills.

Hotel number three utilised a total of two worm bins in their initiative to implement an earthworm farm. The hotel did not have a garden for which to use the compost produced by the earthworms. Instead, Waste Plan collected the compost to utilise it offsite. The two worm bins were collectively able to prevent an average of 5 kilograms of food waste from reaching landfills each month. That comes to a total of roughly two wheeled dustbins of food waste per annum.

Hotel number four was reusing its water directly through harvesting rainwater for future use. The harvested rainwater, captured in a 146 kilolitre water tank, was substituted with municipal water when the tanks ran dry. The direct reuse of waste water allowed the hotel to irrigate its garden during the warmer summer months through a combination of rainwater and municipal piped water.

During the colder winter months, the hotel was able to irrigate its garden solely through its rainwater harvesting initiative as the garden's watering needs decreased. The hotel's water recycling initiative effectively allowed it to utilise an alternative source of surface water.

5.2.3 PROVING THE SUB PROBLEM

The sub problem required investigation into whether implementing eco initiatives to recycle water and food waste in selected Cape Town hotels could achieve long-term success.

The contribution of eco initiatives to the environment in terms of tourism may be observed internally through the commitment of the hotel staff involved in the process (Storck, 2011: 24). The future success of eco initiatives in South Africa is challenged by a lack of environmental awareness in an environment relying on guidelines. That is, it is desirable that there should be a framework to influence a hotel's practices; without it, there are no constant variables directing employees on an environmentally sustainable path. According to Acutt (2002: 4) and the Department of Environmental Affairs and Tourism (1998: 1), these guidelines, as in an EIA, are based on emerging International trends with few developments at home. The researcher utilised the results from the quantitative data in order to determine the views and opinions of the respondents on eco initiatives within their hotels.

Considering the responses to question 4.7.4.2 in Chapter Four, the researcher could determine that 12 respondents in the Food and Beverage and 14 respondents in the Rooms Division departments felt that government support would benefit the long term success of eco initiatives within hotels. This indicated that 67 % of the respondents in the Food and Beverage department and 78 % of the respondents in the Rooms Division department were accepting of government support for the implementation of eco initiatives within their hotels.

Considering the responses to question 4.7.4.3 in Chapter Four, the researcher could determine that nine respondents in the Food and Beverage and eight respondents in the Rooms Division departments received training within their work environment to realise the advantages of recycling food waste and waste water.

This indicated that 50 % of the respondents in the Food and Beverage department and 44 % of the respondents in the Rooms Division department were educated regarding the implementation of eco initiatives within their hotels.

Considering the responses to question 4.7.4.5 in Chapter Four, the researcher could determine that 16 respondents in the Food and Beverage and all 18 respondents in the Rooms Division departments believed that recycling food waste and waste water would reduce the waste produced by their hotels. This indicated that 89 % of the respondents in the Food and Beverage department and 100 % of the respondents in the Rooms Division department believed in the success of eco initiatives within their hotels.

5.3 RECOMMENDATIONS

This study was based on the theory that implementing eco initiatives could reduce water and food waste within hotels. The researcher further aimed to provide practical examples to how existing theory regarding these initiatives was applicable to operations within hotels. Sustainability through eco initiatives may be considered within any organisation and is not specific to any industry. However, with tourism being accountable for 5.5 % of the world's GNP, its product and service value is evident in this regard.

The concept of eco initiatives may therefore be made applicable to hotels considering the impact of their operations. Within developing countries, technical expertise and social development are highly important to environmental sustainability. The researcher consequently makes recommendations derived from these developments.

5.3.1 TECHNICAL EXPERTISE

Earthworm farms contribute directly to reducing the footprint left by hotel operations on the environment through reducing the amount of food waste that reaches landfills. The worm bins that house the earthworms are constructed of plastic or even wood and offers the user a durable container to convert organic food waste into compost.

The researcher noted that the environmental integrity of the worm bin may be questioned considering the negative impact the production process may have on the environment. That is, the production of plastic or the felling of trees for wood to some extent defeats the purpose of the earthworm farm to contribute towards environmental sustainability. An alternative container that is recycled would ensure that this eco initiative provides the maximum benefit to the environment.

The researcher therefore recommends the use of old car tires as an alternative container for housing the earthworm farms. The large volume of the rubber tires and their inherent durability provide a suitable alternative to plastic or wooden bins.

The direct reuse of waste water was investigated through the harvesting of rainwater for irrigation purposes. The researcher therefore considered a method for the indirect reuse of waste water as the second recommendation.

