UTILISING SUSTAINABLE TOURISM INDICATORS TO DETERMINE THE ENVIRONMENTAL PERFORMANCE OF SUN CITY RESORT

by

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Declaration

I, Daniel Venter Boshoff, hereby declare that Utilising sustainable tourism indicators to determine the environmental performance of Sun City Resort is my own work and that all sources that I have used or quoted have been indicated and acknowledged by means of complete references.

_____ _____

Daniel Venter Boshoff Date

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Abbreviations

BMS	Building Management System
BOP	Bantustan of Bophuthatswana
BPDM	Bojonala Platinum District Municipality
CSI	Corporate Social Investment
EMS	Environmental Management System
DEAT	Department of Environmental Affairs and Tourism
DSM	Demand-Side Management
DWA	Department of Water Affairs
DWQ	Drinking Water Quality
GEAR	Growth, Employment and Redistribution
GSTC	Global Sustainable Tourism Council
ISO	International Organization for Standardization
INDC	Intended Nationally Determined Contributions
JSE	Johannesburg Stock Exchange
LPG	Liquid Petroleum Gas
MKLM	Moses Kotane Local Municipality
MTCE	Million Tons Coal Equivalent
MWh	Million Watt Hour
NGC	Nedbank Golf Challenge
NWMS	National Waste Management Strategy
OSV	Old Staff Village
RCI	Resort Condominium International
SANS	South African National Standard
SCR	Sun City Resort
SPI	Sustainable Performance Indicator
SRI	Socially Responsible Investment
SV	South Village
UNFCC	United Nations Framework for Climate Change
WWTW	Waste Water Treatment Works

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Chapter 1
Introduction

"What's the use of a fine house if you haven't got a tolerable planet to put it on?"

— Henry David Thoreau

1. 1 Introduction

Without a healthy environment and social and economic growth, sustainability is impossible. We as people on earth need to ensure that all industries that have a major impact on the environment are taken to task to mitigate said impacts. As early as the 1960s people had already raised concerns about the rapid expansion of industries and economies. There is a limit to the earth's resources and by careless use of the scarce resources, they will vanish quickly. The first meeting regarding the environment we live in, United Nations Conference on Human Environment took place in Stockholm, Sweden in 1972, which was attended by 113 countries. The United Nations World Commission on Environment and Development followed in 1983, which was flagged as the first global gathering to address the concerns caused by human greed and uncontrollable use of natural resources (Keyser, 2009). Economic growth and the environment are in many instances contrasting concepts and both are critical to ensure sustainability (Keyser, 2009). Businesses should operate in such a manner that they do not impact on the environment, while still maintaining a feasible economic outlook. Tourism businesses are mostly situated close to attractions that draw people to a certain location. They are in many cases natural or cultural attractions, which means the possibility of impacting on the attraction is fairly certain. The objective is to manage the impacts (economic, social or environmental) in such a way that the attraction will be sustained and available for future generations to enjoy it in the same manner as at present.

The United Nations World Tourism Organization (UNWTO) provides the following definition:

> Sustainable tourism development meets the needs of present tourists and host regions while protecting and enhancing opportunities for the future. It is envisaged as leading to management of all resources in such a way that economic, social and aesthetic needs can be fulfilled while maintaining cultural integrity, essential

ecological processes, and biological diversity and life support systems (Laimer & Öhblöck, 2004).

Responsible tourism is about creating an equilibrium between the environmental, economic and social factors at the host community. It includes factors such as minimising the negative economic, environmental and social impacts. The host communities must benefit from economic growth and increased work opportunities. Responsible tourism also mean that the local communities are included when decisions are made that can affect their lives. It ensure that the natural environmental and cultural heritage is maintained and to provide enjoyable experiences for tourist when interacting with locals. It also means that access for physically challenged people will be catered for and that cultural significance of host communities will be protected (Cape Town Declaration, 2002).

Sustainable tourism development guidelines and management practices are applicable to all forms of tourism in all types of destinations, including mass tourism and the various niche tourism segments. Sustainability principles refer to the environmental, economic and socio-cultural aspects of tourism development, and a suitable balance must be established between these three dimensions to guarantee the long-term sustainability of tourism (UNWTO, 2004b). Figure 1.1 indicates the three dimensions of sustainable tourism and how they interconnect. More and more companies are required to report on their sustainability performance by including environmental and social dimensions in their annual reports. A sustainable tourism destination cannot exist with only one or two of the sustainability dimensions. A successful tourism business cannot be built on a polluted and degraded area of land, just as a business cannot operate without local knowledge and expertise. Therefore, all the dimensions must be given equal consideration and dedication by management.

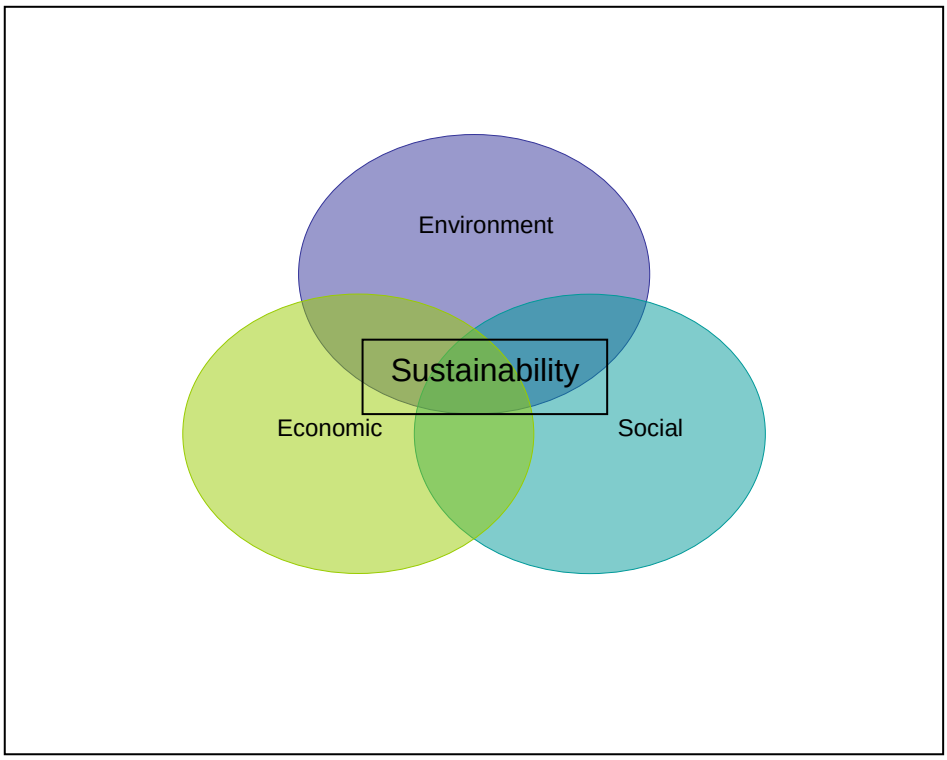


Figure 1.1: Three dimensions of sustainable tourism (adapted from Parkin, S., Sommer, F. & Uren, S., 2014)

1.2 Sustainable development

Since the idea of sustainable development emerged, it has had a significant influence on the manner in which people perceive themselves as part of the environment. More people are now aware of what they do, where they do it and what the impacts may be (Mearns, 2012). Tourism is seen as an integral part of the economy worldwide and the cornerstone of many national and local economies. Tourism destinations are becoming increasingly aware of the need to align their economic objectives with the social and natural environment (Keyser, 2009). A destination is defined as a physical place in which a visitor spends at least one overnight. It broadly refers to an area where tourism is a highly important activity and where the economy of the area relies on tourism revenues (Jamwal, 2015). Communities have established on the boundary of Sun City because of the resort being a major employer. Sun City is therefore regarded as a tourism destination.

1.3 The sustainability of tourism destinations

Due to the rapid increase in the worldwide population in the last century, there are now more people travelling across the globe. In order to meet the increased

demands of the travelling community, more accommodation and facilities must be developed on land that is becoming scarce, especially close to major attractions. Weaver (2001) defines mass tourism as “large-scale, externally controlled and concentrated high density tourism strips”. Mass tourism is inherently unsustainable, can severely impact on the natural resources of the area, as well as the social aspects, if not managed properly (Weaver, 2001). If a tourism business maintains a balance between its economic, social and environmental aspects, it will be sustainable and should be able to continue to operate for many years to come. This study entailed an investigation into the environmental aspects of a tourism business and how the mass tourism destination achieves sustainability with high guest demands on natural resources (energy and water) and the generation of waste. Sun City Resort (SCR) as a mass tourism destination consumes large quantities of resources, and an Environmental Management System (EMS) is an essential part of its daily operations to reduce the impact of tourism. An EMS will allow a tourism business to understand its impacts on the environment and how effectively it is managing and reducing these impacts. It allows the business to set objectives and targets to minimise the impacts and guide employees with policies and procedures to comply with best practices and legislation. In addition, it allows management to check the effectiveness of the system with audits and management review processes and to implement new strategies to mitigate anomalies. Annual reports are submitted as part of the requirements of a public company and these must include all three spheres of sustainability. If the EMS is functioning well, certification is awarded through an accredited certification bodies to prove to the public that while they are on holiday, their impacts are reduced where possible. Certification is defined by the International Organisation of Standardization (ISO) as “the provision by an independent body of written assurance that a product, service or system in question meets specific requirements.” Tourism destinations can also enter responsible tourism awards to use for marketing purposes and to motivate employees to continue to build on the current EMS. See Figure 1.2 below for a process flow diagram on sustainable development of a tourism destination from an environmental performance point of view.

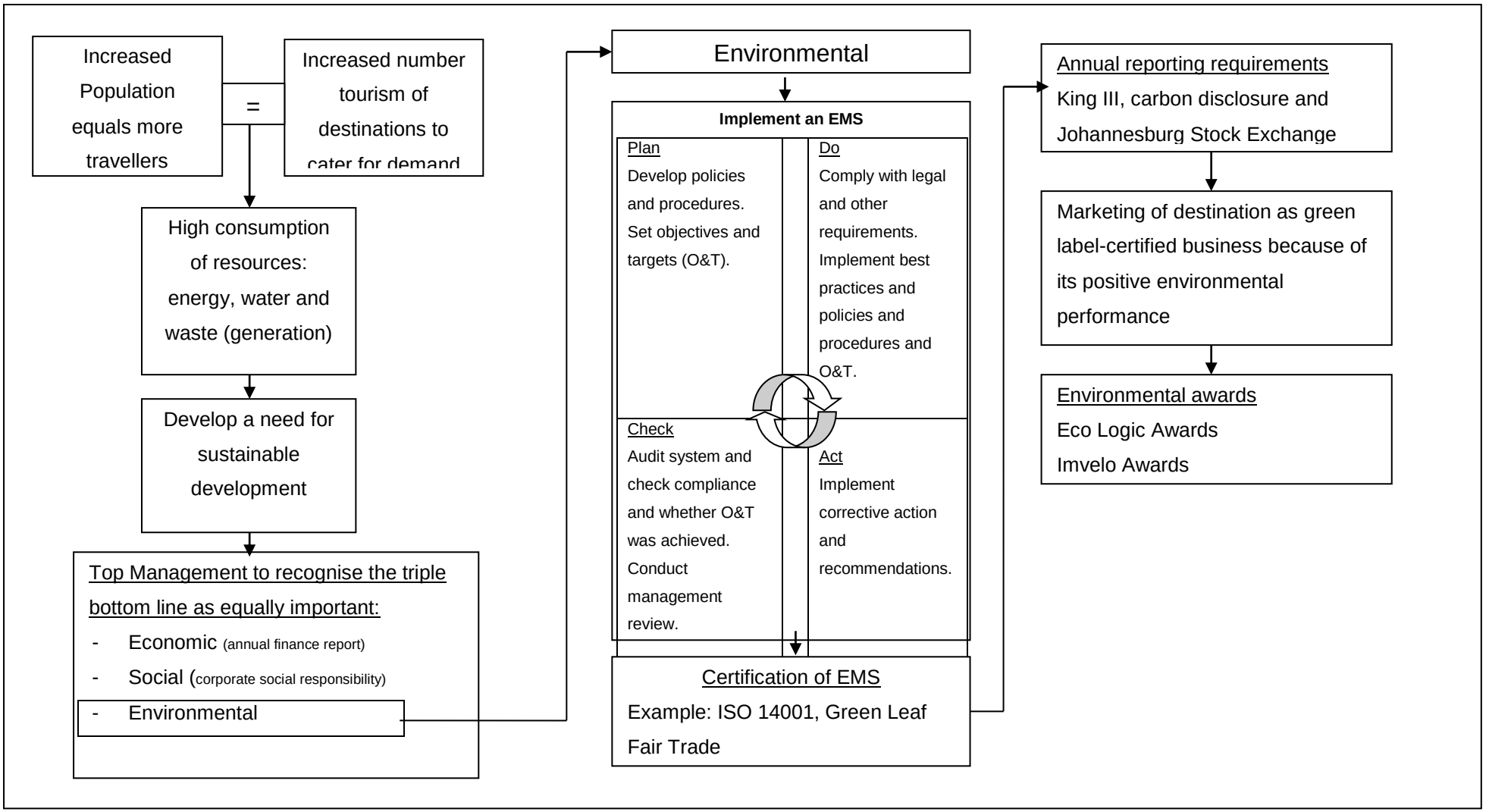


Figure 1.2: Sustainable development process of a tourism destination from an environmental performance point of view

If a tourism destination can prove that it is sustainable in all three spheres of the triple bottom line, it should have a good financial statements, supportive to the local communities and employees and sound environmental performance. The researcher investigated the environmental management aspects of SCR to determine the level of SCR's performance in the environmental dimensions of sustainable tourism with specific focus on energy, water and waste management because it accounts for the most significant environmental impacts.

1.4 Research question and problem

The research question of the study was formulated as follows:
What is the environmental performance of SCR in relation to energy, water and waste management?

The research problem was the following:
Establish how well SCR is performing with regard to environmental management. The problem is that there is not much published theory on environmental management for mass tourism destinations in South Africa. By determining the performance of SCR, it can be compared to international benchmarks to indicate its level of performance.

1.5 Aim of the study

The study aimed to determine the environmental performance of SCR by utilising UNWTO sustainable tourism core indicators in terms of energy, water and waste.

1.6 Objectives of the study

The objectives formulated for this study were to:

1. determine and analyse the energy consumption of the five accommodation areas and SCR as a whole
2. determine and analyse the water consumption of the five accommodation areas and SCR as a whole
3. determine and analyse the solid waste and waste water generation and recycling (sewage treatment) efficiency of SCR
4. investigate the perception of staff of SCR's energy and water consumption and waste generation and recycling

5. investigate the perception of guests of SCR's energy and water consumption and waste generation and recycling
6. make recommendations for the improvement of the environmental performance of SCR in terms of energy, water and waste management.

The five accommodation areas referred to above are the four hotels and Vacation Club on Sun City.

The results derived from the study may be used to aid managers in making informed decisions on the environmental strategies of SCR. The study also yielded recommendations to management to assist in long-term planning to improve the environmental performance of the destination.

1.7 Methodology

1.7.1 The approach to the study

The approach to the study entailed a combination of quantitative and qualitative research designs. Combining the two approaches builds on the strengths of both and concurs with Lötter's (1995:4) view that quantitative and qualitative research is, in fact, a complex continuum (Schulze, 2003). The study was a descriptive, exploratory and evaluation research study, as described by Mouton (2009).

1.7.2 Research design

The research design entailed exploratory and evaluation research to reach the six objectives of the study. Quantitative and qualitative methodologies were used to obtain data from primary and secondary data sources and questionnaires were compiled for guests and staff to obtain qualitative data. Figure 1.3 is an illustration of the research approach that was followed in the study.

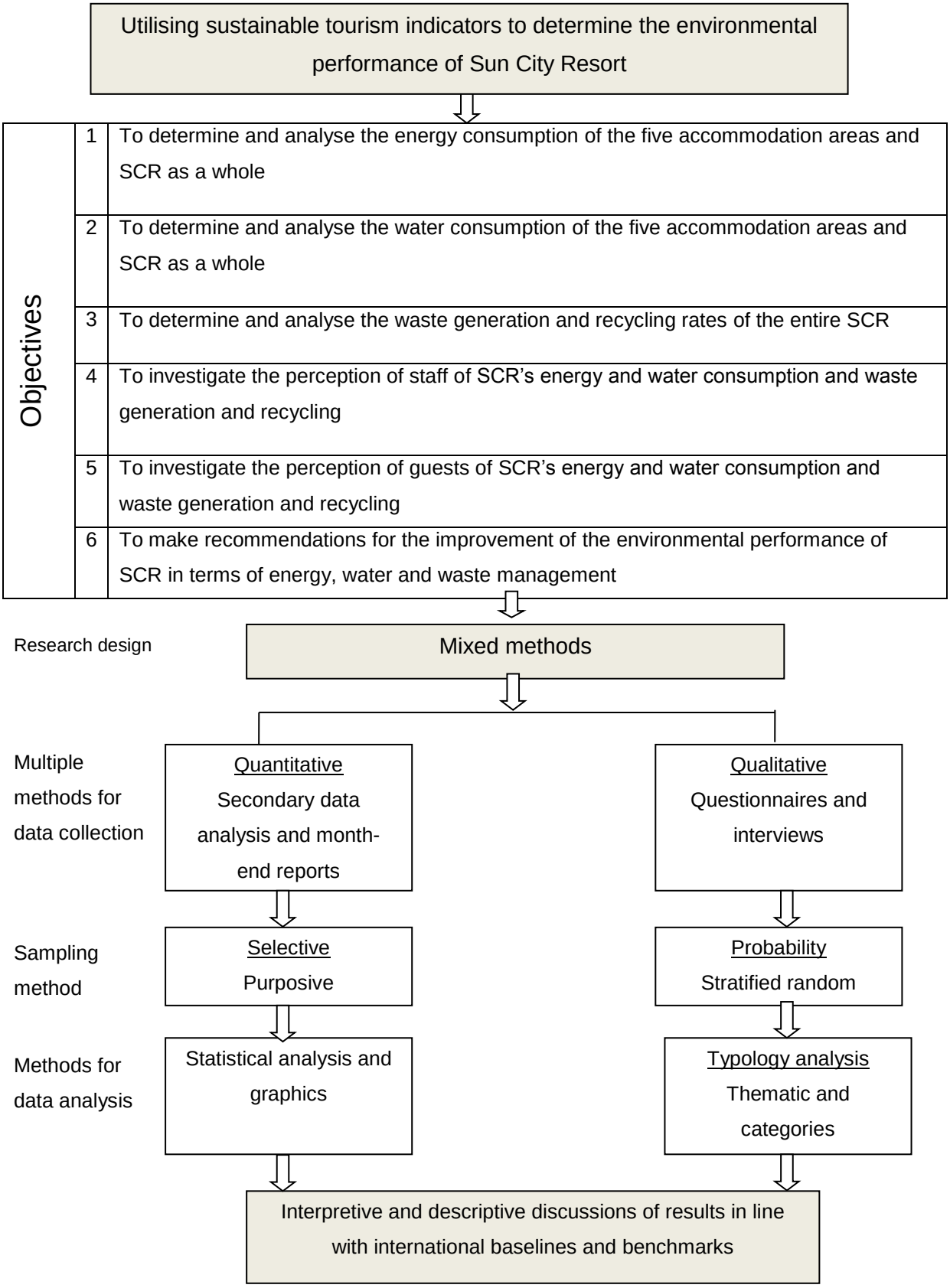


Figure 1.3: Research design for the study

1.8 Scope of the study

1.8.1 Study area

SCR consists of four hotels and a self-catering holiday resort, titled the Vacation Club. The resort also has two golf courses, namely the Gary Player Country Club and the Lost City Country Club. The three staff housing complexes comprise 740 units. The 1 683 guest rooms at SCR along with the staff units can accommodate a total of 7 339 people. The Valley of Waves and the Entertainment Centre are two of the most visited attractions for both day visitors and hotel/overnight guests. The Valley of Waves is a waterpark with a man-made wave pool that simulates wave action. It also have various tube and body slides and food and beverage outlets. The Entertainment Centre houses the superbowl which is a 7500 seater event venue and conference area. It is also a central hub for day visitors with many retail and food outlets.

1.8.2 Indicators on Sun City Resort

SCR is most definitely a city, with the infrastructure as well as the challenges that a small town would have to endure considering that its annual visitor numbers exceed two million (Buhrmann, 2010). The resort does not have its own governmental structure but it does manage the same infrastructure (landfill site, water services, WWTW and electrical network) equivalent to small towns. A recent study conducted by the University of Memphis, Centre for Resort and Hospitality business over 18 month with executives from 120 destinations in three continents, a resort must have certain attributes to qualify as a resort. As a minimum, a resort must have six attributes to be called a resort. These are: 1) Provide one signature amenity or anchor attribute, 2) Provide five secondary recreation/ leisure/ entertainment experiences, 3) Provide one full-service food and beverage outlet, 4) Bed-base must include short term or overnight lodging, 5) Minimum of 25 rooms or other accommodations and 6) Emphasise a leisure or retreat-environment experience (Brey, 2009). There are four major types of resorts. Namely a Destination Resort, Intermediate Resort, Intermediate Access Resort and a Specialised Resort. SCR matches the Destination Resort definition, which is defined as a property seen as a resort in the truest sense. A destination resort must have: 1) Four signature amenity or anchor attribute, 2) Provide fifteen or more secondary recreation/ leisure/ entertainment experiences, 3) Provide three full-service food and beverage outlets

that serve more than two meals a day, 4) Must have a spa/health/wellness amenities, 5) Multiple shopping outlets and 6) Variety of lodging options: In response to the above, Sun City Resort has: 1) the Valley of Waves, the Superbowl, a large casino, a recreational lake for water sports and a two kilometre Zipslide, and an Entertainment centre as a signature amenities, 2) Fifteen other facilities include the two golf courses, crocodile farm, aviaries, The Maze, a helipad, a cultural village, shebeen bar, GameTrackers game drives and hot air balloons, multiple walking trails, Segways tours, outdoor adventure centre, Adrenalin Extreme, Kings Tower, Wedding Cazebo and Kamp Kwena Kids entertainment area. 3) The resort has over 44 restaurants and various bars. 4) Guest can overnight as long as they wish. Vacation Club units work on a timeshare system. 5) SCR has the Gatsby Spa with a gym and a hair salon. There is a spa at the Palace as well. 6) SCR has 1301 rooms in four hotels and a 382 unit self-catering Vacation Club.

Due to the number of facilities on SCR, the impact on the environment could be quite significant. The resource demand for the resort is based on that of a small town and not a single hotel. It is therefore increasingly important to implement programmes or use tools to determine the consumption rates and ultimately the environmental footprint of the destination. In any destination, the best indicators are those that respond to the key risks and concerns regarding the sustainability of tourism and also provide information that can help clarify issues and measure responses (UNWTO, 2004a).

Indicators are to be used as a central instrument for improved planning and management, bringing managers the information they need, when it is required and in a form that will allow better decision making (UNWTO, 2004a). There are three basic functions for indicators, namely simplification, quantification and communication. Indicators generally simplify in order to make complex phenomena quantifiable so that information can be communicated (UNWTO, 1995).

1.9 Chapter breakdown

The study includes the following chapters:

Chapter 1: This chapter provides the background and rationale of the study, followed by a section that described the research problem, aim and objectives. The research design and methodology were then discussed briefly, followed by a chapter breakdown and a conclusion.

Chapter 2: This chapter covers a literature review to gain understanding of the information available in the research world and to identify gaps, which this study attempted to address.

Chapter 3: This chapter covers the study area and detailed information of SCR. It includes background information on the location and a section that describes each hotel and gives an overview of the EMS.

Chapter 4: This chapter describes the research design and methodology of the qualitative and quantitative data collection.

Chapter 5: This chapter reports on the findings of the study and the analysis of the results.

Chapter 6: This final chapter presents the synthesis, recommendations and conclusion of the study.

1.10 Conclusion

The aim of the study was to utilise sustainable tourism indicators to determine the environmental performance of SCR. Chapter 2 elaborates on the sustainability of tourism destinations with specific focus on environmental aspects and impacts of operations. The researcher describes the process to achieve sustainability, from planning an EMS to ultimately achieving certification.

CHAPTER 2
LITERATURE REVIEW

2.1 Introduction

A literature review forms an integral part of any research study and gives context to the research topic. It creates the links between historical studies and the current research. By reviewing the available theory, gaps can be determined to justify the planned research (Boote & Beile, 2005). In this chapter the researcher investigated the tourism industry and the growth that was achieved from 2010 to 2014. The impact of tourism on the environment and the steps tourism destinations are taking to become more sustainable were investigated. The methods for measuring sustainability indicators and ultimately the process of achieving certification are also discussed.

2.2 Conceptual framework

The conceptual framework outlines the literature review chapter structure and content, as illustrated in Figure 2.1. First, the status of the current global travelling population was determined, as well as where they travel to. This was followed by an in-depth overview of the South African tourism industry, tourist arrivals and annual tourist arrival growth. SCR is internationally renowned as one of Africa's premier holiday resort (SA-venues, 2016) and deemed to be one of the mass tourism destinations in South Africa. Tourism, and in particular mass tourism destinations, have a variety of impacts on the environmental, social and economic aspects of the destination. The focus of this study was to look at the environmental aspects only. To determine the impacts, they have to be quantified, and to this end an EMS assists with identifying the activities with environmental impacts, managing the impacts and looking at the performance of the destination in terms of how well it managed to reduce the impact year on year. The performance of the destination can be determined by measuring against international benchmarks and standards and opting for voluntary certification to place a mark on its environmental performance**.**

South Africa has a short history of development of responsible tourism standards and guideline documents. The country has also implemented corporate governance requirements to force companies listed on the stock exchange to report on their triple

bottom line, namely environmental, social and economic aspects, and not only their financial performance.

UNWTO developed a list of indicators that is a useful tool for tourism destinations to measure their sustainability performance. In order to use the indicators effectively, data are required. The resource management section (Section 2.9) gives an overview of the quantitative data that were used, namely energy, water and waste. The qualitative data were derived from guest and staff questionnaires on their perception of resource use. The perceptions of people can be influenced by effectively communicating the successes of the EMS. Similarly, the consumption of resources and impacts of tourism can be reduced by responsible tourists who are conscious of their impacts while travelling. The results from the indicator analysis will evaluate the environmental performance of the destination.

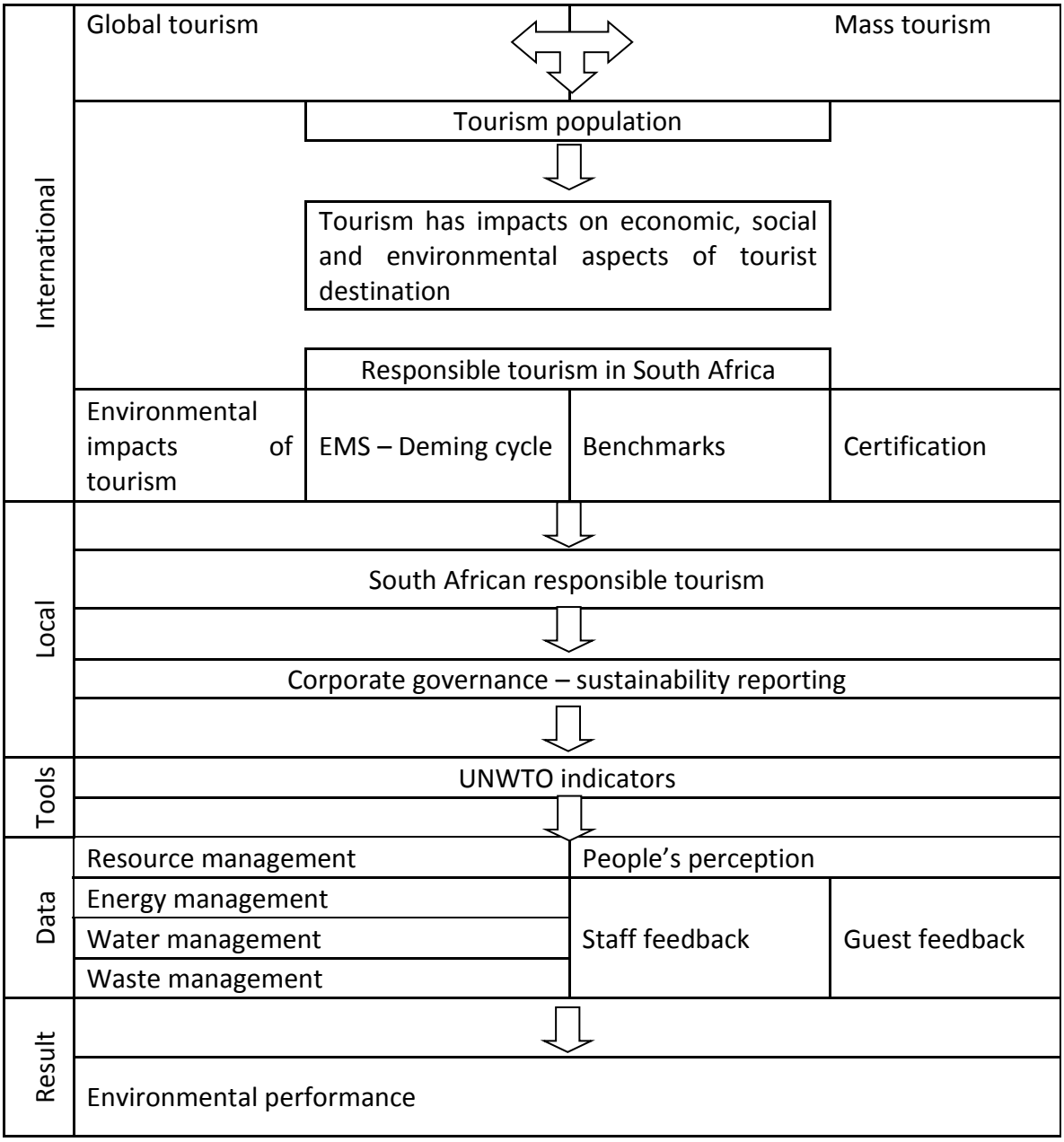


Figure 2.1: Conceptual framework of literature review

2.3 Global tourism

Many countries across the globe use tourism as a key driver for infrastructure development, increased export income and job creation. Since the 1950s, tourism has continued to grow rapidly, not only in the number of travellers, but also in the diverse forms of tourism. In the last few decades rural tourism, ecotourism and agritourism have emerged, to mention a few. Popular holiday destinations such as Europe and North America now have to compete with other destinations offering travellers a different experience. Despite irregular impacts such as financial

recessions, international tourist arrivals across the globe have continued to grow from 25 million tourists in 1950 to 278 million in 1980. Tourist arrivals continued this upward trend and increased dramatically from 528 million in 1995 to 1 078 billion in 2013 (UNWTO, 2014).

Passports are stamped with ever-increasing rate. It is estimated that 1.6 billion tourists will travel the globe annually in 2020, which is twice as many as in 2009 (Ringbeck, 2009). Globally, tourism is regarded as one of the international engines of development. Many countries hosting international sporting events invest billions of dollars in sporting arenas, road, water and electricity infrastructure, which provides improved infrastructure after the event for citizens. Every year, more people are travelling than previous years. When proper planning is done for the influx of tourists to a destination, it could positively affect the destination's socio-economic and environmental aspects, but it could also cause the opposite when poorly managed, leading to the exploitation of indigenous people and widespread environmental degradation (UNWTO, 2004a).

International tourist arrivals (overnight visitors) grew by 5% in 2013 to 1 087 million arrivals worldwide, up from 1 035 million in 2012, which marked the first time that the 1 billion mark was exceeded. Despite a global financial crisis, the demand for international tourism has increased, with an additional 52 million international tourists travelling internationally in 2013. In 2013, 29 million more international tourists visited Europe, which raised the total to 563 million. Growth of 5% was double the region's average compared to the previous seven years (UNWTO, 2014).

Asia and the Pacific recorded a 5% increase in tourist arrivals, which is an increase of 13 million travellers, totalling their arrivals at 263 million (UNWTO, 2015). Africa saw an increase of 5%, equivalent to 3 million more tourists, reaching 56 million. In the Americas, international arrivals grew by 3% to 168 million, or an increase of 5 million. The Middle East (0%) has not yet succeeded in returning to growth, even though some destinations performed rather well and others saw a moderate recovery. According to UNWTO (2015:1), "international tourist arrivals reached 1,138 million in 2014, a 4.7% increase over the previous year, according to the latest

UNWTO World Tourism Barometer." For 2015, UNWTO forecasted international tourism to grow by 3% to 4%, further contributing to the global economic recovery.

Africa has continued to show a positive growth by attracting 5% more international tourists in 2012 compared to 2013. This means that 3 million more tourists travelled to the continent in 2014, compared to the 53 million in 2013. The 50-million mark was first achieved in 2012. The region's tourism receipts grew to USD 34 billion, which is a 3% share of the world total with a corresponding increase to 5% of the world total. North Africa showed 6% growth in 2014, which is slightly above the world average of 5%, while Morocco was the first country in Africa to reach the 10-million tourist arrival mark, managing a 7% growth. Other notable achievements in sub-Saharan Africa was Seychelles (+11%), Gambia (+9%) and South Africa – the largest destination on the continent with 4% growth. Uganda, Mauritius and Zimbabwe all achieved a growth rate of 3% and less in 2014 (UNWTO, 2014). South Africa is 1% behind the international average growth of 5% and continues to show positive growth year on year. The total domestic and international tourist arrivals in South Africa in 2012 was 35 291 559, much more than the 19 185 135 recorded in 2000, showing a remarkable growth margin of 84%. A larger annual increase in tourist arrivals was noted in 2012 with 10.2% more than in 2011. According to StatsSA 90.4% (8 310 456) of the 9 188 368 tourists indicated that their reason for travel was for holiday purposes (Stats SA, 2012).

From the above it is clear that the tourism industry in South Africa is growing at a phenomenal rate, which requires tourist destinations to manage the impacts of tourism in a responsible manner. Tourism will impact on the natural resources of the area tourists travel to (environment), the communities may benefit by means of socio-economic development through job creation and exposure to foreign cultures (social) and businesses could generate income (economic).

The more tourists a destination attracts, the higher the level of importance to manage its impacts on the environment. Mass tourism destinations therefore require dedicated teams of people that solely perform the task of environmental

management to reduce the destination's environmental risk. For the purpose of the study the focus was on the environmental aspects of sustainability.

2.4 Mass tourism

There are many forms of tourism in the world. These range from business, religion, family and travel tourism, which have always been the norm. In the last decade more forms of tourism have transpired to suite more specific focuses as requirements and preferences have changed from tourist to tourist. Tourism in the 1950s and 1960s was seen as an industry with minimal impact (Jafari, 1989). This meant that the higher the tourist arrivals were to a destination, the better, in turn making mass tourism seem like the ideal option for tourism. In the 1970s this way of thinking was made unpopular by academics who portrayed the tourism industry as a monster who will have severe impacts on the environmental, economic and socio-cultural aspects of destinations around the world. Mass tourism soon become known for the impact it has on the host destination especially in developing countries or secluded areas (Jafari, 1989).

Due to the image in which mass tourism was labelled, most considered it to be destructive and unsustainable. Because of this alternative tourism markets were established, such as ecotourism and agritourism, which had a deeper focus on sustainable development and the natural environment, and not cultural attractions. Ecotourism is the "*responsible travel to natural areas that conserves the environment, sustains the well-being of the local people and involves interpretation and education (TIES, 2015).*" A form of ecotourism that has been practised for many years is that tourists flock to national parks and protected natural areas (Clarke, 1997). This niche market was formed for the more environment-conscious travellers who base their holidays on experiencing natural wonders with minimal impact on the environment as opposed to the luxuries of an upmarket hotel.

Establishing whether a tourism product or service is good or bad does not depend on the size, but on the management of the destinations and how effectively environmental principles are implemented to reduce impacts. This means that small tourism destinations can be more unsustainable and damaging to the environment than larger destination if they are not managed effectively (Butler, 1990).

When the possibility of sustainable mass tourism is acknowledged, there is no longer any basis for contending that mass tourism and ecotourism are inherently incompatible. It is because of this perception that alternative tourism niche markets for ecotourism-and-mass-tourism combinations, known as resort ecotourism, have developed (Ayala, 1996). Mass tourism destinations yield higher occupancy in the tourism industry compared to small lodges, which means a higher income, and are therefore better positioned to implement sustainable practices because of their internal economies of scale. For example, a larger resort is more likely than a small hotel to recruit employees to manage environmental and social issues in a highly professional manner and carry out environmental audits to measure the effectiveness of their management system. The sheer volumes of recyclables generated allow them to implement profitable recycling, feasible resource-reduction products or technologies and other measures that are coherent with the goals of the sustainability (Weaver, 2001).

Due to inter-competition among hotels on Sun City Resort to reduce resource consumption and be more sufficient, they are applying new strategies to demonstrate and improve their environmental performance. Newer technologically advanced and environmentally friendly equipment and products often used by the hotel industry are implemented as equipment and products are replaced. It is more evident in new developments, which forms part of the development of sustainable destinations. For instance when retrofitting light globes, they are replaced with energy efficient alternatives. Changes brought in by environmentally conscious managers are vital to achieve a sustainable destination label. According to Karthik (2002:1), “[t]his can be achieved by effectively employing a benchmarking process that helps the entire sector in managing those elements of their activities, products and services that can significantly impact the environment”. The impacts of tourists will also be determined by the type of tourism destination and the size and range of facilities and activities.

2.5 Managing environmental impacts of tourism

2.5.1 Impacts of tourism

According to Sunlu, (2003), “[n]egative impacts from tourism occur when the level of visitor use is greater than the environment’s ability to cope with the use within acceptable limits of change”.

Tourism in natural areas is often kept to a minimum in order to preserve the natural beauty of the environment, because when the site’s capacity to host tourist is exceeded it leads to congestion, which in turn will show an increase in environmental impacts such as pollution, habitat loss, increased pressure on vulnerable and endangered species and land degradation. It puts more stress on resources such as water and energy to a point where tourists will compete with local populations (UNEP, 2001). History has proved that population growth could have devastating effects on the environment with the exploitation and depletion of natural resources and environmental degradation. For example, these are caused by over-utilisation of fishing areas and grazing land, habitat loss due to development and overpopulation, which have dramatic effects on water and energy consumption and leads to increased waste generation (Schmidt-Traub & Sears, 2005). Many destinations around the world are under pressure in terms of their socio-economic, cultural and natural environments because of tourism growth that is not managed properly, especially when based on short-term priorities and events. Unsustainable practices such as congestion of tourist attractions with high volumes of tourists will result in damages to the environment that will be difficult to mitigate (Kotze, 2002).

In order to understand the impacts and performance of a tourism business, the relevant aspects and impacts must be defined and recorded. The environmental performance of a business can only be determined if it is measured. Many companies are becoming increasingly aware of the importance of adopting tools or metrics to effectively measure their operations and activities. Many of the activities tourists do each day have environmental impacts and managing these impacts are costly if it is done in compliance with legislation. The environmental cost of certain aspects can force companies to seek environmentally friendly alternatives in order to reduce the management cost of said impacts. There are four main pressures linked to environmental cost, namely market-related, regulatory and public pressures and

those that the company implements as a best practice, called voluntary initiatives. Examples of the latter include the International Chamber of Commerce's Business Charter for Sustainable Development, or international management system standards, such as the International Organization for Standardization (ISO) 14001, and the Eco management and Audit Scheme (GEMI, 1998).

The severity of impacts can only be determined if they are measured against a baseline set obtained from historical data. When indicators are utilised to measure environmental quality and not environmental impacts, benchmarks are required to illustrate changes from data in the past. Benchmarks can also be used when measuring environmental degradation or management across multiple destinations or business outlets nationally or globally. Buckley (2003:56) explains as follows:

> [I]f indicators of different types are to be aggregated to yield an overall comparative measure of environmental quality, impact or management performance, they must first be expressed as numerical measures with similar means, range and variance; and normalisation against a benchmark is generally the first step.

2.5.2 Environmental Management Systems

The implementation of an EMS is often required as tourism destinations expand. The impact on the natural resources of an area is directly linked to the number of tourists visiting the destination. It is therefore vitally important to implement an EMS in a destination showing positive growth annually. An EMS is an organisational approach to environmental management. The aim of an EMS is to provide a structured framework to manage the company's environmental impacts and achieve continual improvement each year. The ISO system is based on the Plan, Do, Check and Act (PDCA) cycle (Moen, 2009) illustrated in Figure 2.2 below.

The company establishes an environmental policy that describes the direction that the business wants to move towards. It then continues to planning on how to achieve the statements made in the policy, followed by an implementation plan into the operations and an effective monitoring and measurement schedule by means of internal and external audits, management reviews and quantified resource data.

When scrutinising the data and audit reports, corrective action plans are issued to non-conforming sectors of the business to yield greater compliance and ensure that continual improvement is achieved. Management reviews are done after the cycle to review the effectiveness of the system, after which the process starts again.

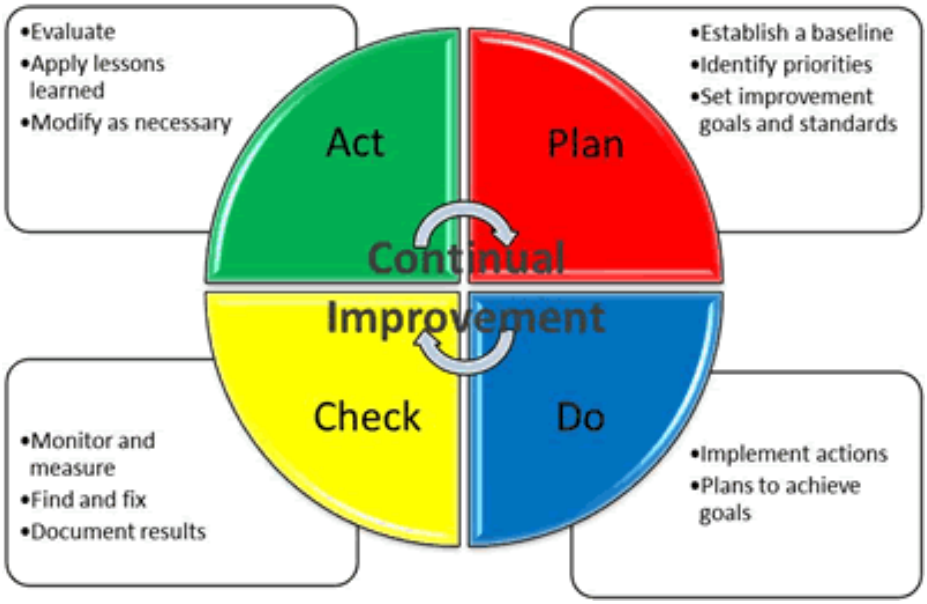


Figure 2.2: PDCA cycle (Pretorius, 2010)

The aim of Sun City's EMS as per the Sustainability Policy is to reduce the impacts on the environment through improved processes to conserve water and energy, reduce waste generation, prevent pollution and create awareness to gain support from staff and guests (See Fig 3.10). There are various EMSs available that companies can voluntarily subscribe to. All standards set out specific requirements that need to be fulfilled by an organisation that is implementing an EMS, which must be verified by an external accredited party. ISO 14001 is an EMS series that deals with the process of environmental management, although it is not confined specifically to the hotel industry (Hotel Energy Solutions, 2011).

Specific knowledge is required by the environmental managers to understand the link between tourism activities and their effects on the natural, built, socio-cultural and economic surroundings. By collecting and using data based on this knowledge, changes can be monitored and decisions can be made to reduce risks to the business and the destination (GSTC, 2008). These indicators ultimately give rise to global baselines or benchmarks against which to measure a tourism destination's

operations. Benchmarking is a standard by which something can be measured or judged and allows a company to compare itself against others in its industry sector (GSTC, 2008).

2.5.3 Set baselines or benchmarks

A simple type of benchmarking or baseline measure is to compare an organisation's performance against the average number of events in a particular category for the industry as a whole (GEMI, 1998). Baseline measurements are a measure of the status quo of the indicator at the start of the period and progress is measured from the baseline (George Municipality, 2008). Sustainable tourism certification bodies utilise baselines to measure the environmental, economic and social sustainability of tourism destinations and to certify them according to their performance. According to H.J. Harrington, "[m]easurement is the first step that leads to control and eventually to improvement. If you can't measure something, you can't understand it. If you can't understand it, you can't control it. If you can't control it, you can't improve it" (Goodreads, 2014:1).

2.5.4 Certification

Companies can voluntarily apply for certification from reputable and accredited bodies for their products or services in order to reassure their customers that their products or services meet a certain standard and that they can be comfortable with their purchase. Upon certification, the company will receive a logo from the accredited body for marketing purposes (Bien, 2003). Certification is a fairly new phenomenon in the tourism industry and is based on measuring the quality of the tourism offering or aspects of the destination individually (Mahony, 2007). Aspects such as environmental performance (energy, water, and waste management) guest experience, community socio-economic improvement programmes, health and safety and food safety are certified. Once the aspect is certified, it must be retained, which means the company will provide resources to manage it properly and ensure continual improvement. Promoting the business as being certified on its environmental performance will attract certain markets of guests that are ecologically orientated (Dodds, 2005:4). Certification schemes use two main approaches to assess hotel performance. The first focuses on the environmental performance of the hotel as measured through a small set of benchmarking values (e.g. energy

consumption per overnight stay) and the second uses a list of environmental measures of which a certain number have to be undertaken by the hotel in order to obtain the certification. Some schemes use a combination of these two approaches (Hotel Energy Solutions, 2011). The impact of the certification on the hotel sector and to what extent it influences the consumer's choice are often debated. However, green awareness and certification is becoming more and more mainstream, and hoteliers must consider consumer demand in relation to this increase of public awareness of environmental concerns (Baylor, 2016) Conference and event organisers are scrutinising the environmental performance of destinations and use this as a major factor in deciding on where to host meetings, incentives, conferences and events, because it will impact on their clients' environmental policies and corporate responsibility. Eco-labels and certificates are helpful tools that can positively change the tourism market and encourage improved environmental performance (Hotel Energy Solutions, 2011). The most common certification standard for environmental management is ISO14001. ISO 14000 is a family of standards provides practical tools for companies and organisations of all kinds looking to manage their environmental responsibilities (ISO, 2015). It is developed by a technical committee known as TC 207 which is a group of experts in the field of environmental management across the world. Green Leaf is a sustainability and certification assessment tool for the performance management of any international organisation or property (Green Leaf, 2015). Green Leaf is based in South Africa.

There are many different standards that guide the tourism industry in South Africa, including benchmarking and reporting initiatives, independently reviewed certification and award schemes, general principles and codes of conduct (Mahony, 2007). Globally more than 30 diverse organisations and businesses with a good understanding of sustainable tourism have formed a non-profit organization known as the Global Sustainable Tourism Council (GSTC). The standards developed by the forum aims to be the minimum that all sustainable tourism business should aspire to achieve. During the development of the council's criteria, which took about two years, various leading tourism experts, academics and members of the tourism industry and public were involved in an extensive consultation process. With forums such as GSTC publishing standards to which tourism companies need to adhere to,

certification and benchmarking bodies will be able to measure tourism businesses' environmental performance against international standards.

It is common for companies to collect environmental, social and economic information during their operations. The challenge is to break down and analyse the information to determine the performance of the company so that management can make decisions based on this. A sustainable performance indicator (SPI) is a tool that can be used for this purpose. SPIs can be used separately to determine the environmental, social or economic dimensions of sustainability (DANTES, 2005).