The researcher noted that waste water may be effectively reused for potable use in hotels through the use of a membrane filter. This filtration process seeks to remove all harmful pathogens that are detrimental to the consumer's health from the water. The disadvantages of this method are its excessive financial costs and the limited development within South Africa to support this technology.

As an alternative to reusing water indirectly, the researcher recommended hotels consider a system that is readily available and may be installed on site in order to contribute to environmental sustainability. A water purification system may be used by a hotel to produce its own bottled water. The glass bottles may further be recycled and municipal water that in certain cases would be considered non potable may be filtered to such an extent that it becomes potable.

5.3.2 SOCIAL DEVELOPMENT

In certain cases the hotel may not be able to use the compost produced by earthworm farms, should the hotel not have a garden on site that would require compost. The compost may be used off site and may even be collected by the company that supplies the worm bins. However, the financial cost of selling the compost would exceed the profit made from producing it.

The researcher noted that the correct amount of media exposure may make this eco initiative beneficial to the hotel, both with a garden or without a garden on site, as a public relations initiative. That is because many travelers are seeking out environmentally friendly hotels as part of their corporate travel policy. The researcher therefore recommends this strategy to improve the public's perception of a hotel's operations by informing them of its environmentally sustainable practices.

The initiative to use the compost off site may be taken a step further to ensure that not only the environment benefits but the local community as well. In order to achieve this, the researcher has recommended that a hotel invests in a farm within a set radius around the hotel, usually about 50 kilometres. The investment could constitute purchasing a plot of land tilled by a farmer or to contribute to its production value by providing compost that the hotel's earthworm farms produce. Ultimately, the main contribution the researcher recommended was to use the compost off site to assist the farmer. In turn, the farm would be able to supply its produce for the hotel to use in its kitchens. Support for this relationship between a farmer and hotel aids social development as employment is provided by the farmer to the local community in the rural areas.

In summary, the researcher recommended that both technical and social aspects be considered. With regard to recycling food waste, the researcher recommended car tires be recycled to house the earthworm farm. If the compost produced cannot be used directly by the hotel it should be used to support a farmer and the local community. With regard to recycling waste water, the researcher recommended a water purification system on site in order to reuse water indirectly.

5.4 SUMMARY

This chapter investigated the data analysis as set out in Chapter Four through discussing the quantitative and qualitative results of this study. The multi strategy approach adopted by the researcher provided supportive findings through the interviews to enhance the results of the questionnaires. This chapter set out to prove the validity of the hypothesis, main problem and sub problem that defined the research study.

A total of 18 questionnaires and interviews conducted with four hotels contributed to the results and findings discussed in this chapter.

The hypothesis was ultimately proven by the researcher by highlighting the link between implementing an eco initiative and its ability to reduce waste. The investigation followed the approach of defining an eco initiative in terms of the South African government's strategy for modernising its environmental practices. It was found that the defining purpose of implementing an eco initiative, whether the State supported technological or social progress, was aimed at reducing waste.

The researcher found that few of the selected Cape Town hotels implemented eco initiatives to reduce their food waste and waste water. A total of four hotels either utilised earthworm farms or harvested rainwater for future use. The researcher investigated quantitative and qualitative data from these four hotels to ultimately prove the main research problem. It was found that, in each of the four hotels, the eco initiative resulted in the reduction of waste. These successful recycling drives allowed the hotels to reduce the food waste they were sending to landfills and to utilise an alternative source of surface water. These observations were further supported through case studies that offered similar findings.

The researcher found strong support for the implementation of eco initiatives among staff members of the selected Cape Town hotels. An important factor for the long-term success of these eco initiatives may be seen in the level of commitment shown by the persons involved in putting these initiatives into practice. The researcher noted that, with adequate training and awareness, the persons responsible for the initiatives would be able to show the commitment needed to make it a viable future endeavour.

The researcher's concluding remarks about the study are presented in Chapter Six.

CHAPTER SIX

CONCLUDING REMARKS

6.1 INTRODUCTION

This study aimed to investigate how effective an eco initiative to recycle water and food waste would be when implemented in selected Cape Town hotels. The study highlighted the effectiveness of harvesting rainwater as an indirect method for its future use in hotel operations, namely for irrigation purposes. The effectiveness of earthworm farms comprised the main focus with regard to converting organic food waste into compost, a usable by-product that provides an alternative to landfills.