2.6 South African performance on responsible tourism standards

Tourism in South Africa is regarded as an industry with high potential to create jobs and alleviate poverty. In 1996 the Department of Environmental Affairs and Tourism (DEAT) published a white paper on development and promotion of tourism. Government then followed with the Tourism in Growth, Employment and Redistribution (GEAR) strategy document, which emphasised that tourism should be government-led, private sector-driven, community-based and labour-conscious (Goodwin, Spenceley & Maynard, 2005:5). Subsequently, the former DEAT developed national guidelines for responsible tourism and a responsible tourism manual in 2002. The National Tourism Sector Strategy (2010) has as its vision "boldly growing responsible tourism together to deliver memorable experiences for all our tourists and sustainable benefits for all South Africans" (SABS, 2011:3). In 2011 the South African Bureau of Standards published the South African National Standard (SANS) 1162: responsible tourism requirements (SABS: 2011), see Table 2.1 below for a graphical presentation of the timeline.

Table 2.1: Sustainable tourism timeline in South Africa

The guidelines are voluntary and tourism operators are encouraged to select aspects in the guidelines that are applicable to their operation and to develop a responsible tourism management plan and a policy statement. It is self-evaluated and monitored

and because it is unclear whether employees have the capacity to perform these tasks, the credibility of the guidelines has been questioned by industry experts (Mahoney, 2007).

2.7 Corporate governance: Sustainability reporting

SCR can use its environmental performance status for marketing and Global Reporting Initiative report-writing purposes.

The aim of the King Committee, as with King I and King II, the King III, was to promote governance internationally by focusing on the importance of reporting annually on how a company has both positively and negatively affected the community in which it operates (Kana, 2009). There are five main principles included as part of the King III executive guide. According to the guide, one of these principles states that sustainability is now the primary moral and economic imperative and it is one of the most important sources of both opportunities and risks for businesses. It also shows the obvious and complicated links between nature, society and business that need to be understood by decision makers (Kana, 2009).

SCR, as part of Sun International, is listed on the Johannesburg Stock Exchange (JSE), and must prescribe to the Social Responsible Investment (SRI) Index. Each year JSE-listed companies must report on their performance with regard to social and environmental performance. Sun International scored the highest on the JSE compared to other tourism companies such as City Lodge and Wilderness Safaris (Hunter, 2013).

2.8 The United Nations World Tourism Organization: List of core indicators for sustainable tourism

Indicators are information sets that are formally selected to be used on a regular basis to measure changes that are of importance for tourism development and management. They can measure 1) changes in tourism's own structure and internal factors, 2) changes in external factors that affect tourism, and 3) impacts caused by tourism (UNWTO, 2004a). UNWTO has developed a set of core indicators in 2004 as a general toolkit to measure the sustainability of tourism organisations (see Table 2.2 below).

Table 2.2: The 10 core indicators of UNWTO (UNWTO, 2004a)

	Core indicator	Supplementary indicators
1	Local satisfaction with tourism	I. Local satisfaction level with tourism (questionnaire)
2	Effects of tourism on communities	I. Ratio of tourists to locals (average & peak period/days) II. % who believes that tourism has helped bring new services or infrastructure (questionnaire-based) III. Number & capacity of social services available to the community (% that is attributed to tourism) IV. Sustaining tourist satisfaction V. Level of satisfaction by visitors (questionnaire)
3	Tourism seasonality	I. Tourist arrivals by month or quarter (distribution throughout the year) II. Occupancy rates for licensed (official) accommodation by month (peak periods relative to low season and % of all occupancy in peak quarter or month) III. % of business establishments open all year IV. Number and % of tourism industry jobs
4	Economic benefits of tourism	I. Number of local people (& ratio of men to women) employed in tourism (also ratio of tourism employment to total employment) II. Revenues generated by tourism as % of total revenues generated in the community
5	Energy management	I. Per capita consumption of energy from all sources (overall & by tourist sector – per person day) II. % businesses participating in energy-conservation programmes, or applying energy-saving policy and techniques III. % of energy consumption from renewable resources (at destinations, establishments)
6	Water availability & conservation	I. % of tourism establishments with water treated to international potable standards II. Frequency of water-borne diseases: number/% of visitors reporting water-borne illnesses during their stay
7	Waste water management (Sewage Treatment)	I. % of sewage from site receiving treatment (to primary, secondary & tertiary levels) II. % of tourism establishments (or accommodation) on treatment system(s)
8	Solid waste management	I. Waste volume produced by the destination (tons) by month II. Volume of waste recycled (m^3) / Total volume of waste (m^3) (specify by different types) III. Quantity of waste strewn in public areas (litter counts)
9	Development control	I. Existence of a land-use or development-planning process, including tourism II. % of area subject to control (density, design, etc.)
10	Controlling use intensity	I. Total number of tourist arrivals II. Number of tourists per square metre of the site (e.g. at attractions), per square kilometre of the destination – mean number/peak period average

To meet the objectives of this study, the focus was on the indicators related to the impacts that SCR has on energy and water use and waste generation.

2.9 Resource management

Any business requires resources to operate, whether social (human labour), natural (energy and water) or economic (capital or financing). For the purpose of this study, natural resources were investigated.

2.9.1 Energy management

2.9.1.1 Electricity

The hotel industry is known for being one of the most energy- and resource-intensive sectors of the tourism industry. In order to provide guests with the comforts and exclusive amenities, treatment and entertainment they are accustomed to, energy are consumed. Many guests are willing to pay the required tariffs for these luxuries despite the impact on the environment. All facilities in hotels cater for all the guests, but are only fully utilised during peak periods. The energy consumption of many facilities remains similar or will show minimal change whether readily utilised or not, for example water features, air-handling units and public lighting. Because they need to cater for the out-of-the-ordinary level of comfort that guests may experience in their homes, the energy use of a hotel is typically greater than that of another building of the same size.

The impacts on the environment can be caused by excessive consumption of local/imported resources such as water, food, electricity and fuel, as well as by releasing waste in the air, water and soil, causing pollution. The large quantities of waste products generated in hotel facilities pose a greater significant environmental threat compared to domestic volumes in residential areas (Bohdanowicz, Churie-Khallhauge & Martinac, 2001). The main energy-consuming activities in a hotel include the heating and cooling of rooms, lighting, hot-water use, preparing meals and maintaining the swimming pool. The larger the hotel, the higher the consumption will be.

Hotel energy consumption is directly affected by hotels' physical and operational parameters. The common physical parameters of most buildings include size,

structure and design of the building (prevailing architectural/construction practices), geographical and climatic location, age, energy supply and water systems installed, the way these systems are operated and maintained, types and amounts of water and energy resources available locally, as well as energy-use regulations and costs (Hotel Energy Solutions, 2011). Operational parameters that influence energy use in hotels include services offered, variation in occupancy levels, customer preference relevant to indoor comfort, on-site energy-conservation practices, the number of facilities (kitchens, restaurants, in-house laundries, swimming pools, sports centres, business centres, etc.), operating schedules for the different functional facilities in the hotel building, as well as the culture and awareness of resource consumption among personnel and guests (Hotel Energy Solutions, 2011). Only certain variables in a hotel's operation and design will really affect the energy use of the property. Typical variables that are investigated that influence energy use are hotel standards and floor area; cooling and heating of spaces and water, including hot-water pools and saunas; room occupancy, which will affect use of kitchen equipment and facilities; employee use of resources and facilities; and the level to which guests participate in conserving energy use (Hotel Energy Solutions, 2011). In order to have a fully functional hotel with fresh cool air, hot showers and general guest amenities, the property has to operate large equipment that requires vast quantities of electricity, such as cooling towers, boilers and suitable electrical distribution networks for sufficient lighting and electricity supply (Hemphill, 2010).

In order to implement energy-optimisation strategies, management requires reliable data for analysis. In order to obtain the data, a range of high-quality electricity meters must be installed on the primary electricity feed to the hotel as well as second-tier meters on major electricity-consuming equipment and key areas of the hotel. After analysis is completed, new strategies can be developed and implemented (Hemphill, 2010). Nowadays, building management systems (BMSs) are used to control electricity feed and management in large properties; however, a BMS requires a good communication platform such as fibre optic cables to improve communication from the central BMS room to equipment. It also allows management to remotely implement changes to the electricity network or equipment, load-shedding schedules and so forth from their office desk.

Without knowing the resource consumption rate of the facility, it is fairly difficult to manage facilities properly. Metering high electricity- and water-consuming equipment can also quickly indicate spikes in electricity use or sudden water losses.

Hemphill (2010:2) explains the following:

> [W]hen it comes to cooling, the key card contactor is not necessarily the answer. Alternative, more sophisticated intelligent automation solutions which really remove the human factor, reduce energy consumption and help hotels to go green, are now available and should be considered.

For many organisations and their sustainability teams, these were the ‘easy’ first phase wins; the low-hanging fruit. The second round of energy efficiency savings will be much harder to unlock but equally important, particularly as organisations set increasingly ambitious sustainability targets.

In order to improve and maintain electricity-conservation strategies, manual and reactive approaches must be deleted as part of any energy-management strategy. Companies must leverage technology to automate, standardise and integrate data collection for the energy-management system so that proper analysis can be done by optimisation experts to continue to empower the business in finding new ways to reduce electricity use (Hemphill, 2010). JSE listed Companies are required to keep record and report data of their energy- and water-consumption rates for annual sustainability reporting and to put them in a position to understand the dynamics of their utility use and to manage consumption.

Tsogo Sun and City Lodge annual reports included the consumption rates. Tsogo Sun Hotel group has used 252 million kWh in 2013, which is 3% less electricity compared to the previous financial year. The City Lodge Hotel Group has also managed to show electricity reductions in all their accommodation offerings, as indicated in Figure 2.3.

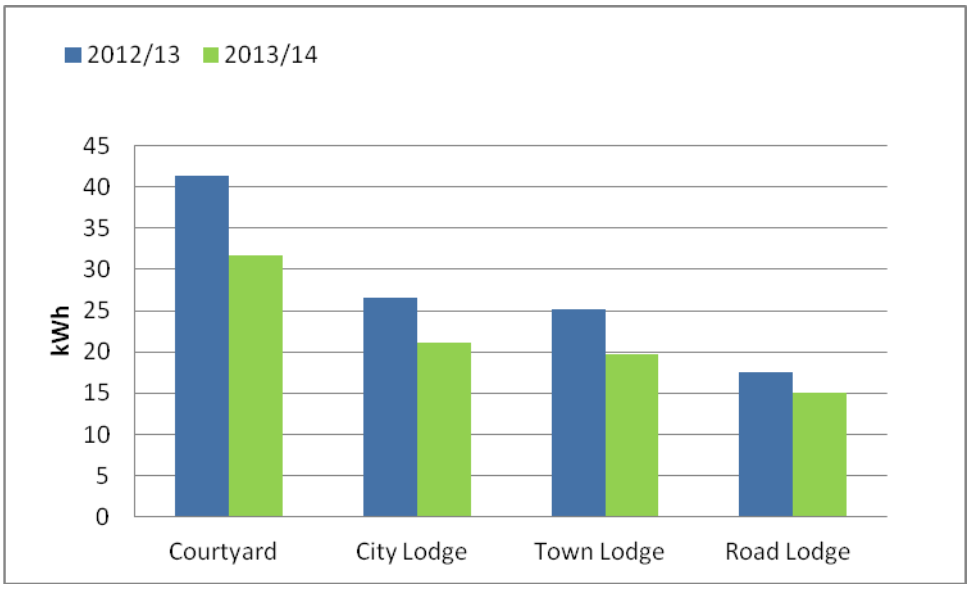


Figure 2.3: Electricity consumption for City Lodge Hotel Group: kWh per room night (City Lodge, 2015)

2.9.1.2 Liquefied Petroleum Gas

Liquefied Petroleum Gas (LPG) is a flammable mixture of hydrocarbon gases (propane or butane) used as fuel for cooking, heating, commercial appliances and vehicle propulsion. For the latter use it is referred to as autogas. The boiling point is lower than room temperature and therefore pressurised to liquefied form for storage. LPG is usually supplied in pressurised steel vessels (LPG cylinders) typically filled to 80 to 85% of their capacity to allow for thermal expansion of the contained liquid. LPG emits 50% less CO_2 emissions than coal and 20% less than heating oil, and it improves both indoor and outdoor air quality by substantially reducing pollutants that are hazardous to health, such as SOx, NOx and particulate matter. LPG is a by-product produced during the refining of petroleum (crude oil), or is extracted from petroleum or natural gas streams as they emerge from the ground. Three per cent of a typical barrel of crude oil is refined into LPG, although as much as 40% of it could be converted into LPG (Mkhize, 2013). LPG is a much cheaper and cleaner form of power compared to the country's largely coal-fuelled electricity, yet we hardly use it. Gas makes up only approximately 3% of South Africa's total energy mix. South Africans use three to four times less gas than countries such as Kenya and Tanzania (Prinsloo, 2013). In 2008, 337 000 tons of LPG were produced in South Africa with consumption at approximately 365 000 tons (Mkhize, 2013).

There are many benefits for companies to rather use LPG than electricity. Savings in electricity consumption through increased use of LPG in the residential sector could alleviate pressure from the electricity grid to the extent that the reserve margin of electricity could be improved. There is a contribution to the green economy because LPG produces less carbon emissions that cause air pollution. By not burning coal, fewer soot particulates, nitrogen oxides and sulphur are released into the air. It is more versatile because it can be transported using sea, rail or road. LPG is an energy-rich fuel source with a higher calorific value per unit than other commonly used fuels. LPG offers a modern alternative to traditional cooking methods with materials such as firewood, charcoal and dung, which are extremely harmful to human health (Mkhize, 2013).

The South African petrochemical company Sasol will soon offer housing developers the infrastructure to supply LPG to developments as an alternative to electric stoves and heaters. Sasol Homegas has mentioned that this will help ease the burden on South Africa's power grid and also allow companies to save on electricity costs due to the steep increase experienced recently. According to Pieter Claasen, Sasol Oil's new business development manager, "[m]any South Africans are thinking twice about how they make use of energy at home and at work" (SouthAfrica.info, 2010:4).

2.9.1.3 Diesel and petroleum fuels

Diesel and petrol fuel is a combination of hydrocarbons and it has a boiling point in the range of 150 to 380 °C, with petrol having the lowest ignition point. When crude oil is refined, it produces various by-products used for transportation fuels such as petrol, jet fuel and diesel fuel and other petroleum products such as liquid petroleum gas, asphalt, motor oil, wax and bubble gum (Majewski & Jääskeläinen, 2013). Diesel is mainly used in South Africa for transportation, but also for power generation. In 2009 South Africa consumed 9.1 billion litres of diesel and 11.6 billion litres of petrol. South Africa imports up to 95% of its crude oil requirements from the Middle East. Four of the six refineries are situated on the coast and the remainder inland. Fuel, both petrol and diesel, produced at the refineries is transported by sea, road, railway or pipes to the 200 depots, 4 600 fuel stations and 100 000 private tanks on farms (SAPIA, 2010). Figures 2.4 and 2.5 illustrate the fuel use per province in South Africa in 2009.

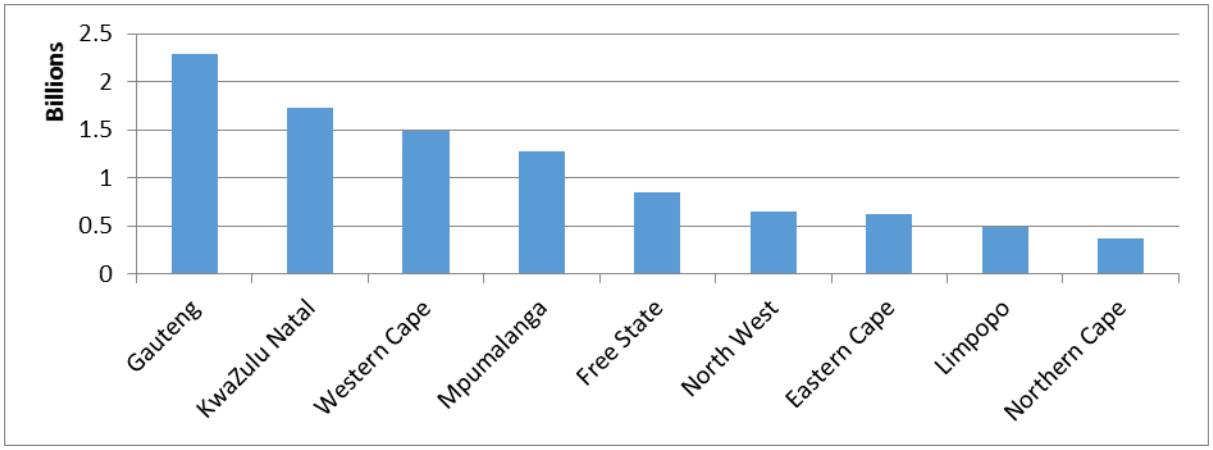


Figure 2.4: Diesel consumption per province in 2009 (adapted from SAIPA, 2010)

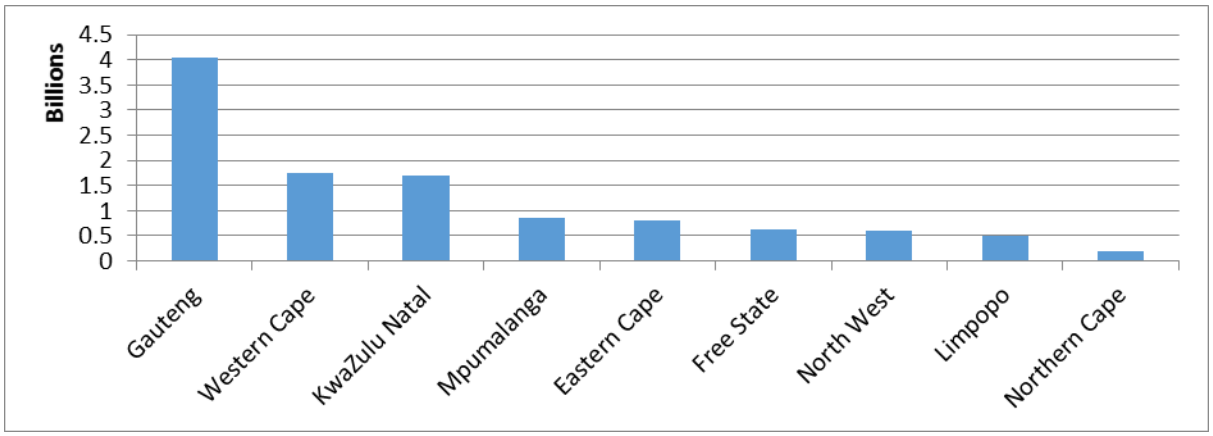


Figure 2.5: Petrol consumption per province in 2009 (adapted from SAIPA, 2009)

The crude oil received on coastal towns must be refined and pumped inland to mainly Gauteng, which consumes most of the production.

The hospitality industry is heavily reliant on transportation. Hotels and resorts often offer a shuttle service to their guests to and from the airport and also to destinations and activities in the area. Products and food supplies must also be transported from production points to the hotels. If the resorts are large, a shuttle service might also be included to transport guests to facilities on the resort. Although the guests also consume resources such as fuel when travelling via road or air to the destination, this is excluded from the study because the data is not always accessible. The objective is to establish the resource use within the SCR boundaries.

2.9.1.4 Coal

South Africa's primary energy resource is coal, simply because it is readily available, relatively easily mined and cost-effective. Internationally, on average coal is used to generate only 36% of power requirements compared to South Africa's 77%. South Africa also exports approximately 28% of its coal reserves per annum. About half of the coal in South Africa is mined underground and the remainder is practically scraped from the surface (DOE, 2014). Eskom, which is the national electricity provider in South Africa, is also the seventh largest electricity generator in the world. Sasol is also the largest coal-to-chemical producer worldwide, which further increases South Africa's demand on coal. It is estimated that South Africa has 53 billion tons of coal reserves and that at the current rate of use it would last another 200 years. Table 2.3 below illustrates the producer and exporter statistics.

Table 2.3: Top coal producers and exporters worldwide based on million tons coal equivalent (MTCE) (adapted from Eberhard, 2011:6)

Producer	MTCE/annum
China	2 971
USA	919
India	526
Australia	335
Indonesia	263
South Africa	247
World total	5 990

Exporter	MTCE/annum
Australia	262
Indonesia	230
Russia	116
Colombia	70
South Africa	67
USA	53
World total	944

Coal mining is associated with a range of health and environmental impacts. Coal mining puts strain on the environment from extraction, processing and transportation to the power stations. Human beings are affected from using coal as a fuel source and exposure to pollutants when living in close proximity of coal mines. The coal miners are also exposed to injuries and potential fatalities during mining processes (Action Aid, 2014 p11).

Coal was often used in older hotels for hot-water generation, especially when the property was situated in a secluded region where electricity infrastructure was not

present during development. There are still some hotels in South Africa and neighbouring countries that rely on coal for hot water. One of Sun International's properties, Gaborone Sun Hotel, operated a coal-fired boiler until 2009, when it was replaced with a solar heating system (Copans, 2009)

South Africa committed to contributing towards the United Nations Framework on Climate Change (UNFCC) as agreed at the Convention of the People (COP) 21 conference held in Paris, France in 2015. South Africa submitted the Intended Nationally Determined Contribution (INDC) in November 2015 as a documented commitment which includes the financial aid required by developed countries to achieve the set goals. The ultimate aim is to ensure temperature increases remain below 2°C worldwide. This includes the alignment of the national development plan with sustainable and economic development goals. The reliance on coal for electricity supply from outdated power stations is a risk to South Africa's people and development as a developing country. South Africa has already invested R192 Billion in 79 renewable energy projects as per of the Renewable Energy Independent Power Producer Procurement Programme to ease the strain on the generation coal-fired electricity (Winkler, 2015).

2.9.2 Water management

2.9.2.1 Water availability

The rapid global population growth with often higher living standards and increased food production places greater pressure than ever on fresh water supply. Floods and erratic weather patterns that occur out of season, as we have come to know in the last century, mainly due to climate change, are also adding to the problem. Weather patterns are more extreme these days. One year drought is experienced, followed by a year of floods. When flooding occurs, time for water to penetrate the soil is not nearly enough, which results in groundwater stocks not being replenished (Tuppen, 2013).

Looking back into history, before the Industrial Revolution, everyone could use water to their satisfaction. However, times have changed, as demographic pressure in the last three centuries no longer allows for exploitation of water resources and greedy use. The world population has increased significantly in the last 100 years. The world population reached 1 billion inhabitants in 1800 and grew to 2 billion in 1900. On 1

July 2015 there was an estimated 7.349 billion people on earth (Worldmeters, 2015). This makes it is easy to understand the impact on our natural resources.

Similar to populations, water is not equally distributed across the earth geographically. Access to clean water per capita in sub-Saharan Africa and South East Asia is challenging mainly because of high population growth, which leads to water scarcity (UNEP, 2008).

Fresh water is one of the most precious natural resources on earth and one without which life is not possible. In general terms, the tourism industry is often responsible for overusing water through hotels, golf courses, water facilities and personal use by guests. This can cause water shortages in areas where water availability may be under pressure. Tourists have the tendency to consume more water when on holiday than at home, which could easily reach 440 litres per day (UNEP, 2008). It is almost double the volumes consumed per capita in a Spanish city, for instance. The potential for becoming a water-scarce region is likely to happen if measures are not put in place to reduce water demand (UNEP, 2008).

Water scarcity is a recognised problem around the globe. It is projected that demand for water will exceed supply by 40% by 2030 as illustrated in Figure 2.6. By this time half of the world's population will be living in water-stressed areas.