Hotel guests make their decisions about where to stay based on criteria such as services offered and how eco-friendly hotels are, in consideration of whether hotels adhere to environmental policies (Bohdanowicz, 2005: 188-205). A direct link between the implementation of environmental policies and the implementation of eco initiatives would encourage hotels and the service sector as a whole to implement such initiatives.

While Chapter Five presented recommendations flowing from the findings of this study, this chapter aims to provide recommendations for future research. A summary of the findings will further be provided and concluding remarks will be made.

6.2 SUMMARY OF THE RESEARCH STUDY

Chapter One served to provide a basic understanding of the research conducted in this study. Environmental movements developed from a concern for the personal wellbeing of the public and of the ecology of the surrounding landscape. The movement was defined by a period of rapid economic growth related to industrial development. Recycling initiatives came to be in high demand to curb the stress on the environment created by unsanitary practices, a general shortage of water and overflowing landfills. In South Africa, a lack of available surface water require methods for the reuse of water to be adopted. Landfills that release toxic smoke when burned further present a need to recycle food waste into compost through vermicomposting.

This chapter provided clarification of terms and concepts related to and contributing to the understanding of these environmental movements.

Chapter Two expanded on these terms and concepts and sought to investigate eco initiatives in full. This was accomplished through analysing the four tiers constituting an eco initiative namely the environment, technology, economy and society. It was suggested that development within the City of Cape Town may reach a road block when a water deficit is expected to be experienced as early as 2013. This as a result of a decrease in the availability of surface water and an annual increase of 3.7 % in the demand for water. The means to curb toxic emissions from landfills was a slow development. The public's perception of earthworms had to be influenced in order to realise their potential for producing compost, a possible alternative to the high demands for artificial fertilizers.

Chapter Three was focused on the research methodology through investigating the research strategy, design and the research instruments. A descriptive approach was adopted based on the strategic objectives of the study, namely gathering facts relevant to the theory of the study (De Vaus, 2001: 1). This was achieved through multi-strategy research design whereby both quantitative and qualitative research approaches to the research were utilised. Though it is uncommon to use both approaches in a research study, the researcher found that the data gathering tools collectively provided supporting findings. That is, the findings from questionnaires as quantitative research were enhanced by the findings from the qualitative research, namely interviews. Case studies, as part of the qualitative research, provided the researcher with practical example to the theory (Schell, 1992: 1; Welman *et al.,* 2005: 25). In order to select the sample, the researcher considered departmentalisation within a hotel. The Food and Beverage and Rooms Division departments were consequently selected.

In Chapter Four, the results obtained from the questionnaires and interviews were analysed. A total of 18 hotels responded by providing feedback to the questionnaires, a 72 % response rate from the 25 hotels that were included in the data collection process. Questionnaires were formulated based on the variables to the hypothesis, namely the eco initiatives. Consequently, the researcher distributed questionnaires to the Food and Beverage and Rooms Division departments of the selected hotels. The interviews were aimed at the hotels that were implementing the eco initiatives in question.

That is, a total of four hotels that were implementing either food waste or waste water recycling initiatives formed part of the interviews.

Chapter Five discussed the findings from the data analysis and recommendations to these findings were made. This chapter demonstrated that eco initiatives were reducing the water and food waste generated by hotels in varying capacities.

This determined the validity of the hypothesis, with the main research problem and the sub problem having been addressed. The relationship between implementing an eco initiative and the reduction in waste it was intended for was the main focus of the researcher when seeking support for the hypothesis. Ultimately, the desired purpose of any eco initiative is to reduce waste. The main research problem required both the quantitative and qualitative data to be analysed whereby the findings were corroborated. It was determined that hotels implementing eco initiatives were in fact reducing their waste production. Finally, the sub problem investigated the success of environmental sustainability according to the capacity of the people involved in the process to carry through the initiatives. The recommendations referred back to the four tiers through investigating a technological and social point of view.

6.3 FUTURE RESEARCH POSSIBILITIES

Considering this study and the outcomes of the focus group, the researcher was able to make three recommendations for possible future research. These concern investigating how staff training is able to influence the future success of eco initiatives within hotels by informing the perceptions of the persons involved in the process; how the political strategy within governments is able to directly influence sustainability through having legislation in place to guide hotel operations; and determining the cost-effectiveness of implementing eco initiatives through analysing the bottom line of implementing these initiatives and income generated through public relations.

Staff commitment is a deciding factor in the future success of eco initiatives within the operations of hotels. Without the correct training, it would be unrealistic to expect these staff members to realise the impact of a hotel's operations on the sustainability of the environment. However, a trained workforce requires adequate management to ensure that their commitment to environmentally sustainable operations is maintained.

The researcher would therefore suggest this aspect of staff commitment as possibility for future research. Key areas might include incentive schemes and information about how standard operating procedures have been made applicable by government legislation.

The political strategy of a government determines which regulations serve the interest of a country. These regulations may overlook the environment, demonstrated to be a key factor to the prosperity of a country. The researcher therefore recommends an investigation into the current policies and guidelines directing environmental sustainability within South African legislation. This also includes factors such as guidelines, an example being the EIA guidelines that currently are not legislated but may be of assistance to hotels that would like to provide more environmentally sustainable operations.

The bottom line of implementing eco initiatives is a key aspect of the viability of such initiatives within a hotel's operations from a management point of view. The researcher therefore recommends investigating the cost-effectiveness of implementing these initiatives as a possibility for future research. This includes its effectiveness on a large scale as well as a small scale to accommodate the difference in size of hotels according to the number of available rooms. The bottom line, however, may be indirectly influenced through the income generated by the hotel. Though eco initiatives may prove to be an investment, the researcher would further recommend investigating the effect on the hotel's income of travelers seeking environmentally friendly hotels. This may include the beneficial public relations generated through the hotel's environmental practices.

6.4 CONCLUSION

Our physiological needs encompass having access to clean water, air and sufficient food. This contributes to our ability to live a dignified life and have fair environmental rights (Cullet, 2003: 1). The challenge remains to provide a community with the opportunity to enjoy a healthy environment.

Technology is a one-stop solution towards environmental sustainability; however, society needs to be actively engaged in the process. This inclusion of the community encourages social development, a step towards economic growth and reducing poverty.

The climate for the growth of tourism in South Arica is a reality. The spending power of tourism has increased by 30.7 % between 2009 and 2010 in the Western Cape alone (United Nations ESCAP, 2007: 20). This provides entrepreneurial opportunities to impact the environment through socio-economic growth. This link was illustrated by reducing poverty and degradation of the environment through economic growth.

The recycling of water and food waste is a contribution that is made towards sustainable tourism. This may be regarded as a social responsibility by our generation to ensure that our actions do not affect the natural resources that should be available to future generations; the same quality resources available today should be available for the next generation.

This study has illustrated successful eco initiatives undertaken to recycle water and food waste produced by selected hotels in Cape Town and to ultimately reduce the amount of this waste that is produced. Earthworm farms are able to convert organic food waste into usable compost as an alternative to depositing it in landfills. Rainwater harvesting and storage of such water for future use provides an alternative source of surface water. Both initiatives contribute to environmental sustainability.

BIBLIOGRAPHY

Abbasi, S.A. 1998. *Environment everyone*. New Delhi : Discovery Publishing House.

Acutt, N. J. 2002. Voluntary environmental initiatives: Case studies in the South Durban petrochemical industry, South Africa. Unpublished PhD thesis, University of East Anglia, Norwich.

Alexander, S. 2002. Green Hotels: Opportunities and Resources for Success. *Zero Waste Alliance*: 5-7, September.

Benchmarkhotel and Hilton environmental reporting. 2005. Paper presented at the 2005 World Sustainability Building Conference, Tokyo, 27-29 September 2005.

Blumberg, B., Cooper, D.R., & Schindler, P.S. 2005. *Business research methods*. 2nd Edition. London. McGraw-Hill Higher Education.

Bohdanowicz, P., Simanic, B. & Martinac, I. 2005. Sustainable hotels-environmental reporting according to green globe 21, green globes Canada/GEM UK, IHEI

Bohdanowicz, P. 2005. European Hotelier's environmental attitudes: greening the business: *Cornel Hotel and Restaurant Administration Quarterly*, 46 (2): 188-205. May

Bryman, A. 2006. Integrating quantitative and qualitative research: How is it done? United Kingdom: University of Leicester.

Brynard, P.A. & Hanekom, S.X., 2005. Introduction to research in Public Administration and related disciplines. Paarl. Van Schaik Academic.

Bunclark, L. 2010. Rainwater harvesting: A suitable poverty reduction strategy for small-scale farmers in developing countries? Unpublished MA thesis, University of East Anglia, United Kingdom.

Cape Nature. 2007. *Cape Nature*. http://www.capenature.co.za/projects.htm?sm[p1][category]=619 [10 March 2011].