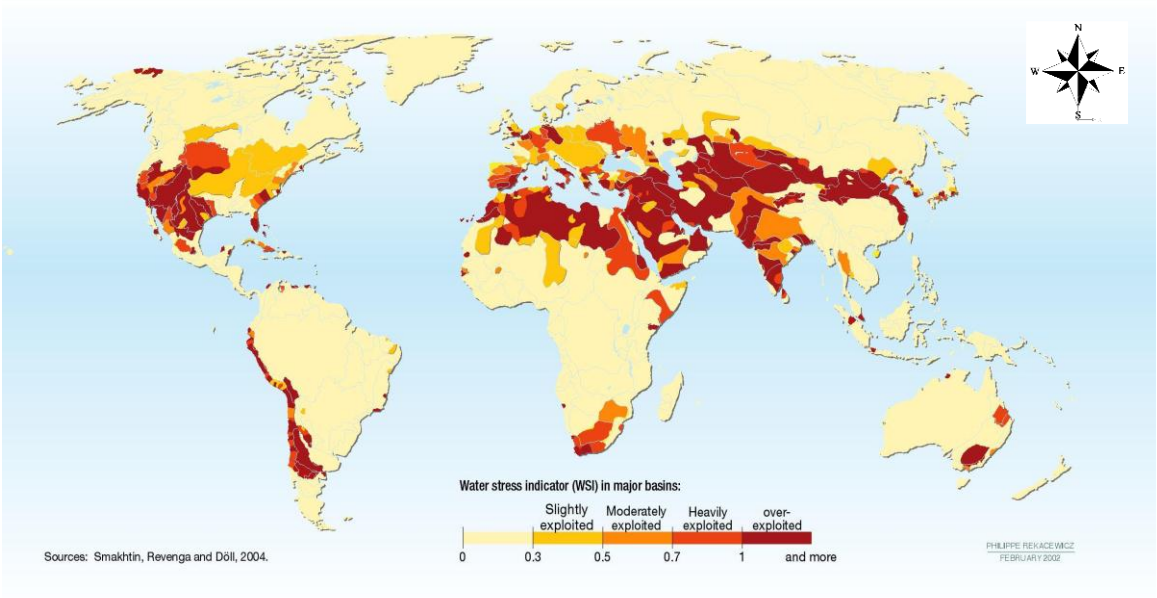


Figure 2.6: Global water scarcity (Rekacevicz, P. 2009**)**

People living in developing countries consume roughly about 10 times less water each day than those in developed countries. The average person in a developing country consumes between 60 and 150 litres per day, compared to 500 to 800 litres per day in a developed country (UNESCO, 2000).

The City Lodge Hotel Group is Green Leaf-certified and one of the top 250 hotel groups in the world (City Lodge, 2014). Figure 2.7 shows the kilolitre per room use since 2012 in the four different accommodation offerings by the group in South Africa. The water data form two financial years, namely July 2012 to June 2013 compared to July 2013 to June 2014.

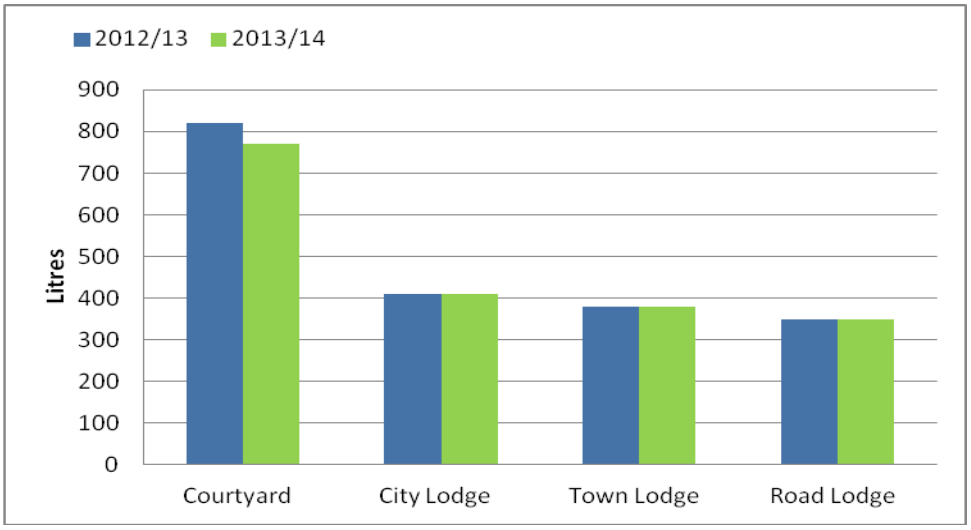


Figure 2.7: Water consumption for City Lodge Hotel Group: Litre per room night

The Tsogo Sun Hotel Group has indicated that the group's South African properties have managed to show a 3% reduction in water consumption in 2013 compared to the previous year (Tsogo Sun, 2014). Most of the water is supplied by the municipality.

2.9.2.2 Water availability to SCR

SCR is located in the Moses Kotane Local Municipality (MKLM) within the Bojonala District, North West province. The water services provider for the MKLM is Magalies Water which is situated next to the Vaalkop Dam.

After winter season in 2013 after a long absence of rain, the North West province was declared a National Disaster area because of drought. The Department of Water Affairs (DWA) had to take drastic action to avert the looming crisis (News24, 2013). The chief operating officer of the Moses Kotane municipality mentioned that the restrictions will alleviate the pressure in areas where water shortages were experienced (SAnews.gov.za, 2013). Water leak repairs was flagged as a priority and an engineering company was appointed to repair the leaks. The small mining town has grown into a metropolis which water demand is forever growing. According to the DWA, an additional 40 megalitres of water would be required to address growth in the northern areas of the municipality.

> [T]he local water board, Magalies Water, is implementing the Pilanesberg Scheme to increase the bulk water supply from the Vaalkop Dam to various areas in Rustenburg and Moses Kotane local municipalities in the future. The second phase of the scheme will supply additional water to the municipality, together with the upgrade of the Bospoort Water Scheme that is owned and managed by the Moses Kotane municipality. Rustenburg Municipality has put in place several short- and medium-term measures to address the situation (SAnews.gov.za, 2013).

The area undergone water restrictions in 2013 and in October to November 2014. This meant that SCR had to reduce irrigation, report water leaks immediately, and conserve water at work and home. The basis of the restrictions in 2014 was due to the upgrades of the Magalies water-purification plant that caused a lower yield of freshwater supply (Sun City internal communication from Engineering Department, 2014).

The water-reconciliation strategy was developed for the management of water resources in the Crocodile River System. The following were the main outcomes of the strategy relevant to the Bojonala Platinum District Municipality (BPDM). Most of the water that is currently available to the area north of the Magaliesberg consists of local surface resources and return flows from parts of Gauteng (BPDM, 2011). This water is released into the Crocodile West System, which includes Hartebeespoort Dam, Rooikoppies Dam and Vaalkop Dam. From here it is pumped to SCR 70 km away. The increase in water requirements in this area will be supplied from the growth in return flows from northern Gauteng. Groundwater will continue to supply

some rural water users. Surplus return flows from the Crocodile water-management area will be used to augment the water requirements for Medupi power station and of the rapidly developing Lephalale area. Farmers north of the Magalies mountain range rely on groundwater resources for irrigation of their crops. The infrastructure in the Brits area is highly developed to cater for extraction and reticulation of groundwater via a network of channels. Increased mining and population growth in rural communities also add to the pressure on the current supply. The total water requirements in the catchment exceed the water available from local surface and groundwater resources by more than four times. Due to the limited local water resources, large quantities of water are transferred into the catchment. Potable water is transferred from the Vaal River System to the Crocodile River catchment via the Rand Water network. The volume of return flows, which mainly originate from the urban areas, is approximately equal to the yield from local resources, and is growing due to growing water requirements in urban areas (BPDM, 2011).

2.9.2.3 Water quality

Water analyses results recorded in 2011 show that phosphate concentrations at most dams are concerning. Phosphate presence in fresh water river systems is usually an indication of raw sewage disposal into the system. In this instance it will be from failing water-treatment works or illegal disposal of sewage in Johannesburg, Midrand and Krugersdorp. High phosphate levels will act like a catalyst for eutrophication in open water systems. These return flows in the Tweelopiespruit contain acid mine drainage from the mines in the West Rand, which also affects the quality of water in the region. Good to moderate-quality groundwater is available in the BPDM, although current land uses impact on natural water quality. These impacts are specifically related to the use of fertilisers, which increase nitrate concentrations, and the presence of poor or inadequate sanitation, which increases chloride concentrations (BPDM, 2011).

Derek Turner, Infrastructure Manager at SCR, stated the following:

> We have an extensive water quality monitoring programme in place which is coordinated by the on-site laboratory employees who conduct the testing. Third party tests are also conducted by a South African National Accreditation System (SANAS) accredited laboratory and results obtained from Magalies

> Water, the water service provider in Moses Kotane, are also monitored. Magalies Water complies with South African National Standard (SANS) 241 standard which is the national standard that water must adhere to when supplied to consumers. Due to the broad variances in the standard quality can be low and still compliant. Once the water is received at Sun City, the water is dosed with chlorine dioxide as a secondary treatment to assist in further treatment of potential odour issues and to aid in maintenance of the aging infrastructure. The Resort has since June 2009 achieved 100% microbial and chemical compliance test results according to the requirements of SANS 241 and has recently obtained Green Drop status for the Waste Water Treatment Works. A project is currently underway to achieve Blue Drop status as well (Turner, 2014).

The Green Drop award is given to Waste Water Treatment Works (WWTW) that meet the requirements of the Green Drop regulation. It focusses on how well a specific WWTW manages the waste water it receives. Blue drop is an award given by the DWA to water service providers for the management of drinking water quality (DWQ). The objectives are 1) introducing incentive based regulation of DWQ management 2) Introducing key requirements for effective and efficient management of DWQ by water service institutions, 3) Initiating transparency on the actual drinking water quality management, 4) Providing information to the public on the DWQ performance per water supply system and 5) Facilitating closer working relationships between water services authorities and water services providers (DWAF, 2009)

Although water quality can impact on the guest experience and possibly on supply if it does not comply with the required standards, it was not included in this research paper.

2.9.2.4 Compliance

Section 21 of the National Water Act (No. 36 of 1998) deals with water use and licensing. The act is founded on the principle that the national government has overall responsibility for and authority over water resource management, including the equitable allocation and beneficial use of water in the public interest, therefore a person can only be entitled to use water if the use is permissible under the act. This section is therefore of central significance to the act, as it lays the basis for regulating water use. The various types of licensed and unlicensed entitlements to use water are dealt with in detail.

Water use is defined broadly, and includes taking and storing water, activities that reduce stream flow, waste discharge and disposal, controlled activities (activities that impact detrimentally on a water resource), altering a watercourse, removing water found underground for certain purposes, and recreation. In general a water use must be licensed unless it is listed in Schedule 1, is an existing lawful use, is permissible under a general authorisation, or if a responsible authority waives the need for a license. The Minister may limit the amount of water that a responsible authority may allocate. In making regulations the Minister may differentiate between different water resources, classes of water resources and geographical areas.

Section 21 on water use reads as follows (DWA, 1998):

> For the purposes of this Act, water use includes-
>
> (a) Taking water from a water resource;
>
> (b) Storing water;
>
> (c) Impeding or diverting the flow of water in a watercourse;
>
> (d) Engaging in a stream flow reduction activity contemplated in section 36;
>
> (e) Engaging in a controlled activity identified as such in section 37(1) or declared under section 38(1);
>
> (f) Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit;
>
> (g) Disposing of waste in a manner which may detrimentally impact on a water resource;
>
> (h) Disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process;
>
> (i) Altering the bed, banks, course or characteristics of a watercourse;
>
> (j) Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and
>
> (k) Using water for recreational purposes.

Industries or business that had existing water uses prior to the promulgation of the National Water Act in 1998 are required to obtain licenses for the uses under Section 21 of the National Water Act. The SCR water use license was issued in June 2015.

2.9.2.5 Water Policy at Sun City Resort

SCR has a well-documented water policy to which it conforms. The purpose of this policy is to provide the framework within which to manage fresh water consumption and waste water or effluent discharge standards on SCR so as to minimise the impact on ecological resources. This procedure applies to all, personnel of SCR which include contractors and business partners, as well as hotel personnel and operational activities.

According to SCR's policy statement, SCR will ensure that no contamination of adjacent watercourses and the groundwater will occur as a result of its operations (Sun City Environmental Department, 2012). This will also include minimising the impact of operations upon wildlife habitats, aquatic flora and fauna, fisheries, recreation and amenity facilities and landscape features. SCR will ensure that any operations that may pose a threat to these areas are carefully planned and managed to minimise the risk of pollution and environmental damage. It will implement appropriate water-management strategies and policies to manage and control the use of water on the property. This will include all operational aspects of the business itself and will incorporate strategies that are aimed at minimising water use, limiting wastage and communicating polices appropriately. SCR will ensure that all water-use licence renewals, registrations of dams with a safety risk, standards for treated effluent water irrigation and environmental impact assessments where required are adhered to according to national legislation. Identify areas to store all hazardous substances. All operations taking place close to watercourses must be have risk assessments to eliminate impacts on the environment. All permanent and temporary employees, including sub-contractors will undergo induction where they are informed how to prevent pollution

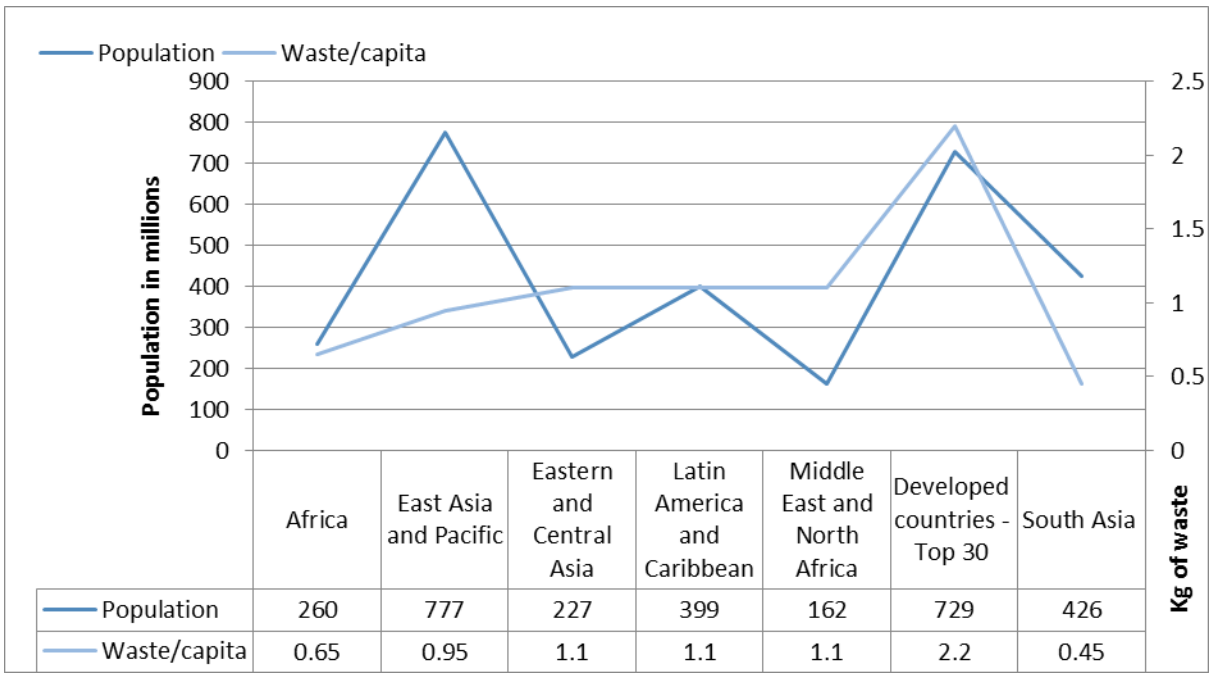
The document also includes area- and process-specific water-management procedures, emergency procedures and links to other operational documents and procedures governed by the policy. The environmental policy statement of SCR indicates that the company is determined to reduce its demand on natural resources.

2.9.3 Waste management

2.9.3.1 International waste management and tourism

Human health and ecosystems are more under pressure as waste volumes and the complexity thereof are increasing. Companies that implement greening strategies usually start with the recycling and minimising of waste. Waste management is linked to population growth and income, with income being the more powerful driver (UNEP, 2011). In 2012 it was estimated that 1.3 billion tons of municipal waste is generated per year and that this figure could increase to 2.2 billion in 2025. The 2012 per-person rate (see Figure 2.8) on average was calculated at 1.2 kg per person per day and is expected to increase to 1.42 kg per person per day in 2025. It must be noted that the per-capita figure varies between countries, regions and cities (Hoornweg & Bhada-Tata, 2012).

UNEP identified other waste streams apart from municipal solid waste, namely construction and demolition waste, biomass waste, health care waste, electronic waste, hazardous waste and packaging and marine litter (UNEP, 2011).



	Africa	East Asia and Pacific	Eastern and Central Asia	Latin America and Caribbean	Middle East and North Africa	Developed countries - Top 30	South Asia
Population	260	777	227	399	162	729	426
Waste/capita	0.65	0.95	1.1	1.1	1.1	2.2	0.45

Figure 2.8: Waste generated per capita per region (adapted from Hoornweg & Bhada-Tata, 2012:10)

Tourism establishments and particularly hotels cater for large groups of people at once, and often such catering is of a greater variety than most people are used to at

home. The cost of responsible and safe disposal of all the different waste streams is becoming higher (UNEP, 2003). Companies need to comply with waste legislation, which describes disposal procedures to which the general public needs to adhere. Compliance comes at a great cost, because waste-management companies now offer their services to tourism businesses at a high cost. The South African waste-management industry worth is estimated at R10 billion (DEA, 2011:5).

A hotel generates two primary streams of waste, namely solid waste and waste water. Solid waste includes domestic waste, garden waste, hazardous waste, medical waste and electronic waste. Waste water is sewage water, referred to as black water, and shower and kitchen waste water, referred to as grey water. Figure 2.9 clearly indicates the two primary waste streams.

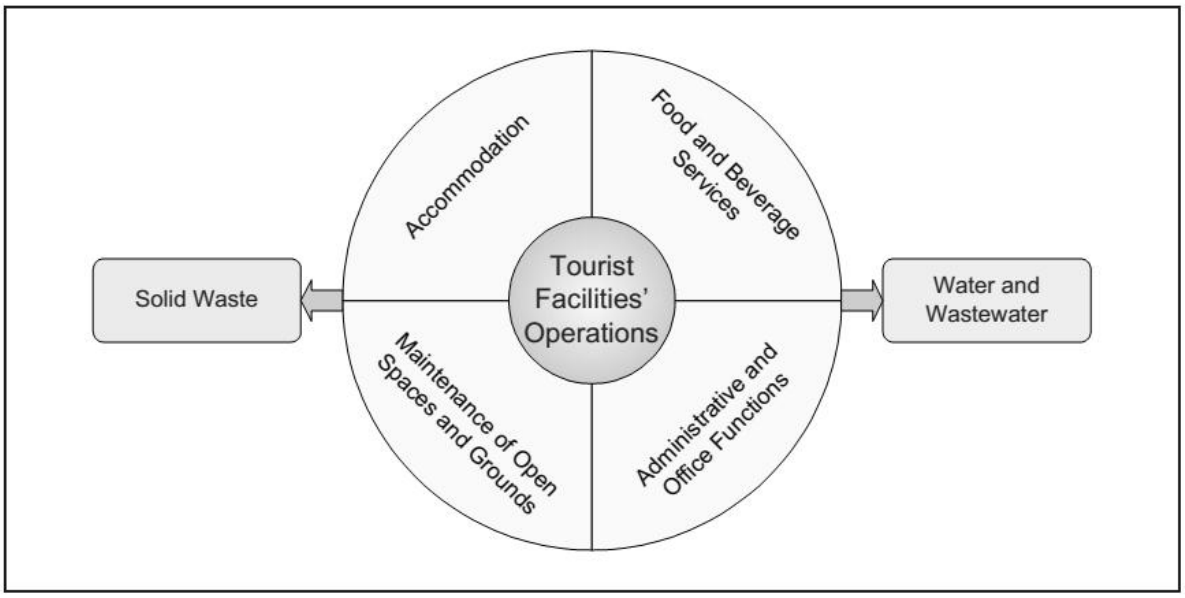


Figure 2.9: Tourism facility operations and outputs (UNEP, 2003)

Waste water generated in hotels is mainly diverted to municipal waste water treatment works (WWTW) where it is treated and either reused for drinking water or released into local rivers to supply in the ecological reserve requirement of communities downstream. Once released into the municipal infrastructure the tourism establishment has no right over this potential resource anymore. Businesses nowadays have come to understand the value of waste water and are implementing purification plants in the buildings so that the water can be reused. It is estimated that 90% all waste water generated in developing countries is released into river

systems untreated. According the UNEP (2010:10), two million tons of sewage, industrial and agricultural waste that is discharged directly into waterways kill 1.8 million children each year.

2.9.3.2 Waste management in South Africa

Waste management in South Africa is governed by the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008), which came into effect on 1 July 2009. Following the enactment of the Waste Act, the Minister of Environmental Affairs established the National Waste Management Strategy (NWMS) in terms of Section 6(1) for achieving the objectives of the act. The NWMS was approved for implementation by Cabinet in November 2011. The Waste Act supports the waste-management hierarchy in its approach to waste management by promoting cleaner production, waste minimisation, reuse, recycling and waste treatment, with disposal seen as a last resort in the management of waste (SAWIC, 2014).

The Waste Act 59 of 2008 defines waste as any substance, whether or not that substance can be reduced, reused, recycled and recovered-

(a) that is surplus, unwanted, rejected, discarded, abandoned or disposed of;

(b) which the generator has no further use of for the purposes of production;

(c) that must be treated or disposed of;

(d) that is identified as a waste by the Minister by notice in the *Gazette*, and includes waste generated by the mining, medical or other sector, but -

  (i) a by-product is not considered waste; and

  (ii) any portion of waste, once re-used, recycled and recovered, ceases to be waste.

The waste hierarchy forms the basis of waste management and in its simplest form is referred to as the 3 Rs: reduce, reuse and recycle. The top of the inverted pyramid (Figure 2.10) is the most preferred way to deal with waste, with the bottom of the pyramid the least favourable.

The hierarchy approach is accepted internationally and in South Africa as a rigorous approach to integrated waste management.

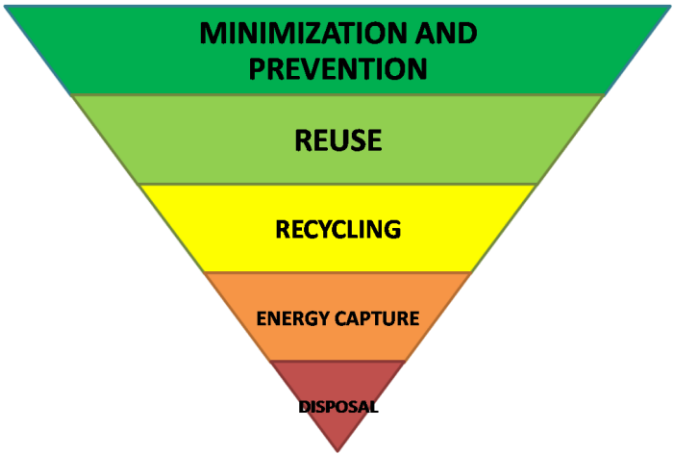


Figure 2.10: Waste-management hierarchy (PURCO, 2013)

All manufactured products have some sort of lifecycle. In order to make a product, a raw material must be sourced. The raw material is then processed to manufacture a product. Once in this state, the consumer will use or consume it, after which it can be recycled and converted into a usable material to manufacture the same or another product again, thereby reducing the demand for raw materials. Increased consumption and the lack of a recycling culture in South Africa have resulted in an ever-growing volume of used packaging and other recyclable materials reaching landfill sites. Not only does this use up increasingly scarce and valuable land, but it also constitutes a loss of potentially valuable materials, such as steel, glass and plastics, which could otherwise have been re-processed into new products, thereby decreasing the need to source new raw materials. This recycling cycle is illustrated in Figure 2.11.

A recent study on the impact of a circular economy on the waste sector found that the majority of businesses in the United Kingdom are moving waste up the hierarchy by focussing on increasing recycling rates, better waste prevention, a greater focus on waste reuse, setting zero waste-to-landfill targets and energy recovery (Perella, 2013).

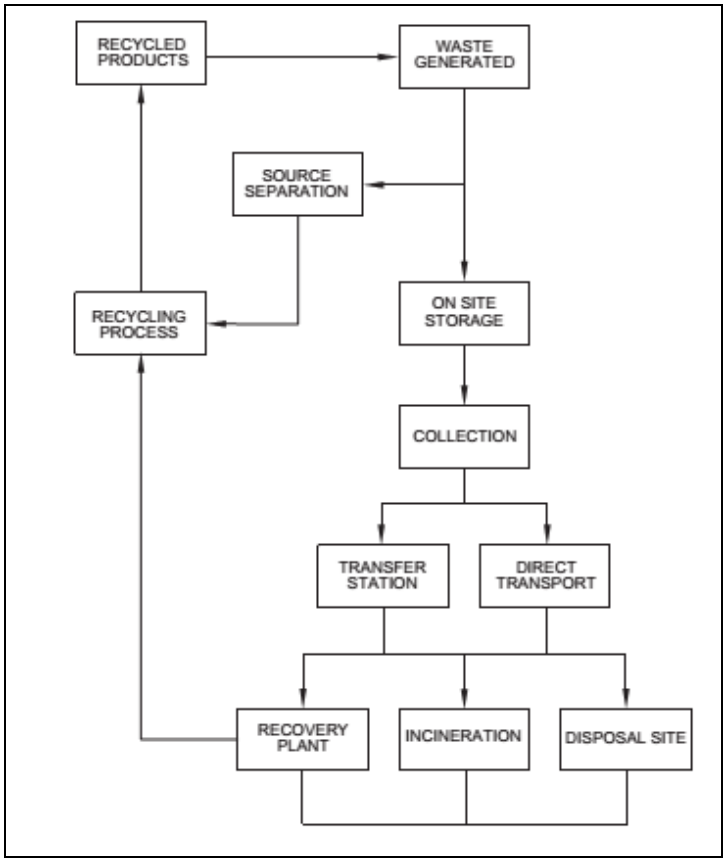


Figure 2.11: The waste cycle (CSIR, 2001)

However, as of 2011, an estimated 90.1% of all general and hazardous waste generated in the country was still disposed to landfills. In the case of municipal waste, disposal is often to uncontrolled open dumpsites. Only 9.8% of generated waste in 2011 was recycled and 0.1% treated (DEA, 2012). When one considers that approximately 13% of general waste generated in South Africa is municipal organic waste (DEA, 2012), collected predominantly by municipalities, and an additional 61% is industrial and agricultural biomass waste, it is surprising that biological treatment (e.g. composting, anaerobic digestion) is not utilised more extensively in South Africa. Large quantities of waste biomass are being generated by industry, yet thermal and biological technologies remain underutilised. Industrial biomass presents the largest, single type of general waste generated in South Africa at an estimated 36 million Tons/annum for 2011 (DEA, 2012).

2.9.3.3 Waste management at Sun City Resort

SCR's Waste Policy adopts the waste hierarchy and commits to the following to promote sustainable environmental practices (Sun City Environmental Department, 2012:5):

The prevention of waste: Through implementing good operating practices, e.g. training, loss prevention, material handling and inventory practices. We actively seek to replace harmful substances that will generate hazardous waste with scientifically approved biodegradable or eco-friendly products. We ensure that hazardous waste is kept separate from general waste. All work shall be carefully considered to minimize and prevent waste.

Reduction or minimization of waste: Changes to processes, equipment, layout and operating conditions, specifically aimed at reducing waste generation are incorporated in our IWMP. The Complex Procurement Policy states the commitment to purchasing protocols that is aimed at reducing waste.

Reuse: The return of waste material either to the originating process as a substitute for an input material or to another process as an input material.

Recycling: The separation at source (s@s) approach is used to assist in recovery of recyclables by continuing integrity of separated waste stream into the collection point areas. Recovered material is sold to recycling companies by the waste collection company.

Energy recovery: Where economically viable, we will invest in energy recovery technology.

Disposal practises: That conforms to legislation and permit commitments.

The Waste Policy also states that all employees and contractors must adhere to the general guidelines. All waste generators must ensure that as much as possible recoverable materials are separated for recycling purposes. The storage requirements for waste are to be identified to allow for the separation of waste and the prevention of odours, water pollution and cross-contamination of materials. All employees, suppliers and sub-contractors will be made aware of their responsibilities to ensure the correct disposal of waste. Where the production of hazardous waste is envisaged, the producer of the waste will liaise with the environmental manager and the appropriate authority to determine the most appropriate method of disposal. Waste-disposal contractors must possess the appropriate license to dispose of any

waste off site. The Environmental Department will periodically check the waste contractor's current license.

2.10 People's perception

Over the last few decades, the environmental performance of a hotel has become an important part of managing a hotel (Sun-Hwa, 2005). The perceptions and attitudes of green consumers in the hospitality industry have not been extensively researched (Cometa, 2012). A multiple analysis of various studies in 2003 indicated that most studies related to hospitality focused on cleanliness and location, but never on any environmental attributes or perceptions (Millar & Baloglu, 2008). According to Mearns (2015:5), "[a]s tourists become more aware of their impacts on the environment, they are demanding more sustainable tourism experiences". Although tourists may be conscious of their impacts on the environment, the environmental performance of a hotel does not guide them in their choice of accommodation (Millar, 2008). Millar (2008:3) also state that "recent studies showed that guests prefer hotels with environmental management strategies in place but are not willing to pay more for the room".

Due to ecology being so entwined in the sustainable development industry, the focus of many academic papers and the public's attention is placed on the environment. As guests are often directly involved in green practices of hotels, for example by reusing towels by hanging them back on the rail, they are more prone to become aware of the initiatives and potential impact on their experience or perception of the hotel compared to intangible initiatives such as green building material. When the basic tangible green initiatives are in place and experienced in hotels, guests are more likely to support high-level sustainable initiatives such as carbon reduction or offsetting (Stuart & Duverger, 2010:9). Similarly, Sun-Hwa (2005) found that here is a positive correlation between employees and green practices. When employees are actively involved in greening projects or if they form part of their daily chores, they will become more conscious of green initiatives. Maintenance or housekeeping employees that come into contact with water- and energy-saving initiatives on a daily basis will most likely support green initiatives, as compared to a receptionist or credit clerk, for example.

When guests stay in a hotel or employees perform certain tasks, they are at all times connected to the environment. This can either be by using resources (impacts) or by contributing to reducing the impacts by acting responsibly. The diagram in Figure 2.12 below indicates the interconnection and links relating to sustainability. All guests and employees use energy and water each day and generate waste. Staff should be more informed than guests and therefore assist in reducing resource impacts automatically due to an environment-conscious culture in the hotel. Guests must, in most cases, be educated on their impacts and their participation must be requested before they assist in reducing their own impacts. Then they follow in the footprints of the employees who lead by example. Environmentally conscious travellers that do not require education and will contribute to conservation of resources on their own.

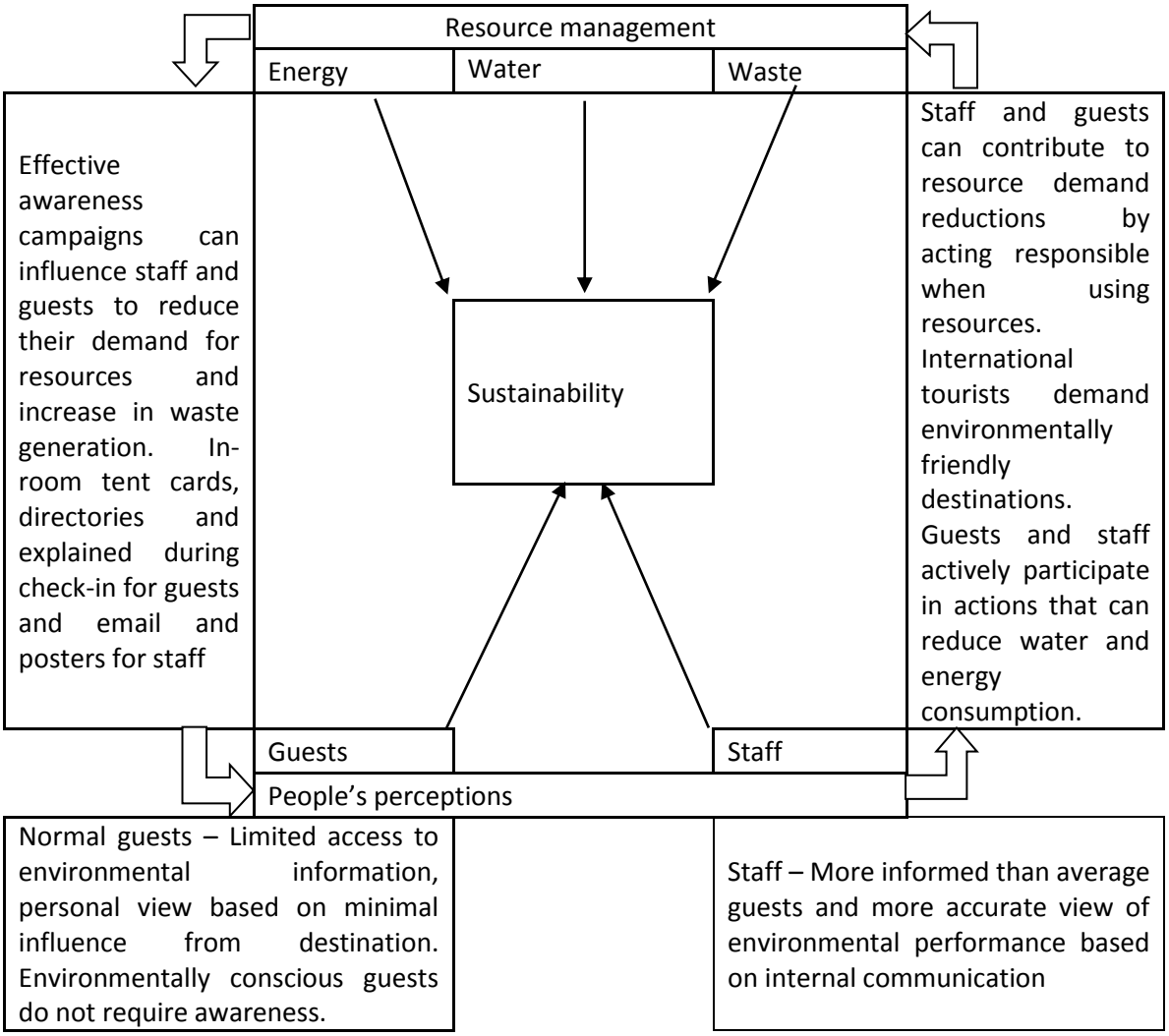


Figure 2.12: Sustainability: Link between resource management and people's perception

2.11 Environmental performance and benchmarks

One of the major problems with tourism is the reliance on fossil fuels for energy. Managing the establishment's demand on natural resources is a requirement for becoming a sustainable tourism destination (Gössling, Peeters, Ceron, Dubois, Patterson & Richardson, 2004). Earlier in this report, sustainable tourism was discussed, which includes equilibrium of three aspects, namely environmental, economic and social. Tourism businesses must manage and reduce the risk to all aspects to achieve sustainability. It is no longer a unique form of tourism, but rather a goal for any tourism destination (UNEP & UNWTO, 2012). To understand whether a tourism business is sustainable, it must be measured. Various forms of measurement exist. In South Africa there are annual reporting requirements, audits and voluntary green labels for all sectors of sustainable tourism. The process to monitor environmental performance involves taking measurements of environmental conditions using selected indicators and baseline criteria (UNEP & UNWTO, 2012).

Greening of mass tourism will most probably have a significant effect on resource use and management (Gössling *et al*, 2004; UNEP & UNWTO, 2012). In this study, the first year (2010) of data was the baseline to determine whether SCR and its single hotels have reduced or increased their demand throughout the study period. The study focused on the environmental sector alone, namely energy, water and waste.

Besides the baseline measurement, industry averages are required to compare SCR with similar resorts internationally to verify its environmental performance. Table 2.4 shows the energy, water and waste benchmarks on a global scale. The results in Chapter 5 were compared to the benchmarks and therefore determined the environmental performance of SCR.

> [T]his unique resort complex is a world unto itself. The world class restaurants; relaxed poolside venues; lush botanical gardens and extensive sporting facilities including two world-class golf courses and the Valley of Waves with its dramatic water slides and an enormous wave pool are just some of the elements that make Sun City unique (PSA, 2015).

Sun City is a unique resort and finding truly similar resorts or hotels were not easy.

Table 2.4: Energy, water and waste global benchmarks (adapted from Bohdanowicz *et al.,* 2001; Gössling *et al.,* 2004; UNEP & UNWTO, 2012)

ENERGY	
Type of accommodation	**Megajoule (MJ) per day**
Hotels	130
Self-catering	120
Camping	50
5-star hotel, Oman	3 717
4-star hotel, Vietnam	288–853
Summer houses, Sweden	246
Holiday village, Germany	91
WATER	
Type of accommodation or region	**Litre per day**
Average tourist use	100–2 000
Zanzibar	685
Mediterranean	440–880
Thailand	913–3 423
Hong Kong	336–3 198
USA	282–787
Germany	90–900
WASTE	
Country	**Kg per day**
Europe	1
USA	2.3
Austria	1.18
Mexico	0.68
India	0.4

2.12 Conclusion

An international drive exists whereby industries and specifically the hotel industry are becoming more conscious of their impacts on the environment and aiming to be sustainable destinations. In South Africa public companies must report on their performance and also use their green certification as a drawcard for visitors. No exploration studies have been done to measure South African sustainable tourism destinations against international benchmarks or standards. The South African government promulgated responsible tourism guidelines in March 2011 to guide local tourism establishments to become more sustainable. These are guidelines and are not quantified benchmarks for energy, water and waste and therefore do not aid in calculating the performance of these establishments.

The best practice will be to measure South African sustainable destinations against international criteria and benchmarks using UNWTO's sustainable tourism indicators and other quantified measuring tools.

This study investigated the current EMS aspects implemented at SCR and determined its performance with regard to resource management and waste generation. For these aspects the UNWTO indicators were the most suitable. The study identified areas of poor performance that give rise to potential for improvement. The study will enable SCR to use this competitive edge in marketing to the sustainable tourism target markets.

Chapter 3
Study area: Sun City Resort information

Here is your country. Cherish these natural wonders, cherish these natural resources, cherish the history and romance as a sacred heritage, for your children and children's children. Do not let selfish men or greedy interests skin your country of its beauty, riches or its romance – ***Theodore Roosevelt***

3.1 Introduction to Sun City Resort and its history

This chapter presents details on the physical characteristics and accommodation units of SCR. It presents the demographics of the people that reside in the immediate area, discusses the climate and gives a general overview of the Environmental Department.

SCR was the vision of the holiday destination developer and then owner of Kerzner International, Sol Kerzner. In 1979, when SCR was developed, it was located in the Bantustan of Bophuthatswana (BOP), which was declared an independent state by the South African government. After the first democratic elections in South Africa in 1994, Bophuthatswana was incorporated into the Republic of South Africa, and now forms part of the North West province. Sol Kerzner chose this location due to the BOP government having no gaming legislation that prohibited gambling. Its location was chosen because it was relatively close to large towns and cities where the guests and gamblers resided. The driving time is 45 minutes from Rustenburg and one and a half hours from Pretoria and Johannesburg. SCR formed part of a greater development plan that included the establishment of a Big 5-protected area, the Pilanesberg National Park, which opened to the public six days after the opening of SCR.

The 1 500-hectare megaresort was developed over a number of years in order to accommodate up to 6 058 guests and 1 281 employees each night. SCR officially opened on 7 December 1979. The resort started off with the Sun City Hotel and Casino and the well-known Gary Player Country Club. Later The Cabanas were built, followed by the Cascades Hotel and Entertainment Centre. In 1992 The Palace of

the Lost City, Valley of Waves and Lost City Country Club opened its doors to the public. The resort also houses the Vacation Club of which the newest section, Phase 2, was developed in 2005 (Footprints Travel Guide, 2016) The Vacation Club offers self-catering units that form part of the RCI holiday exchange programme. The Maze was built in 2012 and opened in 2013, which is a structure of interconnecting pathways where people need to find their way from point A to B. The crocodile sanctuary, Kwena Gardens consists of 14 chalets, curio shop and various crocodile enclosures for viewing the largest crocodiles in South Africa. There is a crocodile farming section as well with 15 breeding enclosures that required hot water from coal fired boilers. SCR is the largest property of the Sun International gaming and hospitality company. Sun International operates all the accommodation units on the resort. Although the Vacation Club operates as a separate entity with regards to financials their operations are influenced by SI.

3.2 Location and geology

SCR is located in the south-eastern section of the North West province and is found in the MKLM, which forms part of the BPDM.

The North West province is in the northern parts of South Africa. It lies south of the Limpopo province and Botswana and shares the western border with the Northern Cape. Gauteng province is situated to the east and the Free State to the south. Because of the large platinum resources underground, the North West province is known as the Platinum Province see Figure 3.1.

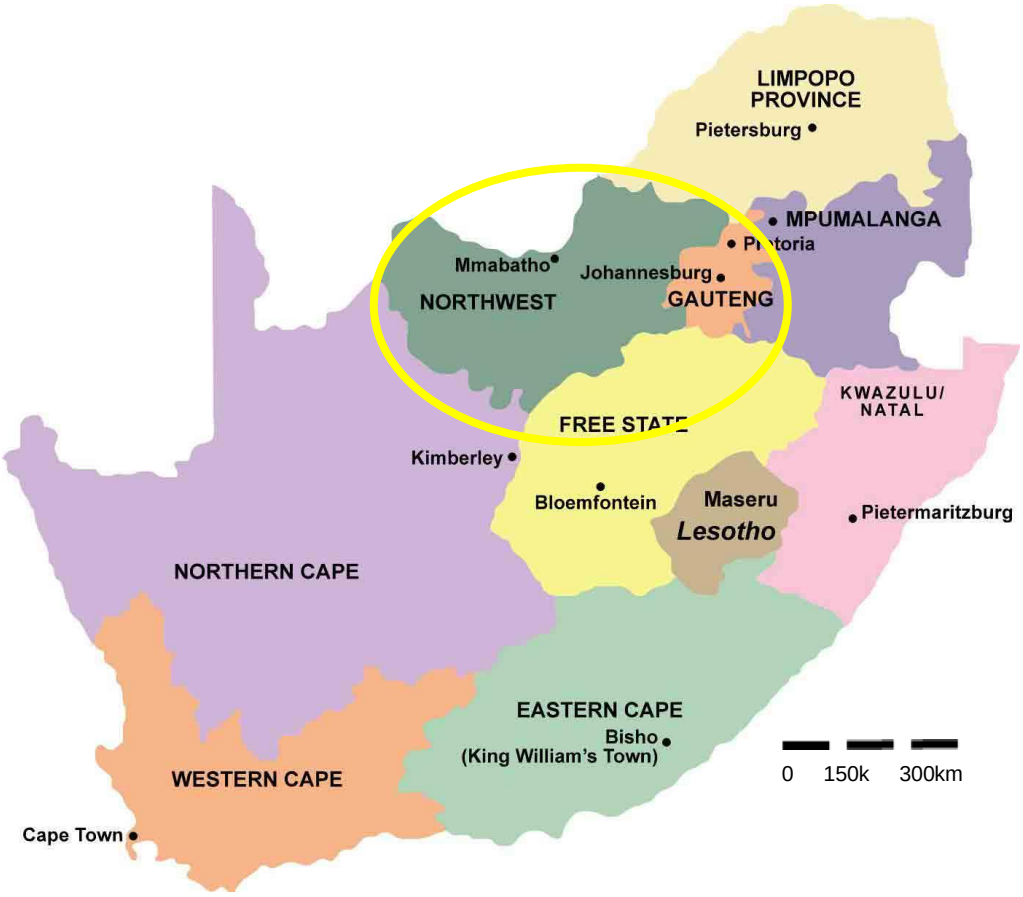


Figure 3.1: Provinces of South Africa (Bookingsafrica.com)

BPDM was founded in December 2000, following the disestablishment of the Rustenburg and Eastern Transitional District Councils. The area of jurisdiction of the district municipality consists of the five local municipalities of Kgetleng Rivier, Moretele, Moses Kotane, Madibeng and Rustenburg. The BPDM offices are located in Rustenburg see Figure 3.2.

Figure 3.2: The location of SCR in the North West province (Places, 2014)

The BPDM is an important mining area for South Africa that contains mainly platinum and chrome reserves. Because of the mining activities, the district experiences negative environmental impacts, particularly on water resources. Furthermore, the international status and global cultural importance of the Cradle of Humankind World Heritage Site requires cooperative governance from the district, provinces, national departments as well as international organisations such as the United Nations Educational, Scientific and Cultural Organisation (UNESCO) to manage the various pressures and impacts on the area effectively (BPDM, 2011).

The Pilanesberg National Park borders the resort on the northern and eastern borders, as illustrated in Figure 3.3 below. The crater of an extinct volcano is the setting of the Pilanesberg National Park – a fascinating alkaline complex produced

by volcanic eruptions some 1 300 million years ago. Pilanesberg is one of the largest volcanic complexes of its kind in the world. Its rare rock types and structure make it a unique geological feature (North West Parks and Tourism Board, 2015).

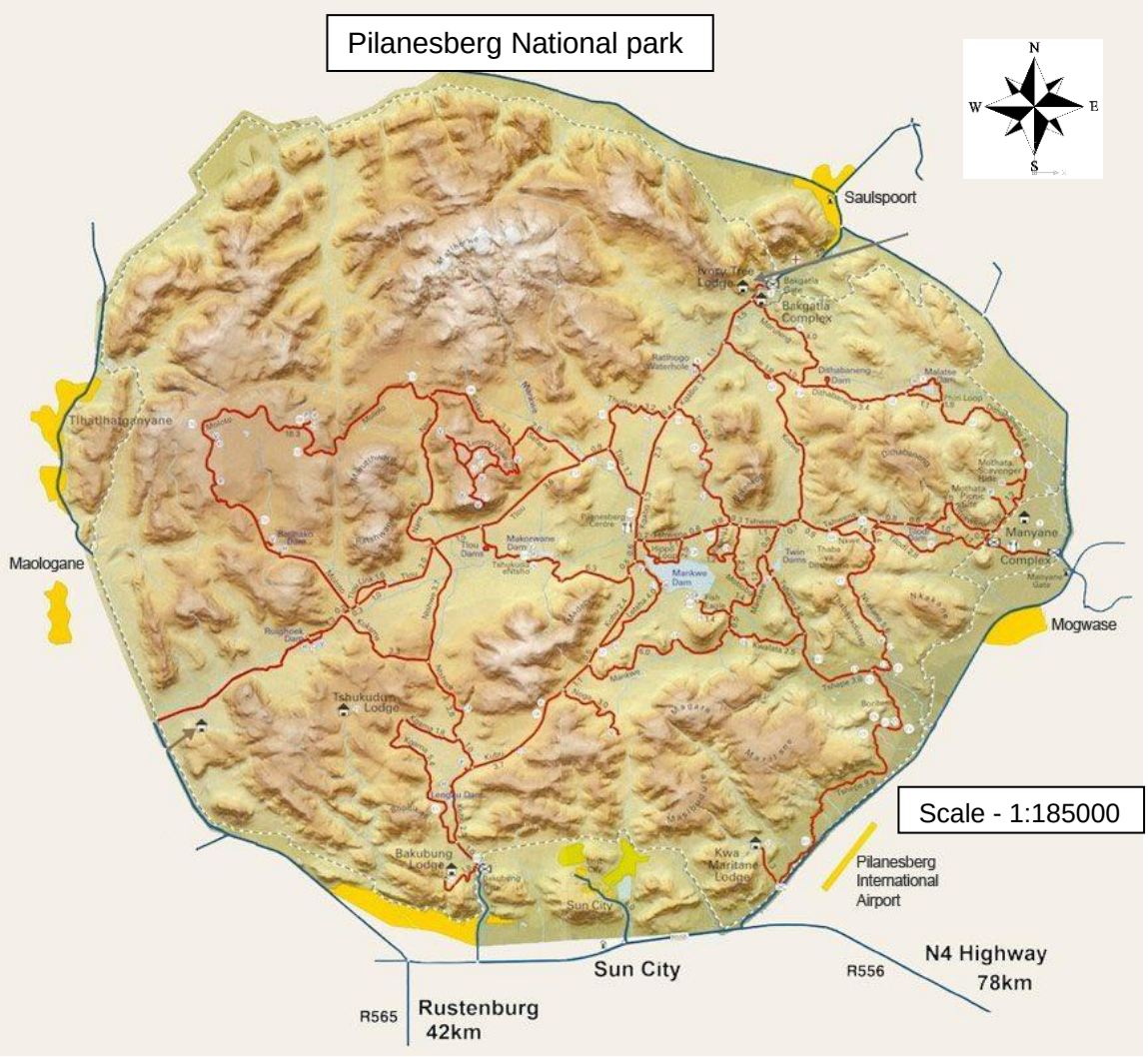


Figure 3.3: Pilanesberg Ring Complex (Pilanesberg Game Reserve, 2016)

The area is fringed by three concentric ridges or rings of hills – the formation rises from the surrounding plains like a bubble. The mountain range layout of the park is termed the Pilanesberg National Park Alkaline Ring Complex (North West Parks and Tourism Board, 2015).