Chapman, S., Leslie, G. & Law, I. 2003. *Membrane bioreactors (MBR) for municipal wastewater treatment: An Australian perspective*. New South Wales: University of New South Wales.

Che-Ani, A. I., Shaari, N., Sairi, A., Zain, M.F.M. & Tahir, M.M. 2009. Rainwater harvesting as an alternative water supply in the future. *European Journal of Scientific Research*, 34(1): 132-140.

Colander, D. C. & Gamber, E. N. 2006. *Macroeconomics*. Cape Town: Pearson Education South Africa.

Conti, A. 2009. *Eco hotels of the world*. United Kingdom: Eco Hotels of the World.

Creswell, J.W. 2009. *Research design: Qualitative and quantitative mixed methods approaches*. USA. SAGE.

Cullet, P. 2003. *Differential treatment in Environmental law*. Chippenham Wiltshire: Anthony Rowe Ltd.

De Vaus, D.A. 2001. *Research design in social research*. London: SAGE.

De Villiers, S., de Wit, M. 2010. H2O-CO2-energy equations for South Africa. Cape town: University of Cape Town.

De Vos, A.S., Strydom, H., Fouche, C.B. & Delport, C.S.L. 2002. *Research at grass roots: For the social sciences and human service professions*. 3rd Edition Pretoria. Van Schaik Publishers.

Durham, B.,Angelakis A.N., Wintgens, T.,Thoeye, C. & Sala, L. 2005. Water recycling and reuse. A water scarcity best practice solution. *Environmental Technologies*: 1-10, May.

Earth Check. 2011. *Benchmarking Assessment Report: Accommodation-Business Hotel Benchmarking*. September.

Earth Day. 2011. *Environmental movements*. http://www.earthday.org/earth-day-history-movement [16 March 2011].

FullCycle. 2009. *Earthworm farms Cape Town*. http://www.fullcycle.co.za/index.php/vmchk.html [10 march 2011].

Fiander, R. 2012. Interview with the researcher on 15 February 2012, Cape Town.

Gaddie, R.E. & Douglas, D.E. 1978. *Earthworms for Ecology & Profit: Scientific earthworm farming*. California: Bookworm Publishing.

Gajalakshmi, S. & Abbasi, S.A. 2004. Earthworms and vermicomposting. *Indian Journal of Biotechnology*, 3: 486-494, 3 October 2004.

Gerhardt, P.L. 2004. *Research methodology explained for everyday people*. http://www.paulgerhardt.com/homework/RESEARCH_METHODOLOGY_EXPLAINED_FOR_EVERDAY_PEOPLE.pdf [14 September 2011].

Google. 1995. *Green Hotels Association*. http://greenhotels.com/index.php#a [09 March 2011].

Grace, P. 2001. *Descriptive research methodologies*. Florida: University of Southern Florida.

Great Britain: Parliament: House of Lords: Science and Technology Committee. 2006. Water Management: Report. *House of Lords Papers*, 191: 69, June.

Hamele, H. & Eckardt, S. 2006. *Environmental initiatives by European tourism businesses*: Instruments, indicators and practical examples. Stuttgart: University of Stuttgart.

Hatibu, N. & Mahoo, H. 1999. Rainwater harvesting technologies for agricultural production: A case for Dodoma, Tanzania. Tanzania: Sokoine University of Agriculture.

Honey, M. 1999. *Ecotourism and sustainable development: Who owns paradise?* Washington: Island Press.

Jargowsky, P.A.; Yang, R. 2004. Descriptive and Inferential Statistics. Unpublished dissertation, Dallas University, Texas.

Jeffery, Y., Barclay, L. & Grosvenor, M. 2008. *Green living for dummies*. New Jersey: Wiley.

Jimenez, B. & Asano, T. 2008. Water Reuse*. An International Survey of Current Practice, Issues and Needs*, 20: 166-176.

Johnson, B. & Christensen, L. 2004 *Educational research: Qualitative, quantitative and mixed approaches*. 2nd Edition. New York: Research Navigator.

Kajornboon, A. B. 2008. *Using interviews as research instruments.* from http://www.culi.chula.ac.th/e-Journal/bod/Annabel.pdf. [7 October 2008]

Karaca, A. 2010. *Biology of earthworms*. United Kingdom: Springer.

Krishnamoorthy, B. 2005. *Environmental management*. New Delhi: PHI Learning Pvt. Ltd.

Leedy, P.D. & Osmond, J.E. 2001. *Practical research and design.* Upper Saddle River. N.J. : Merril Prentice-Hall

Lourduraj, A.C. & Yadav, B.K. 2005. *Role of earthworms on ecology*. New Delhi: A.P.H. Publishing Corporation.