3.3 Local population dynamics

According to the Statistics South Africa, the population of the BPDM area was estimated at 1 507 505 people in 2011, which is a 29.18% increase from 1996. The population in BPDM represents almost 43% of the total population in the province.

The distribution of people within the five local municipalities of the Bojonala district area indicates that the majority of the people, 36% and 31% respectively, reside in the Rustenburg and Madibeng Local municipalities. The MKLM grew by 2.3% in the last decade to a total of 242 554 individuals, see Table 3.1.

Table 3.1: Population growth in North West province district municipalities (adapted from Stats SA, 2011)

District	1996	2001	2011	Percentage growth from 1996	Percentage of North West population
Bojonala	1 067 562	1 189 360	1 507 505	29.18	42.95
Ngaka Modiri Molema	691 529	764 840	842 699	17.94	24.01
Dr Ruth Segomotsi Mompati	415 854	430 228	463 815	10.34	13.21
Dr Kenneth Kaunda	552 278	599 670	695 933	20.64	19.83
North West Province	**2 727 223**	**2 984 098**	**3 509 953**	**22.30**	**100.00**

In terms of population growth within the district municipalities, all areas showed an increase in population between 1996 and 2011, of which the increase in BPDM was the most significant at 29.18% (Stats SA, 2011).

Within the BPDM area, there were slightly more men compared to women in 2011. The urban areas within the district have more men than woman. While the Moses Kotane local municipalities has more woman (52%) than men (48%). This is indicative of the land use in these municipalities, which comprise more rural land. Typically, women then become the subsistence farmers at home while men migrate to work on the mines or urban centres.

3.4 Climate

South Africa and particularly the North West province is known for its climate with sunshine during most days of the year. The North West province is arid in relation to other provinces, and only receives around 73 days of rainfall a year compared to

KwaZulu-Natal with 149 days (Weather2travel, 2015), see Table 3.2. Premier Thandi Modise has declared the entire province of the North West a drought-stricken area in terms of Section 41 of the Disaster Management Act No. 57 of 2002 (as amended on 9 July 2013) (News24, 2013). The mean annual temperature is 27 degrees Celsius with an average of 12.1 hours of daylight. Tourists seek destinations with favourable weather conditions and SCR can offer some of the best conditions available in South Africa, hence the name Sun City.

Table 3.2: Climate of SCR (Weather2travel, 2015)

Aspect	Months of the year											
	J	F	M	A	M	J	J	A	S	O	N	D
Max day-time temperature (°C)	31	30	29	26	24	21	21	24	28	30	30	31
Min night-time temperature (°C)	18	17	15	12	7	3	3	6	11	14	16	17
Hours of sunshine (daily)	9	9	8	8	9	9	10	10	10	9	9	9
Hours of daylight (daily)	14	13	12	11	11	11	11	11	12	13	13	14
Days with some rainfall	11	9	9	6	2	2	1	1	3	7	10	12
Monthly rainfall (mm)	103	101	80	48	12	9	3	3	16	55	75	121

3.5 Accommodation and facilities

SCR has four luxury hotels and the Vacation Club. The resort can accommodate over 6 058 guests in 1 683 rooms. The resort operates with a staff compliment of around 6 500 employees on any given day. This compromises of Sun International staff, business partners, concessionaires and contractor staff. Around 60% of the Sun International (SI) staff members receive accommodation on the resort. Casual staff and business partner employees and the remaining SI staff stay in adjacent

local community villages. There are 739 units that range from bachelor flats to three-bedroom houses. See Table 3.3 depicting the number of rooms and beds at SCR. Due to these being homes for staff, they have a greater impact than the normal hotel rooms. These staff units consume water for washing clothes, household cleaning and irrigating gardens. They also produce general and hazardous waste and use electricity for heating and cooking.

Table 3.3: Sun City Resort rooms and beds

SCR rooms		
Accommodation unit	**Rooms/ Units**	**Beds**
The Palace	338	820
Cascades Hotel	243	650
Sun City Hotel	340	1 036
The Cabanas	380	1 160
Vacation Club Phase 1	234	1 504
Vacation Club Phase 2	148	888
Total	1 683	6 058
Staff accommodation		
South Village	354	757
Old Staff Village	337	469
Cascades Flats	48	55
Total	739	1 281
Grand Total	2422	7339

The geographical locations of the hotels and Vacation Club are highlighted on the aerial photo in Figure 3.4.

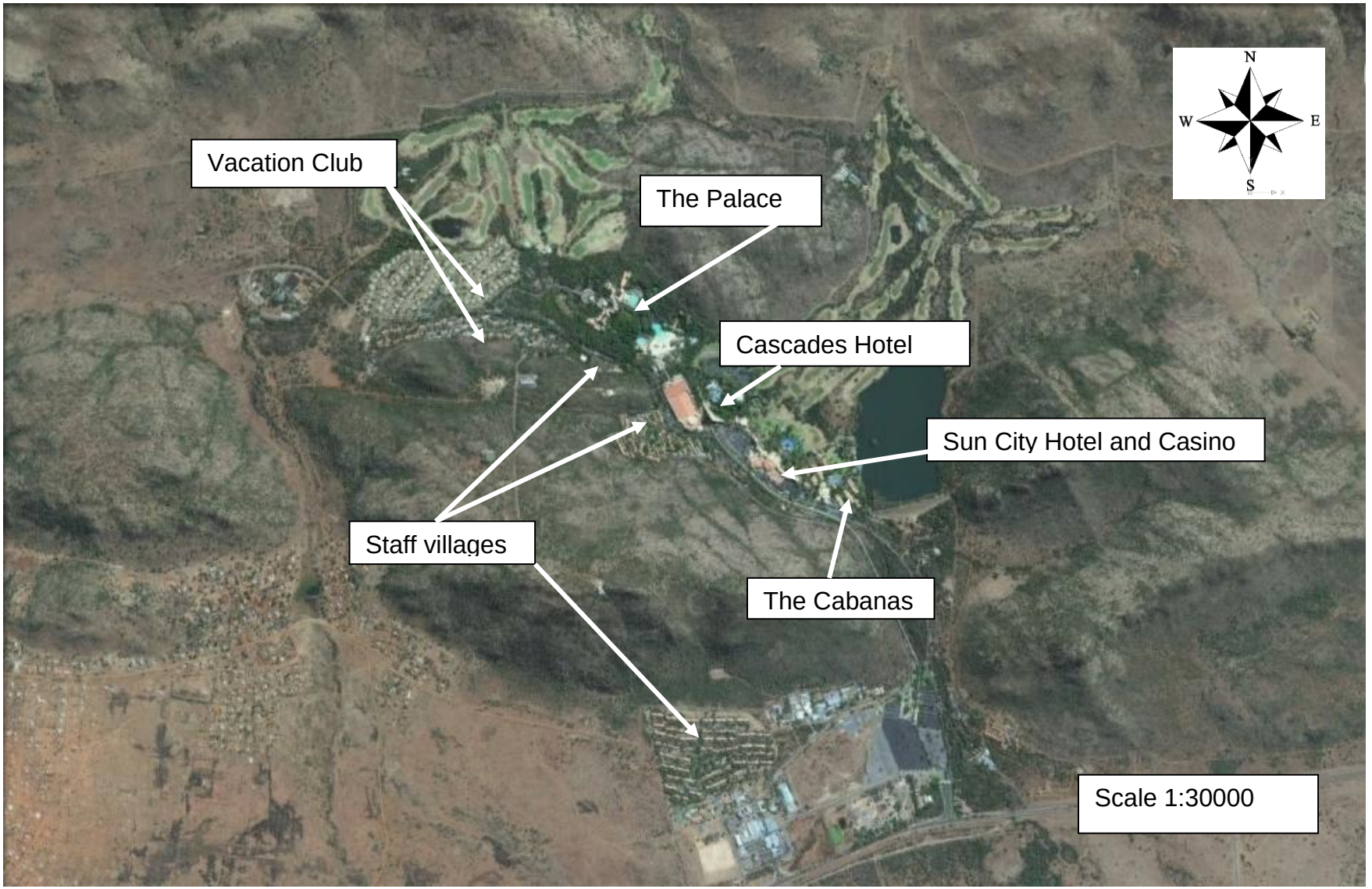


Figure 3.4: Google Earth view of SCR (GoogleEarth, 2014a)

3.6 A brief description of each hotel

3.6.1 The Palace of the Lost City

The Palace of the Lost City is one of the Leading Hotels of the World (LHW) and one of only 11 of these Leading Hotels of the World in South Africa. To become a member of the Leading Hotels of the World, the hotel must undergo an assessment to determine if the hotel meets the LHW standard. The Palace of the Lost City has 338 rooms. The Palace has a double story parking lot separate from the hotel with a wetland on top of the roof. The theme for the hotel came from an ancient city lost in a dense forest. The hotel is surrounded by a 19.8-hectare garden with some of the rarest flora from various countries around the world with 3 200 different species to date.

The Palace, as it is known across the resort, offers the largest suites on the resort, especially African and King suites.

Figure 3.5: The Palace of the Lost City (Whiffler, 2009)

Table 3.4 illustrates the type and size of the rooms available at The Palace of the Lost City.

Table 3.4: Rooms at The Palace of the Lost City (Whiffler , 2009)

The Palace of the Lost City – Room type	Quantity	Surface area (m^2)	Total surface area (m^2)
Luxury twin rooms	151	35.5	5 360.5
Superior luxury family rooms	55	51.4	2 827
Superior luxury rooms	78	46	3 588
Superior luxury pool-facing rooms	35	46	1 610
Junior suites	6	70	420
Superior suites	6	88	528
Presidential suite – Desert suite	1	243	243
Presidential suite – Royal suite	1	243	243
Presidential suite – King suite	1	243	243
Presidential suite – African suite	1	250	250
Paraplegic rooms	3	45	135
Rooms	338	15 448	
Total hotel area (m^2)	64 380		

3.6.2 The Cascades Hotel

The Cascades Hotel is a five-star hotel on SCR that opened its doors in 1983. This hotel has 243 rooms and two restaurants. The hotel was named after its cascading outline. A lush forest encloses the hotel in the front with a pool complex that has a hot- and cold-water pool and a mediterranean restaurant. The hotel caters for the general public on the resort looking for a superior stay in a high-class five-star hotel. It is also ideally situated central to the resort and close to the Valley of Waves and the Gary Player Country Club. The hotel underwent a soft refurbishment in certain areas in 2013. The following was done:

- The coffee shop, Scallini's, across the reception was removed and changed into a group check-in desk.
- Vista Bar was revamped into Luma cocktail bar outside on the veranda.

- The reception was moved further into the hotel to make way for an upmarket whiskey bar in the foyer.
- Some equipment in the rooms was changed.

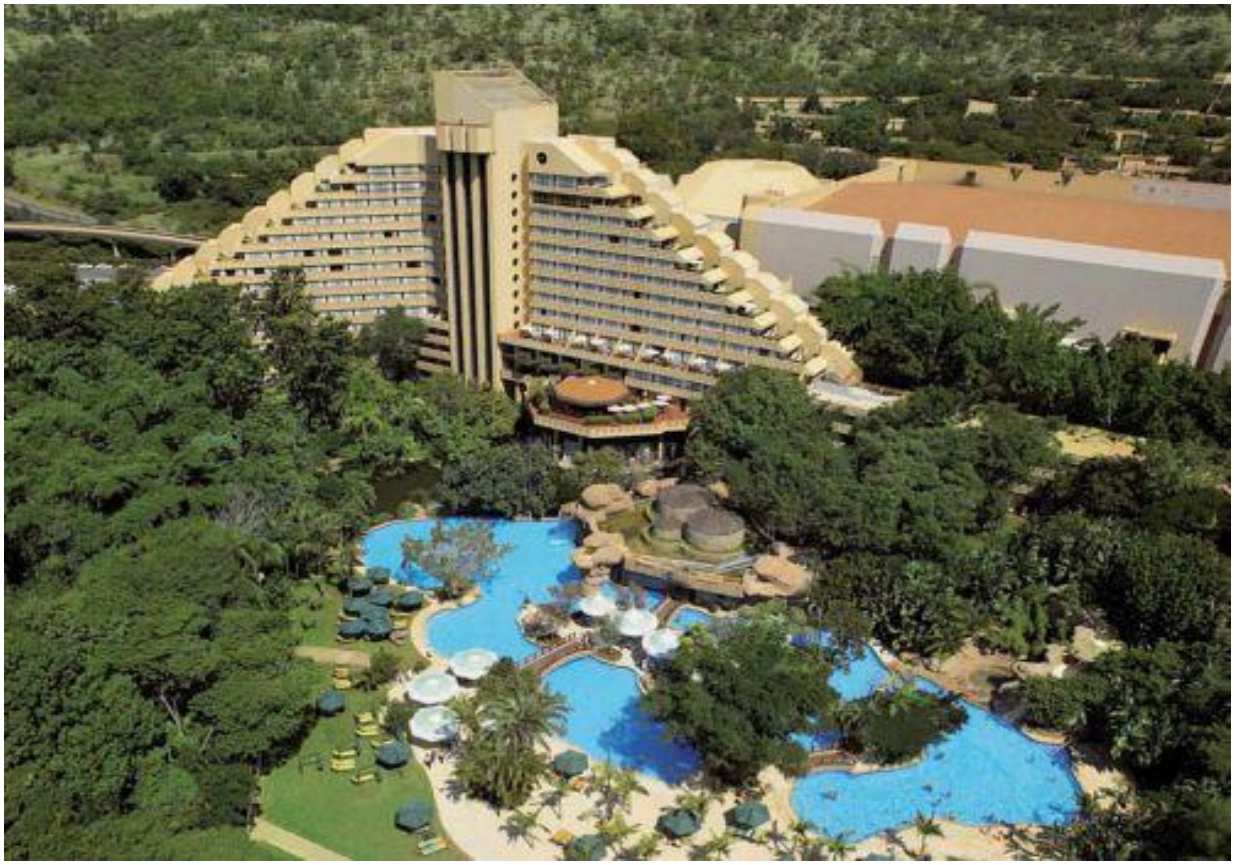


Figure 3.6: Cascades Hotel (Whiffler , 2009)

The Cascades Hotel has the smallest footprint and least amount of back-of-house facilities compared to the other hotels, as most facilities are integrated with the Entertainment Centre. The two areas share the same loading bay, waste area, gas infrastructure and maintenance storage areas. Other hotels on the resort have their own facilities. Table 3.5 below illustrates the type and size of the rooms available at the Cascades Hotel.

Table 3.5: Rooms at the Cascades Hotel (Whiffler , 2009)

Cascades Hotel – Room type	Quantity	Surface area (m^2)	Total surface area (m^2)
Luxury twin rooms	97	30	2 910
Luxury family rooms	63	33	2 079
Superior luxury family rooms	17	33	561
Superior luxury rooms	39	44	1 716
Superior luxury rooms with balcony	15	44	0
Luxury suites	6	65	390
Presidential suite – Garden suite	1	91	91
Presidential suite – Peacock suite	1	169	169
Presidential suite – Flamingo suite	1	224	224
Presidential suite – Heron suite	1	250	250
Paraplegic rooms	2	33	66
Rooms	243	8 456	
Total hotel area (m^2)	25 162		

3.6.3 The Sun City Hotel

The Sun City Hotel and Casino is the oldest hotel on SCR. The Entertainment Centre casino and Sun City Hotel casino were merged in 2012, with everything now being housed in the Sun City Hotel. The hotel has 340 rooms, six restaurants and a five-star conference venue.

Figure 3.7: Sun City Hotel (Whiffler , 2009)

The hotel was revamped in 2008 and 2009. Each year 50% of the hotel was done in order to be ready for the Nedbank Golf Challenge (NGC), which is hosted each year on the first weekend of December. No construction could take place during peak season and the NGC, so the revamp process stopped before NGC and commenced in the New Year after the peak season has ended. Table 3.6 illustrates the type and size of the rooms available at the Sun City Hotel and Casino.

Table 3.6: Rooms at the Sun City Hotel and Casino (Whiffler , 2009)

Sun City Hotel – Room type	Quantity	Surface area (m^2)	Total surface area (m^2)
Luxury twin rooms	120	28	3 360
Luxury family rooms	85	35	2 975
Superior luxury family rooms	53	40	2 120
Ground floor superior luxury family rooms	36	40	1 440
Superior luxury rooms	20	37	740
Ground floor superior luxury rooms	14	37	518
Luxury suites	6	77	462
Presidential suites	2	132	264
Paraplegic rooms	4	35	140
Rooms	340	12 019	
Total hotel area (m^2)	32 860		

3.6.4 The Cabanas

The three star Cabanas was the second property to be built on the resort and has 380 rooms. The Water World, Animal World and Kwena Gardens form part of this division. It is aimed at the domestic tourism market and the prices are much more affordable than that of the other hotels. It is therefore an older property and being busy it requires more maintenance. The hotel has the second most amount of rooms of all the hotels on the resort, although they are the smallest in size.

Figure 3.8: The Cabanas (Whiffler , 2009)

The hotel was be revamped in January to November 2015 to improve the room décor and layout

Table 3.7 illustrates the type and size of the rooms available at The Cabanas.

Table 3.7: Rooms at The Cabanas (Whiffler , 2009)

The Cabanas – Room type	Quantity	Surface area (m^2)	Total surface area (m^2)
Standard twin rooms (single beds)	104	26	2 704
Standard twin rooms (double bed)	16	26	416
Lake-facing twin rooms	24	26	624
Standard family rooms	201	29	5 829
Ground lake-facing family room	16	29	464
Upstairs lake-facing family room	16	29	464
Paraplegic rooms	3	29	87
Rooms	380	10 588	
Total hotel area (m^2)	21 963		

3.6.5 The Vacation Club

The Vacation Club is a business partner of SCR. It forms part of the Resort Condominiums International (RCI) timeshare group and developed over two phases. Phase 1 saw 50 three-bedroom units and 184 two-bedroom units being built. Phase 2 was built in 2005 and consisted of 148 two-bedroom luxury units. It has the highest number of rooms on the resort.

Figure 3.9: Vacation Club (Whiffler , 2009)

Phase 2 underwent a soft refurbishment in 2012 to replace decor and furniture and add a key card energy-management system, solar geysers and plumbing fittings. The 12-year timeshare period for Phase 1 was completed in December 2013 and it was not placed back on the market again through Vacation Club. SCR retained the buildings and started an extensive refurbishment of the units. The company is now called Sun Vacation Club and sales of timeshare started in December 2013 in order to occupy units from May 2014 onwards. Table 3.8 illustrates the type and size of the rooms available at the Vacation Club.

Table 3.8: Rooms at the Vacation Club (Sun Vacation Club, 2015)

Vacation Club – Room type	Quantity	Surface area (m2)	Total surface area (m2)
Phase 1: Three-bedroom apartments	50	174.41	8 720.5
Phase 1: Two-bedroom apartments – ground floor including patio	184	95	17 480
Phase 2: Luxury two-bedroom timeshare units	148	125	18 500
Rooms	382		44 700.5
Total hotel area (m^2)	44 700.5		

3.7 Other facilities

Other than the four hotels and the timeshare offerings, the resort has various facilities to ensure that operations run well and guests are satisfied. These include the maintenance yard and warehouse, WWTW, a transport department with a fleet of over 100 vehicles, mobile equipment such as generators, cherry pickers and a sky train. Retail and recreational activities includes the Entertainment Centre, which houses the Superbowl, food outlets and children entertainment. The Valley of Waves, Waterworld, Kwena Gardens and the two championship golf courses are some of the outdoor offerings available.

3.8 Environmental Department

To ensure that the impacts of all the above facilities are managed well, SCR has its own Environmental Department consisting of three employees. An environmental manager leads the team, assisted by the environmental officer and a training and awareness officer. The department was formed in 2009, but environmental initiatives were implemented as early as 2004 with a waste-separation system and a basic EMS. In January 2014 preparations were made to switch over to ISO 14001 EMS, which is an internationally recognized standard for managing the environmental aspects of a business. SCR was certified in October 2014 as an ISO 14001 business. The department focuses on five core management areas, namely energy,

water and waste management, fauna and flora management and awareness and training.

In order to implement the strategies and meet the objectives of the EMS, the environmental team has formed a Green Team in each of the 13 departments at SCR. The teams consist of management representatives and decision makers in the department and besides their normal day-to-day functions, they also implement the requirements of the EMS to maintain ISO 14001 certification. The EMS is based on a Policy statement, as illustrated in Figure 3.10. The Environmental Policy was developed on the 5th March 2006. It was since revised nine times. The last was the most significant revision which is a combination between the old SCR environmental policy and the SI Group Sustainability Policy.

Sun City

SUN CITY RESORT
SUSTAINABILITY POLICY

VISION STATEMENT

As a Resort, we are aware of the important role we play and the impact that our business has on the environment and communities.

The vision of the Sun City community will assist in the long-term sustainability of the Tourism Industry by creating awareness and being committed to working at the highest level to protect and enhance our environment.

POLICY STATEMENT

To this end Sun City is committed to develop, implement and maintain management systems for safety, health, environment and quality that are consistent with internationally recognised standards. This enables us to:

- Identify, assess and manage risks to employees, guests, contractors, service providers, concessionaires, the environment and the surrounding community.
- Comply with South African and international legislation and best practices relevant to our business operations including but not limited to Corporate Management, Environmental, Health and Safety, Gaming, Corporate Social Investment, BEE and Labour Relations aspects.
- Have effective management systems in place to reduce and prevent pollution to air, water and soil.
- Protect biodiversity including sensitive ecosystems and landscapes
- Management of waste through principles of the waste hierarchy by preventing, reducing, reusing, recycling, recovery and disposal.
- Monitor and minimise use of our natural resources and ensure sustainability of eco-systems.
- Develop our people and provide resources to meet our target needs.
- Ensure the sustainability of our local communities social infrastructure needs through projects including community investment, health, welfare, education and skills development.
- Value our cultural heritage and respect traditional rights of indigenous people.
- Communicate with and engage all employees, guests, contractors, service providers, concessionaires and our surrounding community to share the responsibility for meeting the requirements of this policy.
- Develop partnerships with suppliers and business partners that focus on creating sustainable value for everyone by applying environmental and social criteria in the procurement of goods and services.
- Demonstrate good corporate governance and implement a carbon footprint reduction and disclosure programme.

To this end Sun City is committed to continuously improve on the management of it's financial, environment and social impacts in order to remain a sustainable tourism destination.

Sun International

Figure 3.10: SCR Sustainability Policy (Sun City Environmental Department, 2014)

Below is a short explanation of each of the policy statements from the SCR Sustainability Policy:

Identify and manage risks: Risks to the environment are identified and recorded on an aspects and impacts register so that management plans can be developed to reduce the significance of the impacts. All activities on SCR will have a potential impact and must therefore be managed appropriately.

Legal compliance: South Africa has powerful environmental legislation that governs how businesses should operate in order to be compliant. Because SCR is a gaming business with a high number of employees, it is required to comply with other regulations such as Black Economic Empowerment regulations, the Occupational Health and Safety Act and the Gaming Board regulations.

Pollution prevention: Activities listed under the aspects and impacts register can potentially impact on the environment if not managed well. Impacts that could occur are air, soil and water pollution. When instances are noted where non-conformance exists in the operation, the EMS allows for a request to be sent out to the responsible person. The responsible person or department is issued with a non-conformance report to request corrective and preventative action going forward.

Waste management: Waste management can have severe impacts if managed incorrectly, especially hazardous waste. SCR has an on-site waste-management company to recycle all general waste possible and to ensure that hazardous and non-recyclable waste is disposed of correctly.

Natural resource management: Energy and water use are two of the greatest consumables on SCR and are closely managed to reduce the demand of these scare resources. This is mainly a function of the Infrastructure and Electrical departments, which fit into the maintenance manager's departmental portfolio. The Environmental Department, assisted by specialists contracted by Sun International, work together to reduce the resort's demand on electricity and water.

Awareness and education: The Environmental Department conducts environmental awareness training once a week for available to all staff of SCR. The training is

compulsory and spans one full day. Awareness events are planned at least once a month and usually involve a Green Team to plan an event. Local schools are also incorporated to extend the awareness footprint. Awareness events are based on annual calendar events such as World Water Week or World Environmental Day.

Corporate social investment (CSI): Sun International launched Sun Cares in 2014, which is the name given to the CSI programme for the group. Each hotel or resort is required to implement various strategies each year to improve the livelihood of the people living close to the property.

Sustainable procurement: Procurement of products that are universal in the group are dealt with by the group procurement manager, and stringent policies are in place in vetting all suppliers to ensure they have environmental guidelines in place to reduce the impact in the manufacturing of their products and to reduce their carbon footprint as much as possible. The same process is followed at property level.

Corporate governance: Sun International, being a public company listed on the JSE, is required to report on the economic, social and environmental performance of the business each year. This reporting line is referred to as the SRI Index. It also includes the declaration of the carbon footprint of the property, which is mainly derived from its energy use.

3.9 Conclusion

SCR is often compared to a city because of the infrastructure, facilities and services on the resort. SCR is a unique resort which attracts close to 2 million tourists each year. It has the equivalent of a small town's infrastructure with its own landfill site, WWTW, reservoirs and various substations (Buhrmann, 2010).

In Chapter 4 the research design and methodology of the study are discussed in detail.

Chapter 4

Research design and methodology

4.1 Introduction

The purpose of this chapter is to give an overview of the method of the study and how the quantitative and qualitative data were gathered in order to effectively answer the objectives of the study. The research design is the overall strategy the researcher chose to effectively integrate all the components of the study in a logical way to answer the research question (De Vaus, 2006).

4.2 Research design

In order to accurately answer the six objectives of the study, both exploratory and descriptive research were used. The study therefore employed a mixed-methods research design.

4.2.1 Exploratory research

This design is most appropriate when researching subjects of which there is a high level of doubt, if there is lack of knowledge of the subject or if the problem is not very well understood. Due to the uncertainty of the new field of study, the researcher must exercise a high degree of flexibility to ensure that sufficient information is collected (Van Wyk, 2012). According to Van Wyk (2012:8), the main aim of exploratory research is to “identify the boundaries of the environment in which the problems, opportunities or situations of interest are likely to reside, and to identify the salient factors or variables that might be found there and be of relevance to the research”. Exploratory research is defined as research conducted to gain new insights and discover new ideas, and for increasing knowledge of the certain area or subject (Burns & Grove, 2001:374). The environmental impacts of mass tourism resorts in South Africa have not been explored or properly researched yet, and this study reveals this valuable information.

4.2.2 Descriptive research

When research studies are undertaken in the tourism industry, researchers often use descriptive research because of three reasons: (1) It is a relatively new field of research, (2) the tourism industry is constantly changing, and (3) research seldom

leads to action (Veal, 2006). This paper will provide feasible recommendations to the study area to improve the operation based on analysis from quantifiable data. This could empower the management team to take action to improve the EMS.

According to Van Wyk (2012:9), “the main aim of descriptive research is to provide an accurate and valid representation of the factors or variables that are relevant to the research question. It is also more structured than exploratory research”. The quantitative secondary data gathered from SCR were analysed to understand the guest impacts and the ability of SCR to manage these impacts. This research design showcases an exact depiction of the operations of SCR with regard to environmental impacts and mitigating performance.

4.2.3 Mixed-methods approach

Researchers often have to use more than one research approach to meet the objectives of the study and answer the research questions. For this study, both quantitative and qualitative methods were required. According to Mearns (2011:60), “[i]t is generally recognized that all research methods, both quantitative and qualitative, have limitations, and that by triangulating data sources researchers could seek convergence across qualitative and quantitative methods”. The concept of mixing methods was originally introduced by Jick (1979) as a means for seeking convergence across qualitative and quantitative methods within social science research (Creswell, 2003). By combining qualitative and quantitative findings, an overall or negotiated account of the findings can be forged, which is not possible by using a singular approach (Bryman, 2007).

The purpose of a mixed-methods approach is not to replace qualitative or quantitative methods, but to draw on the strengths and minimise the weaknesses of both if used individually. Mixed-methods research offers great promise for practising researchers who would like to see methodologists describe and develop techniques that are closer to what researchers actually use in practice (Johnson & Onwuegbuzie, 2004). Mixed-methods research as the third research paradigm can also help bridge the divide between quantitative and qualitative research (Onwuegbuzie & Leech, 2004, as cited in Johnson & Onwuegbuzie, 2004). The qualitative data is secondary data that was collected by SCR employees as part of

their daily monitoring and measurement functions for energy, water and waste. The data was analysed to look at the changes in consumption and generation levels and discussed in chapter 5 and 6. The qualitative data was obtained through the use of questionnaires that were completed by guests. The questionnaires had two section. Section one focussed on the demographics of the guests or day visitor and the second section was about their perception on the environmental performance of SCR

4.3 Multiple case studies

The study investigated SCR as a whole for all six objectives and the five individual accommodation units separately for objectives 1 and 2. The secondary data availability allowed for the additional individual analysis for energy and water at unit level as well.

4.4 Specific research design elements

The research question is: What is the environmental performance of SCR with relation to energy, water and waste management? In order to successfully answer it, six research objectives were set. In order to understand how the information was obtained to meet the objectives the following sections look at the information required, how it was accessed and how it was linked to meet the objectives and answer the research questions.

4.4.1 – Objectives 1 and 2

The study's objectives

For the first two research objectives, the same method of secondary data collection was used.

1. To determine and analyse the energy consumption of the five accommodation areas and SCR as a whole.

2. To determine and analyse the water consumption of the five accommodation areas and SCR as a whole.

Approach: Quantitative approach

Data source: Secondary data

The proposition

The SCR Environmental Department consolidates the secondary data collected and analysed by maintenance, service providers and contractors on a central registry referred to as the resource tracking sheet. The process started in 2002 with water and electricity figures, which were easily retrieved from invoices. As the environmental focus grew, items were added to the sheet for data record keeping. Some of the information is based on actual consumption and others on invoice amounts per month. The information is captured on the resource tracking and checks are done immediately and explanations are requested for anomalies in the data. This is the second level of checking, because the data collectors also check their accounts and meter readings on a daily, weekly or monthly basis. Table 4.1 lists all the data streams that were used to answer research objectives 1 and 2. Solar geysers and heat pumps are used across the resort but they are not measured although their impact on the consumption rates are evident.

Table 4.1: Energy and water data selection

Data type	Recorded data
Energy	Electricity use of The Palace, Cascades Hotel, Sun City Hotel and Casino, The Cabanas and Vacation Club
	Electricity consumption of the entire resort
	LPG consumption of the entire resort
	Coal consumption of the entire resort, although it is only used at the Kwena Gardens
	Diesel consumption of the entire resort
	Petrol consumption of the entire resort
Water	Water consumption of The Palace, Cascades Hotel, Sun City Hotel and Casino, The Cabanas and Vacation Club
	Water consumption of the entire resort

Unit(s) of analysis

Monthly consumption figures for both water and energy (electricity, LPG, coal and fuel) are recorded on the resource tracking sheet, as indicated in Table 4.2.

Table 4.2: Energy and water measurements and units

Type of energy	Units	Symbol
Electricity	Kilowatt hour	kWh
LPG	Kilogram	Kg
Coal	Kilogram	Kg
Fuel (diesel and petrol)	Litre	L
Water	Litre	L

Logical linking of the data to the propositions

Whenever guests visit a tourism destination they use various facilities that require large quantities of natural resources, namely energy and water. Electricity is not a natural resource, but it is mainly derived from coal. Coal-fired power stations supply the majority of the electricity in South Africa. Therefore, consumption of electricity, which is derived from coal which is a non-renewable natural resource, has a massive environmental impact and can therefore be linked to SCR's environmental performance. Natural coal used for heating water at Kwena Gardens is mined and causes environmental damage. LPG is also taken directly from natural resources and has similar impacts to those mentioned above. Water resources are taken from a local dam and supplies by the municipality. The use of this scarce resource leads to depletion, and therefore impacts on the environment.

Fuel, diesel and petrol are by-products produced during crude oil refining. Crude oil is also a natural resource that is depleted and mining processes cause serious environmental damage and risks.

Criteria for interpreting the findings

The energy and water consumption figures recorded on the resource tracking sheet were compared year on year to see whether the consumption was reduced each

year. Consumption is also linked to occupancy and some other factors, which are dealt with in Chapter 5.

4.4.2 Objective 3

The study's objective

3. To determine and analyse the solid waste and waste water generation and recycling (sewage treatment) rates of SCR.

Approach: Quantitative approach

Data source: Secondary data

The proposition

SCR generates three types of waste namely solid waste, hazardous waste and waste water. Solid (General) waste as defined in the National Environmental Management: Waste act 59 of 2008 means waste that does not pose an immediate hazard or threat to health or to the environment and includes, a) domestic waste, b) building and demolition waste, c) business waste and inert waste. Hazardous waste means any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment. Waste water is water containing waste. In the case of SCR it is from toilets and kitchens in the industry known as black and grey water respectively.

SCR contracts an on-site waste-management company that weighs and records the waste generated and recycled. The monthly reports are scrutinised by the Environmental Department and spikes and abnormal weights are questioned. The information is then captured on the resource tracking sheet and was retrieved for analysis. Two types of waste streams were investigated as per Table 4.3.

Table 4.3: Waste data selection

Data type	Recorded data
Waste	Solid (General) waste generated by the entire resort
	Waste recycled for the entire resort
Waste water	Raw sewage received from the entire resort
	Treated effluent of the entire resort

Unit(s) of analysis

Due to the large volumes of waste, it is recorded on the resource tracking sheet as tons (ton = 1 000 kg), but the figures were reworked to kilograms. The units are indicated in Figure 4.4.

Table 4.4: Waste and waste water data unit and measurement

Type of waste	Units	Symbol
Waste (generated and recycled)	Kilograms	Kg
Waste water	Litre	L

Logical linking of the data to the propositions

General waste is all solid waste generated in household, office and restaurants. It excludes all hazardous waste. The general waste is normally intended for the SCR permitted landfill site, but volumes of waste replace valuable airspace, the unit in which landfill space is measured. The aim is to retain air space on the landfill site for as long as possible and divert all recyclables away from being buried on these sites. Therefore, the recycling rate will reveal the level of commitment from the CSR environmental team and the on-site waste contractor to reduce the impact of burying waste. Organic waste, which in most cases is not recyclable, is designated to be landfilled. Organic waste that decomposes releases methane gas, which is a greenhouse gas that impacts on the environment. Due to the high volumes of organic waste, the provincial government informed SCR to apply for a waste management license prior to commencement of a food composting facility. Sewage

is treated on site and the treated effluent is used for irrigation on the golf courses. This positive impact and the extent to which the waste is managed will be measured.

Criteria for interpreting the findings

A similar approach as with energy and water was used. Year-on-year comparisons to determine improvement as the system matures were explored.

4.4.3 Objectives 4 and 5

The study's objectives

4. To investigate the perception of staff of SCR's energy and water consumption and waste generation and recycling.

5. To investigate the perception of guests of SCR's energy and water consumption and waste generation and recycling.

Approach: Qualitative approach – stratified random and voluntary participation

Data source: Questionnaires. See a copy of a guest and staff questionnaire attached in appendices 2 and 3.

The proposition

Staff questionnaires were circulated in two ways: (1) physical office-to-office visits to request any interested staff to complete the questionnaire, and (2) circulated questionnaires via email requesting staff to complete and return them. Guests were asked by means of a public announcement in the Valley of Waves to complete the questionnaire. There were four sessions over one month period between 13h00 and 14h00. Three announcements were made per session by the entertainment team to request guests to complete a questionnaire.

Unit(s) of analysis

Data from questionnaires were transferred to Microsoft Excel for analysis.

Logical linking of the data to the propositions

The analysis will show to what extent guests and staff members have been informed about the performance of the environmental management system. Their perception of the EMS will be analysed against the outcome of the quantitative data to check for similarities or misperceptions.

Criteria for interpreting the findings

The questionnaires were examined for patterns in the answers on the structured questions and similarities or extremes in the answers on the open-ended questions.

4.4.4 Objective 6

The study's objective

> 6. To make recommendations for the improvement of the environmental performance of SCR in terms of energy, water and waste management.

Approach:

Qualitative approach – stratified random and voluntary participation

Quantitative approach – secondary data from SCR internal records

Data source: Results from qualitative and quantitative paradigms

The propositions

Once the data from objective 1 to 5 were analysed, the environmental performance of SCR was determined. From the information recommendations are made in areas where the operations did not perform well.

Unit(s) of analysis

Analysis from objectives 1 to 5 yielded sufficient information to make a recommendation for objective 6.

Logical linking of the data to the propositions

The aim of this objective was to supply feedback to SCR so that the environmental programme can be improved.

Criteria for interpreting the findings

Not applicable

4.5 Data collection

The researcher used multiple methods of data collection to utilise all available modes of observation for both structured (questionnaires) and less structured (interviews) approaches and analysed existing documentary sources (such as annual reports, resource tracking sheets and month-end reports), following Mouton (2009). Data collection was achieved through implementation evaluation research for both quantitative and qualitative paradigms.

4.5.1 Quantitative data

A growing field in research over the past three to four decades is secondary data analysis (Mouton, 2009). In this study, the majority of the quantitative data was recovered from secondary data. Quantitative data were collected from historical data and monthly statistics. The data-collection period was backtracked to include data from 2002 to 2012. As mentioned earlier, the record sheets were relatively simple by only capturing electricity and water data from 2002. As the EMS evolved, more types of resources were added to the monthly resource tracking register. The register now keeps record of electricity and water consumption; water recycled; waste generated and recycled; LPG, coal, fuel and pesticide use; occupancy; revenue; generator fuel; recharges for any resources to business partners; refrigeration gas use; head count of staff; and composting volumes. For the purpose of this study, data on electricity use, water use and recycled and waste generated and recycled were used. The quantitative data were analysed using standard statistical techniques, as recommended by Mouton (2009), to determine annual means for the study duration and to conduct trend analysis to determine positive or negative environmental performance. Graphs are used to illustrate the data that were collected.

4.5.2 Qualitative data

The researcher compiled questionnaires and interviewed SCR staff and guests to gain qualitative data. The staff and guest questionnaires differed slightly, ranging from 25 questions in the staff questionnaire to a total of 33 questions in the guest questionnaire. Guest questionnaires also included day visitor questions and

questions on the guest's overnight experience. The questionnaire was divided into two sections: the first to capture the demographic information of the participants and the second for the environmental-related perception questions. The questionnaires are available under annexure 2 and 3.

Table 4.5 depicts the data that were requested on the questionnaires:

Table 4.5: Staff and guest questionnaire questions

Staff questionnaire	
Demographics and general information	
Question 1	What is your age?
Question 2	What is your gender?
Question 3	Marital status
Question 4	Race
Question 5	Country of origin
Question 6	Language
Question 7	Highest qualification
Question 8	Employment status
Question 9	Annual income
Awareness	
Question 10	Environmental signage in workplace?
Question 11	Tick list of media seen from Question 10?
Participation	
Question 12	Green Team member
Question 13	Participation in water saving?
Question 14	Participation in electricity saving?
Question 15	Use of recycling station
Perception	
Question 16	Opinion, is SCR a sustainable resort?
Question 17	Importance of EMS at SCR?
Question 18	Do you prefer green holiday destinations?
Question 19	Will you practise environmental initiatives at home?

Guest questionnaire	
Demographics and general information	
Question 1	What is your age?
Question 2	What is your gender?
Question 3	Marital status
Question 4	Race
Question 5	Country of origin
Question 6	Language
Question 7	Highest qualification
Question 8	Employment status
Question 9	Annual income
Question 10	Guest or day visitor
Question 11	Where are you staying?
Question 12	Length of stay
Question 13	Repeater rate
Question 14	Environmental signage
Question 15	Elaborate on Question 14?
Awareness	
Question 16	Signage in front-of-house
Question 17	Signage in rooms
Participation	
Question 18	Participation in water saving
Question 19	Participation in electricity saving
Question 20	Used a recycling station

Question 20	Proud to work at a sustainable resort?
Question 21	Aware of EMS at SCR?
Question 22	Do you support EMS?
Question 23	Environmental training completed?
Question 24	Single thing that made you aware of sustainability at SCR?
Question 25	Will you refer friend to SCR for a sustainable holiday?

Perception	
Question 21	Opinion, is SCR a sustainable resort?
Question 22	Importance of EMS at SCR?
Question 23	Will water saving interfere with holiday experience?
Question 24	Will electricity saving interfere with holiday experience?
Question 25	Will recycling interfere with holiday experience?
Question 26	Do you prefer green holiday destinations?
Question 27	Green destinations not part of criteria when looking at destinations for holiday?
Question 28	Will you practise environmental initiatives at home?
Question 29	Pay high rates for room – will not save resources?
Question 30	Concerned about carbon emissions when travelling?
Question 31	SCR being a sustainable resort – more comfortable staying here because of carbon emissions?
Question32	Single thing that made you aware of sustainability at SCR?
Question 33	Will you refer friend to SCR for a sustainable holiday?

4.6 Sampling method

A probability sampling strategy with stratified sampling (Straker, 2008) was used for qualitative data. Domestic and international guests from the five business units, namely The Palace of the Lost City, Cascades Hotel, Sun City Hotel, The Cabanas and Vacation Club, formed part of the sample population for the guest questionnaires. Questionnaires were distributed among guests in the Valley of

Waves to reach the sample population. This is one of the main attractions on the resort and at any given time has a mix of all guests from all hotels. By means of a public announcement, guests were requested to come to the entertainment stage to complete an environmental questionnaire. The process was voluntary. Staff questionnaires were distributed in offices and during Green Team meetings, while random groups also requested a number of copies, for example a department that supported the drive. In addition, two emails were circulated to the entire resort's employees who have access to email and were requested to complete and return the completed questionnaires. Selective sampling using a purposive strategy were used to obtain quantitative data. Sample size was 39 questionnaires. The core indicators that required quantitative data were taken from selected departments' monthly data reports as secondary data.

4.7 Measuring instruments

When using indicators that require qualitative data, questionnaires and interviews may be used on the sample population to gather data. Rating scales are used frequently in psychological research (Lane, 2008). Experimental subjects may be asked to rate the level of consumer product (Lane, 2008). The required field will be structured to include all aspects of the predetermined indicators and the sample population can rate their individual experience. Typically these ratings are made on a five-point Likert scale. These scales are ordinal scales, as there is no assurance that a given difference represents the same thing across the range of the scale (Lane, 2008). Respondents choose from a range of answers which aligns the best to their view (Losby & Wetmore, 2012). To convert the qualitative data to a quantitative number, each of the options are assigned a number. The least preferred option is one and the most preferred will be five. Each response is assigned a number and the total of all the response is divided by the total responses to give an average rating.

The core indicators as depicted in Table 4.6 were utilised as part of the process to determine the environmental performance of SCR. The indicators were selected based impact on the environment. It was also important to have data available to measure performance. Energy, water and waste management have some of the highest impacts on the environment and data was available for these. Occupancy data was also available which made it possible to link the consumption levels to

rooms occupied and individuals per hotel as well as the resort as a whole. There was little to no information available for biodiversity and hazardous waste management. Although renewable energy is used, there was no monitoring programmes to determine the contribution it has made, accurately. The reduction is evident in the areas where it was implemented, but it cannot be assumed that the total saving on the consumption rate was because of renewable energy solely and therefor for the sake of accuracy has been left out from the qualitative data.

Table 4.6: UNWTO core indicators (UNWTO, 2004a)

	Core indicator	Supplementary indicators	Output
1	Energy management	I. Per capita consumption of energy from all sources (Entire SCR, and for each hotel – per person day)	1. kWh per room for the resort and each hotel 2. kWh per person for the resort and each hotel 3. kWh per square metre per hotel 4. Consumption for resort and hotels
2	Water availability & conservation	I. Per capita consumption of water from all sources * (Entire SCR, and for each hotel – per person day)	1. Litre per room per resort and hotel 2. Litre per person per resort and hotel 3. Litre per square metre per hotel 4. Consumption for resort and hotels
3	Waste management		
	Solid waste management	I. Waste volume produced by the destination (tons) by month II. Volume of waste recycled (m3) / Total volume of waste (m3) (specify by different types) III. Waste per capita (Entire SCR only– per person day)	1. Kg waste generated per room 2. Kg waste generated per person 3. Kg waste recycled per room 4. Kg waste recycled per person
	Sewage treatment (waste water management)	I. % of sewage from site receiving treatment (to primary, secondary, tertiary levels)** (Entire SCR only– per person day)	1. Waste water treated 2. Litre per room – waste water generated 3. Litre per person – waste water generated 4. Litre per room – treated effluent 5. Litre per person – treated effluent

*Although not listed as a supplementary indicator, it is important to investigate to determine the environmental performance of the SCR. Reducing demand equals water conservation.

** South African legislation regards waste water as part of waste and therefore included here opposed to a separate indicator.

4.8 Data analysis

Data analysis is defined as a practice in which unorganised or unfinished data are ordered and organised so that utile information can be highlighted from them. It involves processing and working on data in order to understand what is present and absent from the data (Gode, 2010).

Typology analysis with the use of themes and categories (Gode, 2010) was used for qualitative data analysis. Questionnaires were structured so that guests and staff could choose from a data range on a rating scale of 1 to 5 based on levels of performance, where 1 represented excellent and 5 represented poor. This allowed the researcher to analyse the qualitative data as numerical data. Interviews with selective SCR employees aided in the explanation of results. This was achieved by using multiple methods of data collection with qualitative and quantitative data. Qualitative data were acquired by means of probability sampling using the simple random sampling method. Questionnaires and interviews were the tools for data collection from the sample population. Rating scales were used in the questionnaires to aid in the data analysis and categorisation process. Quantitative data were acquired by means of selective sampling using a purposive sampling method. Secondary data from the selected sample population were analysed.

4.9 Reliability

4.9.1 Quantitative data

4.9.1.1 Energy data

Electricity measurements are taken at the primary substation, which is the single electricity feed for the resort. The hotels and major facilities are also fitted with meters and monthly data are downloaded from the meters to record the consumption for the particular period. For this study, the researcher worked with the single feed to the resort to calculate the energy use by the resort from 2010 until 2013. The data for each of the four hotels and Vacation Club were used separately. LPG consumption was not measured per hotel, but rather based on the purchases over the study period. Each of the four bulk tanks are usually refilled once per month and the invoiced amount was used for the analysis. The purchase quantities are reliable and the only information available. Coal is only used at the Kwena Gardens Crocodile Sanctuary for heating water in boilers to be used in the breeding ponds.