Lubbe, B. 2005. *Tourism management in Southern Africa*. Pinelands: Pearson South Africa.

Maes, G. 2012. Interview with the researcher on 12 April 2012, Cape Town.

MacMillan, J.H. & Schumacher, S. 1997. *Research in education. A conceptual introduction.* New York: Longman.

Mahomed, N. & Beires, L. 2011. *Unlocking the KwaZulu-Natal green economy*. KwaZulu-Natal: UKZN School of Development Studies, Futureworks & Eco-futures.

Mbaiwa, J. E. 2003. The socio-economic and environmental impact of tourism development on the Okavango Delta, north-western Botswana. *Journal of Arid Environments*, 54: 447-467, July.

McGillivray, V. 2012. Interview with the researcher on 10 April 2012, Cape Town.

McKelvey, P. 2008. *The easy no-dig garden*. Urchin eBooks, from Google books. Viewed 21 February 2011 from http://books.google.co.za/books?id=yydgF3Sc2_sC&printsec=fontcover&dq=the+easy+no-dig+garden+mckelvey&source=bl&ots=_e-tLAovMK&sig=chhhjuU7oCLqg91jumzZ44_9ebE&hl=en.

Meadows, K. 2009. *Quantitative research design.* Ontario: University of Waterloo.

Mema, V. 2010. *Impact of poorly maintained waste water and sewage treatment plants: Lessons from South Africa*. Pretoria: Council for Scientific and Industrial Research.

Maunsell, F. 2004. Grey water recycling and rainwater harvesting at Birmingham Eastside. *Feasibility study presented at Groundwork Birmingham, Birmingham, 26 February 2004*.

Mouton, J. 2001. *How to succeed in your master's and doctoral studies.* Pretoria. Van Schaik.

Mukheibir, P. & Ziervogel, G. 2006. *Framework for adaption to climate change in the City of Cape Town*. University of Cape Town, Cape Town.

Murby, L. 2008. Benchmarking. *Chartered Institute of Management Accountants*, 11, November.

Niir Board of Consultants and Engineers. n.d. *Medical, municipal and plastic waste management handbook*. New Delhi: National Institute of Industrial Research.

Niir Board of Consultants and Engineers. 2004. *The complete technology book on vermiculture and vermicompost*. New Delhi: National Institute of Industrial Research.

October, N. 2012. Interview with the researcher on 11 April 2012, Cape Town.

Oelofse, C., Scott, D., Oelofse, G., Houghton, J. 2006. Shifts within ecological modernisation within South Africa: Deliberation, innovation and institutional opportunities. *Local Environment*, 11(1) January: 61-78.

Oelofse, S.H.H., Viljoen, P., Taljaard, S. & Botes, W.A.M. 2004. Discharge of water containing waste emanating from land to the marine environment: A water quality management perspective. Paper presented at the Water Institute of South Africa (WISA) Biennial Conference, Cape Town, 2-6 May 2004.

Oliver, G. 2009. Friend earthworm. Osiran Books, from Google books. Viewed 4 March 2011 from http://books.google.co.za/books?id=J9Jf68PmF0C&printsec=fontcover&dq=friend+earthworm&cd=1#v=onepage&q&f=false.

Ospina, S. 2004. *Encyclopedia of research: Qualitative research*. New York: Sage.

Schell, C. 1992. *The value of a case study as a research strategy*. Manchester: Manchester Business School.

Scott, D. & Barnett, C. 2009. Something in the air: Civic science and contentious environmental politics in post-apartheid South Africa. *Geoforum*, 40(3): 373–382.

Shank, G.D. 2006. Qualitative research: A personal skills approach. Upper Saddle River, N.J.: Pearson Merrill Prentice Hall.

Sivanappan, R.K. 2006. Rain water harvesting, conservation and management strategies for urban and rural sectors. Paper presented at the National Seminar on Rain Water Harvesting and Water Management, Nagpur, 11-12 November 2006.

South Africa. 2011. *Cape Town Routes Unlimited*. *Annual Report 2010-2011*. Cape Town: Government Printer.

South Africa. Department of Economic Development and Tourism. 2011. *Unlocking the KwaZulu-Natal Green Economy*. KwaZulu-Natal: Government Printer.

South Africa. Department of Environmental Affairs and Tourism. 1998. *Guideline Document: EIA Regulations*. Pretoria: Government Printer.

Stipanuk, D.M. & Roffman, H. 1992. *Hospitality Facilities Management and Design*. East Lansing, Michigan: Educational Institute of the American Hotel and Motel Association.

Storck, A. B. 2011. In the green: Eco-friendly practices, even simple ones, are not just "feel-good" things for hotels to do-they can even have a financial impact. *Hotels*: 22, March.

Strange, T. & Bayley, A. 2008. *Sustainable development: Linking economy, society, environment*. France: OECD Publications.

Strauss, A. & Corbin, J. 1996. *Basics of qualitative research: Techniques and procedures for developing grounded theory.* 2nd edition. Thousand Oaks. Sage.

Teddlie, C. & Yu, F. 2007. Mixed methods sampling: A typology with examples. *Journal of Mixed Methods Research*, 1 (1): 80, January.

Thomson, B. & Thomas, C. 2006. *Indirect reuse of reclaimed wastewater for potable supply: Regulatory considerations*. New Mexico: University of New Mexico.

Tongco, M. D. C. 2007. Purposive sampling as a tool for informant selection. *A Journal of Plants, People and Applied Research*: 152.

UNESCO. 2006. *Water: A shared responsibility*. New York: Berghahn Books.

United Nations Environment Program. 2009. *Rainwater harvesting: A lifeline for human well-being*. New York: United Nations Environment Program/SEI.

United Nations ESCAP. 2007. *Study of the role of tourism in socio-economic development*. New York: United Nations.

Van Wyk, J.J., Moodley, P., Brown, S.A.P. & Viljoen, P. 2002. Water quality management in the new millennium towards a national water quality management framework policy for South Africa. Paper presented at the Water Institute of South Africa (WISA) Biennial Conference, Durban, 19-23 May 2002.

Visvanathan, C. & Ben Aim, R. 2000. *Membrane bioreactors in wastewater treatment*. Thailand: Asian Institute of Technology.

Waterplex. 2011. *Eco sac water bladder*. http://waterplex.com.au/product/water-tanks/bladder-tanks/eco-sac-framed-rain-water-bladder-tank-when-it-rains-it-stores/ [10 March 2011].

Welman, C., Kruger, F. & Mitchell, B. 2005. *Research methodology*. South Africa: Oxford University Press.

Woodford, A., Rosewarne, P. & Girman, J. 2006. How much groundwater does South Africa have? Department of Water Affairs and Forestry. Pretoria.

APPENDICES

APPENDIX A: QUESTIONNAIRE FOOD AND BEVERAGE

Dear Participant,

I currently am an MTech Tourism and Hospitality student with the Cape Peninsula University of Technology. Mass environmental movements aim to bring environmental concerns to the attention of the public and include current issues such as a clean environment. The impact of the hospitality industry in this regard is evident in a hotel's excessive water consumption and food waste production. This questionnaire invites you to be a part of a study to analyse the effectiveness of water and food waste recycling initiatives in selected hotels in Cape Town.

Your identity will remain anonymous and by returning the questionnaire, you concede to form a part of the study however, you are under no obligation to do so.

Kind regards

Ruan de Lange

PLEASE CROSS ONE APPROPRIATE BOX FOR EACH QUESTION

BIOGRAPHICAL DETAILS				**X**
Q1	Where is your hotel located?	1	City centre	
		2	Foreshore	
		3	Atlantic Seaboard	
Q2	What is your position in the hotel?	1	Line staff	
		2	Shift leader	
		3	Middle management	
		4	Top management	
Q3	What is your gender?	1	Male	
		2	Female	
Q4	Which age group category do you belong to?	1	10-20	
		2	20-30	
		3	30-40	
		4	Older than 40	
Q5	What is your preferred language?	1	English	
		2	Afrikaans	
		3	Xhosa	
		4	Other	

RECYCLING OF FOOD WASTE				**X**
Q6	How many restaurants does your hotel have?	1	1	
		2	2	
		3	3	
		4	More than 3	
Q7	How do you manage your food waste?	1	Garbage removal	
		2	Food donations	
		3	Earthworm farms	
		4	Other	
Q8	How many wheeled dustbins of food waste do you produce on an average daily basis?	1	1-4	
		2	4-8	
		3	8-16	
		4	17 or more	

Q9	How often is the hotel's food waste collected on a weekly basis?	1	Once	
		2	Twice	
		3	More than twice	
		4	Daily	

Q10	How much do you spend on waste removal on a monthly basis?	1	R1000-R2000	
		2	R2000-R3000	
		3	R3000-R5000	
		4	More than R5000	

Q11	Do you believe your method of waste removal is cost effective?	1	Yes	
		2	No	

Q12	Do you believe that implementing food recycling initiatives in your work environment will benefit the local community and natural environment?	1	Yes	
		2	No	

Q13	Does your hotel have a garden?	1	Yes	
		2	No	

Q14	Does your hotel use earthworm farms to recycle organic food waste?	1	Yes	
		2	No	

Q15	Do you believe that having food recycling initiatives in place will be sufficient, or would you need to constantly monitor your progress?	1	Yes	
		2	No	

INITIATIVES				**X**
Q16	Do you believe there is a link between society and the environment?	1	Yes	
		2	No	

Q17	Do you feel that the government should be playing the predominant role in ensuring your hotel's operations are benefiting the environment?	1	Yes	
		2	No	

Q18	Do you receive training to realise the advantages of recycling food waste?	1	Yes	
		2	No	

Q19	Is this training provided by the hotel or is it outsourced?	1	By hotel	
		2	Outsourced	
		3	Not applicable	

Q20	Do you believe that recycling food waste will make a difference to reducing waste at your hotel?	1	Yes	
		2	No	

THANK YOU FOR YOUR PARTICIPATION

APPENDIX B: QUESTIONNAIRE ROOMS DIVISION

Dear Participant,

I currently am an MTech Tourism and Hospitality student with the Cape Peninsula University of Technology. Mass environmental movements aim to bring environmental concerns to the attention of the public and include current issues such as a clean environment. The impact of the hospitality industry in this regard is evident in a hotel's excessive water consumption and food waste production. This questionnaire invites you to be a part of a study to analyse the effectiveness of water and food waste recycling initiatives in selected hotels in Cape Town.

Your identity will remain anonymous and by returning the questionnaire, you concede to form a part of the study however, you are under no obligation to do so.

Kind regards

Ruan de Lange

PLEASE CROSS ONE APPROPRIATE BOX FOR EACH QUESTION

BIOGRAPHICAL DETAILS				**X**
Q1	Where is your hotel located?	1	City centre	
		2	Foreshore	
		3	Atlantic Seaboard	
Q2	What is your position in the hotel?	1	Line staff	
		2	Shift leader	
		3	Middle management	
		4	Top management	
Q3	What is your gender?	1	Male	
		2	Female	
Q4	Which age group category do you belong to?	1	10-20	
		2	20-30	
		3	30-40	
		4	Older than 40	
Q5	What is your preferred language?	1	English	
		2	Afrikaans	
		3	Xhosa	
		4	Other	

RECYCLING OF WASTE WATER				**X**
Q6	Are you currently harvesting rainwater for reuse in the hotel?	1	Yes	
		2	No	
Q7	Do you have the available floor space to install a water bladder or water tank?	1	Yes	
		2	No	
Q8	Does the hotel have a garden that requires regular watering?	1	Yes	
		2	No	
Q9	How often is the garden watered on an average weekly basis?	1	Once	
		2	Twice a week	
		3	Three to four times a week	
		4	More than four times a week	
		5	Not applicable	

Q10	How is the garden watered?	1	Sub-surface	
		2	Sprinkler system	
		3	Hose or water canister	
		4	Not applicable	

Q11	Are you familiar with membrane filtering to recycle waste water?	1	Yes	
		2	No	

Q12	Do you have control procedures in place to regulate the hotel's water use?	1	Yes	
		2	No	

Q13	Do you have measures in place to regularly determine how much the hotel's water consumption is?	1	Yes	
		2	No	

Q14	Do you have an annual budget for implementing eco initiatives within the hotel?	1	Yes	
		2	No	

Q15	Are you aware that Cape Town currently has a shortage of available surface water?	1	Yes	
		2	No	

INITIATIVES				**X**
Q16	Do you believe there is a link between society and the environment?	1	Yes	
		2	No	

Q17	Do you feel that the government should be playing the predominant role in ensuring your hotel's operations are benefiting the environment?	1	Yes	
		2	No	

Q18	Do you receive training to realise the advantages of recycling waste water?	1	Yes	
		2	No	

Q19	Is this training provided by the hotel or is it outsourced?	1	By hotel	
		2	Outsourced	
		3	Not applicable	

Q20	Do you believe that recycling water waste will make a difference to reducing waste at your hotel?	1	Yes	
		2	No	

THANK YOU FOR YOUR PARTICIPATION