The actual consumption is estimated, but purchases are recorded as use per month. These are proven amounts and are more reliable than estimated consumption.

Fuel use both for petrol and diesel is recorded on fuel issue lists when employees come to fill up vehicles and scooters. The data from the issue sheet were transferred to an electronic version by an administrator. The same employee has done this for more than 10 years and understands the importance of his work in order to allow for positive reconciliation each month.

Solar energy is implemented, but not measured. Feasibility studies completed by Pretoria-based universities for the solar projects were done and were used as a reliable data source.

4.9.1.2 Water

The Infrastructure Department is responsible for the management of fresh water and waste water at SCR. Internal processes are in place to measure water use by SCR on the primary supply line and also by each major area on the resort. The meters are calibrated each year and the same team of employees have been taking the readings every day since February 2009. The waste water that enters the WWTW is measured and recorded each day. The readings are totalled and recorded on a sheet that is sent to the Environmental Department each month.

4.9.1.3 Waste

SCR makes use of an on-site waste management company to manage all aspects of the waste on the resort. For 2004 until 2014 Platinum Waste Resources were contracted who were replaced with Don't Waste Services in August 2014. The solid waste was used for the study, and no hazardous or special waste. Waste is collected from 54 waste collection areas. There are only two disposal points for all the waste. It is either taken to the landfill site for disposal or to the recycling yard for processing and sold to recyclers. In both areas they have scales for accurate weights. The scale at the landfill site was only implemented in 2011; prior to that the volumes of waste inside the truck were converted to weights and recorded. The 2010 landfill data might be only relatively accurate, but there was no other information to work with.

4.9.2 Qualitative data

Questionnaires were completed by staff and guests and the researcher was present while 90% of these were done. This only excludes 12 questionnaires from The Cabanas, which were left there for staff, and three that were completed at the Welcome Centre. There were two guest questionnaires that were spoiled

4.10 Strengths of and limitations to content analysis

4.10.1 Strengths

The meter readings are taken from calibrated meters and are heavily scrutinised by the unit and departmental managers. The information is also used for many reporting lines to head office, departmental and month-end reports, award entries and government programme requirements for water, such as Green and Blue Drop systems. Accuracy in meters is crucial and management need to ensure that it is maintained. The figures are also audited by the Financial Department and spikes are flagged for explanation. The Electrical Department appointed an electrical optimisation technician whose primary job is to look for efficiencies and effectiveness of energy consuming equipment. He was also responsible for the data used by the researcher for this study.

4.10.2 Limitations

The number of casual and contractor staff on the resort each day was not included in the analysis. Obtaining this information would be labour-intensive, because each business partner's and all departments' attendance registers would have to be checked each day for four years to see who was working in which area per day. Because the casual and contractor employees form part and parcel of the service to the guest rooms, it was included as a room resource 'expense'. This means that if The Palace employs roughly two people per guest room, the energy use, water use and waste generation of the two employees were indirectly added to the per-room and per-person rate as calculated, because they use the resources in order to supply the required service. Some of the resource uses include staff showering before and after work, using the toilets, LPG and electricity use for staff canteens, fuel to transport employees to the workplace and waste generated from lunch. For the calculations of resort-wide resource use and occupancy, the residents of the staff villages were used. This consists mainly of permanent Sun International staff and

business partner staff. Casual and contractor employees who commute daily were not included, because they do not use too many resources besides the canteen and toilets once or twice a day.

The LPG figure for January 2010 is very low because most purchases took place in December 2009. It represents a tenth of the normal monthly consumption. The LPG consumption is calculated from purchases per month, which is usually once a month when the bulk tanks are replenished. For the January 2010 figure, an average was calculated from the volumes purchased in January 2011, 2012 and 2013. Only bulk LPG was used and not the single gas bottles used by some free-standing restaurants and events.

Coal consumption at Kwena Gardens was not recorded prior to January 2011, so for this study, the researcher only included 2011 to 2013 data. There was a period when the boilers were not functioning, namely from August to October 2011. The weight of coal used per month is not highly accurate. Coal is bought in 7-ton loads. It is not always necessary to use a full load of coal per month, especially in summer with high temperatures. It is then not necessary for the boiler to operate optimally, because the water will already be close to breeding temperature and Kwena Gardens is then only required to purchase coal every 2 months and the manager will equally divide the coal purchased between the months.

The water meters in The Palace for January in 2010 were broken and there are no data available for this month. The Cascades Hotel has two freshwater supply lines and only one line was measured and recorded until November 2012. The actual water consumption data for the hotel will be inaccurate prior to November 2012 and were therefore not included.

The implementation of meters at the primary feeds to hotels started in February 2009 and progressed to third-tier meters in 2013. The meter installation project started off with metering the major areas like hotels. Then the second tier meters were at high consuming areas within hotels or operations. The third meters are at smaller operations and specific areas like concessionaires in the Entertainment Centre or Sun City Hotel

No data are available for each waste-collection area, but only for the SCR resort as a whole. The data exclude garden waste, which is composted; carpentry wood, which is given to the local community; and all hazardous waste that is either safely disposed of or recycled. Hazardous waste disposal procedures are in place, but the documentation to get and verify the data is not in place.

Ethical parameters existed where the researcher did not approach guests relaxing around the pool or dining, as it would have affected the guest experience and may have led to complaints. The researcher used random and voluntary sampling, as discussed earlier in the chapter. Employees were targeted during late afternoons on Fridays when they are normally not too busy. The questionnaires were fairly lengthy, as it took around 10 minutes to complete.

After piloting the questionnaires and the duration of completing them was determined, the layout was changed to reduce the completion time. The biggest change was to add all the demographic data on one page in table format. Individuals were not approached because the approach was voluntary and random. The researcher made an announcement within a group to participate and people volunteered to assist. It was therefore not possible to determine refusals. No one directly refused to participate and those that did not participate could also not be labelled as refusals.

4.11 Ethical research design considerations

The researcher has an obligation to protect personal information from the participants of the study and to keep them from any harm. With the study area being a holiday destination with some of the best hotels in South Africa, the researcher was cautious not to cause nuisance to guests while they paid top rates for accommodation and enjoyed their holiday.

4.11.1 Voluntary approach and informed consent

SCR is a holiday destination and guests do not necessarily want to be bothered while they are busy with activities or relaxation with a request to complete a 10-minute questionnaire. For this reason a voluntary approach was decided on.

Approval was given by the managing executive for the researcher to circulate questionnaires in an ethical manner not to cause nuisance to guest and staff when sampling questionnaires. See annexure 2 for the full questionnaires.

4.11.2 Confidentiality and anonymity

People are sceptical to give out personal information these days because it might be used against them or used in a manner that they did not approve of. The researcher made the questionnaires anonymous to protect the privacy of the participants. The confidentiality and anonymity of their participation were also explained in the introduction and conditions of the questionnaire.

4.12 Sampling audience demographics

4.12.1 Staff questionnaire

Staff were visited in quiet times in the office so that they were not interrupted during peak working hours. Friday afternoons after four o'clock was the preferred timeslot. Green Team members were requested to participate, and a voluntary email campaign was done, where the questionnaire was sent and staff were requested to complete it and email it back to the researcher. There were 60 questionnaires completed of which one was spoiled.

Most staff are between 24 and 54 years of age. Most participant staff members were women (58%) and black (57%), while 28% were white and 10% were Asian. Most participants were single (52%) and secondly married (40%). English was the language most spoken at 38%, with a high percentage of Setswana-speaking people (34%), which is the local language. The feedback indicated that the participants had at least Grade 10 to 12 education and a large percentage had diplomas. The majority of the participants were employed by Sun International and earned between R100 001 and R200 000 (38%) and between R200 001 and R300 000 (29%). See Table 4.7 for the staff questionnaire.

Table 4.7: Staff questionnaire

Age	**%**
18–24	7
25–34	27
35–44	37
45–54	23
55–64	7
65+	
Gender	**%**
Male	42
Female	58
Marital status	**%**
Single	52
Married	40
Divorced	8
Widowed	
Separated	
Race	**%**
White	28
Black	57
Coloured	5
Asian	10

Country of origin	**%**
South Africa	93
Namibia	2
Germany	2
Indonesia	2
Mauritius	2
Language	**%**
English	38
Afrikaans	12
Setswana	34
IsiZulu	5
IsiXhosa	7
Sesotho	2
Hindi	2
Education	**%**
No schooling	0
Schooling but less than Grade 10	4
Schooling Grade 10–12	32
Diploma or 1–2 years at university or technical college	44
Bachelor's degree	18
Honours degree	4

Employment status	**%**
Permanently employed – Sun International	88
Permanently employed – Business partner	4
Permanently employed – Concessionaire	2
Contract worker	0
Casual worker	6
Retired	
Income	**%**
R0 – R50 000	4
R50 001 – R100 000	12
R100 001 – R200 000	38
R200 001 – R300 000	29
R300 001 – R500 000	10
R500 001 – R700 000	2
R700 001 – R900 000	2
R900 001 +	4

4.12.2 Guest questionnaires

Guests and day visitors were approached at the Valley of Waves by means of a public announcement. This is one of the facilities on the resort where a mixture of guests from all hotels and day visitors is present, and they were requested on a voluntary basis to complete the questionnaire. By doing this, least amount of nuisance was caused to guests or day visitors. They were offered a small token of appreciation in the form of a chocolate. The questionnaires were handed out from December 2014 to January 2015.

From the guest questionnaires, 38% of the participants were aged between 18 and 24 and 31% between 35 and 44 years. Of the participants, 67% were women and 33% men. Most of the participants were single (54%), followed by married (38%), while 8% were divorced. From a race point of view, most participants were white (64%), then black (15%), Asian (13%) and lastly coloured at 8%. The majority were South African (88%) and the remainder came from Australia, Zimbabwe, Namibia and New Zealand.

The questionnaires indicated that the most spoken language was English (64%), followed by Afrikaans (22%). The largest portion of the participants either had Grade 10 to 12 or a diploma as their highest qualification. Most were permanently employed (55%), followed by 29% students. This is expected, because the Valley of Waves attracts people being 18 to 24 years old which is a normal age for a student. The average income was between R0 and R50 000 per annum, indicative of young employees and students. From the guests, 68% stayed in the Cascades Hotel for either two (32%) or four (32%) nights and have visited the resort more than five times (66%). The repeater rate is a very good indicator for business economics and marketing. It means people are not bored with the offering and enjoy their visit or holiday so much that they return often. Overnight guests formed 64% of this pool of participants. See Table 4.8 for further detail on the guest questionnaires.

Table 4.8: Guest questionnaire

Ages	**%**	**Country of origin**	**%**	**Employment status**	**%**	**Accommodation unit**	**%**
18–24	38	South Africa	88	Unemployed	0	The Palace of the Lost City	0
25–34	21	Zimbabwe	6	Permanently employed	55	Cascades Hotel	60
35–44	31	Australia	3	Casual worker	3	Sun City Hotel	24
45–54	3	New Zealand	3	Self-employed	5	The Cabanas	8
55–64	5	**Language**	**%**	Student	29	Vacation Club	4
65+	3	English	64	Retired	5	Kwena Gardens Chalets	4
Gender	**%**	Afrikaans	22	Homemaker	3	**Length of stay**	**%**
Male	33	IsiXhosa	2	Unable to work	0	1 night	4
Female	67	Sesotho	2	**Income**	**%**	2 nights	32
Marital status		Dutch	2	R0 – R50 000	32	3 nights	12
Single	54	Portuguese	4	R50 001 – R100 000	15	4 nights	32
Married	38	Hindi	2	R100 001 – R200 000	15	5 nights	16
Divorced	8	**Education**	**%**	R200 001 – R300 000	18	6 nights and more	4
Widowed	0	No schooling	0	R300 001 – R500 000	3	**Repeater rate**	**%**
Separated	0	Schooling but less than Grade 10	5	R500 001 – R700 000	6	1st time at Sun City Resort	17
Race	**%**	Schooling Grade 10–12	32	R700 001 – R900 000	0	2 visits	6
White	64	Diploma or 1–2 years at university or technical college	29	R900 001 +	12	3 visits	6
Black	15	Bachelor's degree	18	**Guest or day visitor**	**%**	4 visits	6
Coloured	8	Honours degree	11	Guest	64	5 and more visits	66
Asian	13	Master's degree	3	Day Visitor	36		
Hispanic	0	Doctorate degree	3				

4.13 Recommend improvements

The results and conclusions of the study showed where the system is deficient and recommendations could be made to improve these areas. Data were analysed using sustainable tourism indicators. The analysed data revealed the environmental performance of SCR and also gave rise to recommendations for future improvements.

4.14 Conclusion

Chapter 4 has described the research design of the study and how the quantitative and qualitative data were sampled ethically. It also gave a brief overview of how the data were used to answer the research question and the six objectives of the study. Chapter 5 will go into more detail with the results of the data captured and discussions of each objective. It reveals the actual consumption rates of energy and water and also the generation of solid waste. Furthermore, the chapter also covers the perception of tourists visiting the property and staff working at SCR of its environmental performance.

Chapter 5
Results, discussions and analysis

> *Scientific research involves going beyond the well-trodden and well tested ideas and theories that form the core of the scientific knowledge. During the time scientists are working things out, some results will be right, others will be wrong. Over time, the right results will emerge. Lisa Randall (*BrainyQuote, 2015)

5.1 Introduction

As discussed in Chapter 4, six objectives were set in order to answer the research question. In this chapter the researcher analyses and discusses the data of each of the six objectives in detail to determine the environmental performance of SCR.

5.2 Research aim, question and objectives

The research aim of the study was to determine the environmental performance of SCR by utilising UNWTO sustainable tourism core indicators in terms of energy, water and waste.

To fulfil the aim of the study, data from between 2010 and 2013 were collected. Staff and guest questionnaires on their perception of SCR's environmental performance were administered in 2011 and 2014.

The objectives of the study were to:

1. determine and analyse the energy consumption of the five accommodation areas and SCR as a whole
2. determine and analyse the water consumption of the five accommodation areas and SCR as a whole
3. determine and analyse the waste generation and recycling rates of SCR
4. investigate the perception of staff of SCR's energy and water consumption and waste generation and recycling
5. investigate the perception of guests of SCR's energy and water consumption and waste generation and recycling
6. make recommendations for the improvement of the environmental performance of SCR in terms of energy, water and waste management.

To determine SCR's sustainability, the following UNWTO sustainable tourism indicators were used.

Table 5.1: UNWTO core indicators (UNWTO, 2004a)

	Core indicator	Supplementary indicators	Output
1	Energy management	II. Per capita consumption of energy from all sources (overall, and by tourist sector – per person day)	1. kWh per room for the resort and each hotel 2. kWh per person for the resort and each hotel 3. kWh per square metre per hotel 4. Consumption for resort and hotels
2	Water availability & conservation	II. Per capita consumption of water from all sources (Although not listed as a supplementary indicator, it is important to investigate to determine the environmental performance of the SCR)	1. Litre per room per resort and hotel 2. Litre per person per resort and hotel 3. Litre per square metre per hotel 4. Consumption for resort and hotels
3	Waste management		
	Solid waste management	I. Waste volume produced by the destination (tons) by month V. Volume of waste recycled (m3) / Total volume of waste (m3) (specify by different types) VI. Waste per capita	1. Kg waste generated per room 2. Kg waste generated per person 3. Kg waste recycled per room 4. Kg waste recycled per person
	Waste water management (Sewage Treatment)	II. % of sewage from site receiving treatment (to primary, secondary, tertiary levels)	1. Waste water treated 2. Litre per room – waste water generated 3. Litre per person – waste water generated 4. Litre per room – treated effluent 5. Litre per person – treated effluent

5.3 Occupancy and how it affects resource use

The first three objectives of the study that dealt with energy, water and waste had a set of quantitative data, which were analysed to determine whether the entire resort has reduced its consumption of energy and water and also whether the amount of waste generated increased or reduced. The researcher in all instances also calculated per-room and per-person consumption rates for the resort and, where data allowed, the same was done for each hotel. In order to accomplish this, occupancy data were required, which remained constant when using resort or per-hotel data regardless of energy, water and waste calculations. For example, if The

Palace received XXX people in June 2012, the same figure XXX was used for energy, water and waste calculations against the actual consumption rates. It is therefore important to discuss the occupancy data before going into detail on the consumption rates per room and per person.

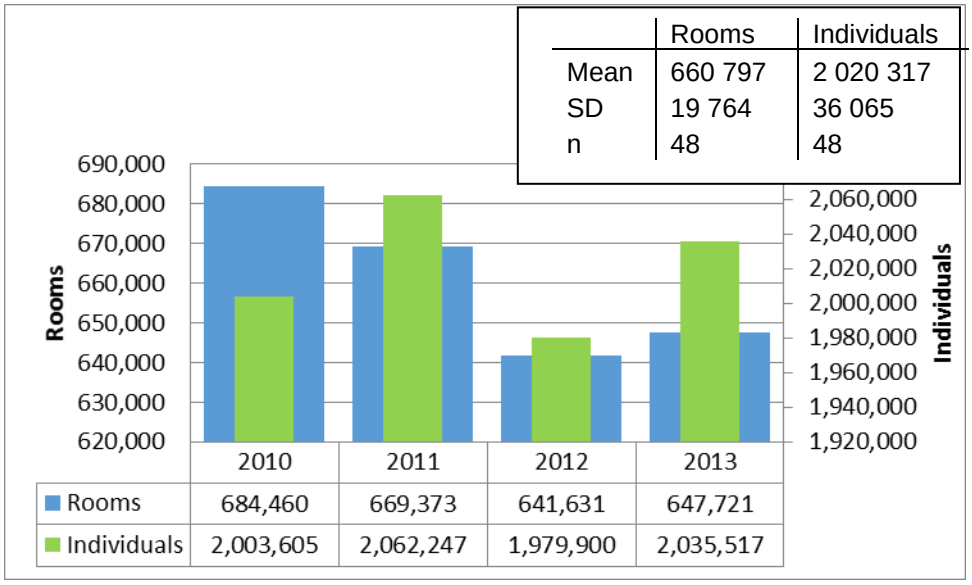
The number of individuals that visited or stayed overnight at the resort were calculated. It included all the overnight guests in all accommodation units, excluding the 14 Kwena Gardens chalets, because those data were not available.

Each hotel generates a monthly occupancy report that includes all the information about the guests that stayed in the hotel for that month. The report includes the number of rooms that were occupied, under maintenance, complimentary and rooms used in-house by employees. It also shows the number of people that stayed in the hotel in that specific month and how many were individuals, meaning those people that were single or one person per room.

Day visitors are non-overnight visitors that enter the resort for a specific day.
Staff residing on the resort were calculated from quarterly resident historical records between 2010 until 2013. A mean was determined of 1 455 adults and children staying in the staff villages on average per month over the four-year period. An average month per year is 30.4 days long, which was multiplied by the 1 455 Individuals to give a total of 44 232 Individuals in the staff villages per month on average. The hotel guests and day visitor occupancies are audited figures and highly accurate.

Staff commuting to SCR, working for the day and leaving after work have an impact on resource use. These are mainly casual and business partner employees. The electricity they use during the day is mainly towards ensuring a positive guest experience and they will visit the toilet a number of times a day. The work these employees to each day is solely towards rendering a service to the guests, meaning all the resources used by the employees can be linked to the guests because if they were not there, the guests will not receive the experience and service they expect. Estimating the number of casual and business partner employees is difficult, and because their impact is directly linked to guests, the impact was included in the guest

and room consumption rates. Staff that reside on site cook, clean and bathe, which requires more than 500 000 kWh and 20 million litres of water per month . On average there are 663 rooms occupied by staff per day in the staff villages. In order to calculate a monthly figure, the same approach was used for calculating individuals, namely to multiply by 30.4 days. This resulted in 20 155 rooms per night per month. The staff rooms are added to the hotels' occupancy data to calculate a resort occupancy figure to be used when calculating resource use per room using overall resort electricity and water consumption, see Figure 5.1 for illustration of the above.



	Rooms	Individuals
Mean	660 797	2 020 317
SD	19 764	36 065
n	48	48

Figure 5.1: Total rooms and individuals per year from 2010 to 2013

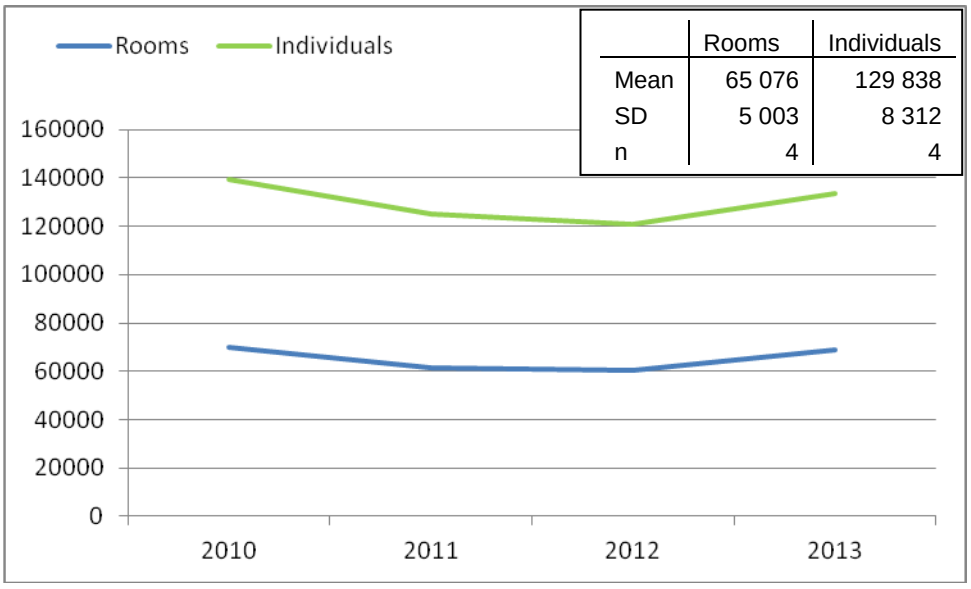
As illustrated by Figure 5.1, rooms sold in 2010 was the highest during the study period, reaching 684 460 rooms sold compared to the lowest occupancy of 641 631 in 2012. In 2010 more rooms were sold with a lower number of people and the opposite is seen in 2013. In 2012 the rooms sold and individuals that stayed over were both the lowest in the four-year study period.

The total Individuals on the resort have a direct impact on the amount of energy and water consumed and also the volume of waste generated. Individuals are the number of people that visited the resort. Individuals include overnight guests, employee residing on the resort and day visitors. Although the room occupancy has some effect on electricity use, each hotel requires a set amount of electricity to operate regardless of whether it is empty or fully booked. These consumption rates

are unknown. The guests cause the electrical use to increase beyond the set baseline requirement. This usage includes equipment and processes such as public space cooling, water heating (excluding rooms), lighting, water features, security systems and administration processes, which require energy and water regardless of guests or visitors. The more guests staying overnight per room, the lower the electricity per person will be and the more rooms occupied, the lower the usage per room will be. This must be kept in mind when looking at fluctuations in per-room and per-person rates in all the resource graphs in Section 5.4.

5.3.1 The Palace

The Palace room occupancy rate has recovered well in 2013 compared to 2010 after a decline was noted in 2011 and 2012. The number of individuals who stayed in the hotel during this period has reduced from 2010 to the lowest occupancy in 2012, but showed improvement in 2013 to just under 134 000 individuals that stayed there for the year. See Figure 5.2 below for the graphical demonstration.



	Rooms	Individuals
Mean	65 076	129 838
SD	5 003	8 312
n	4	4

Figure 5.2: The Palace occupancy

5.3.2 The Cascades Hotel

The Cascades Hotel experienced a decrease in occupancy since 2010 in terms of both rooms sold and individuals. See Figure 5.3.

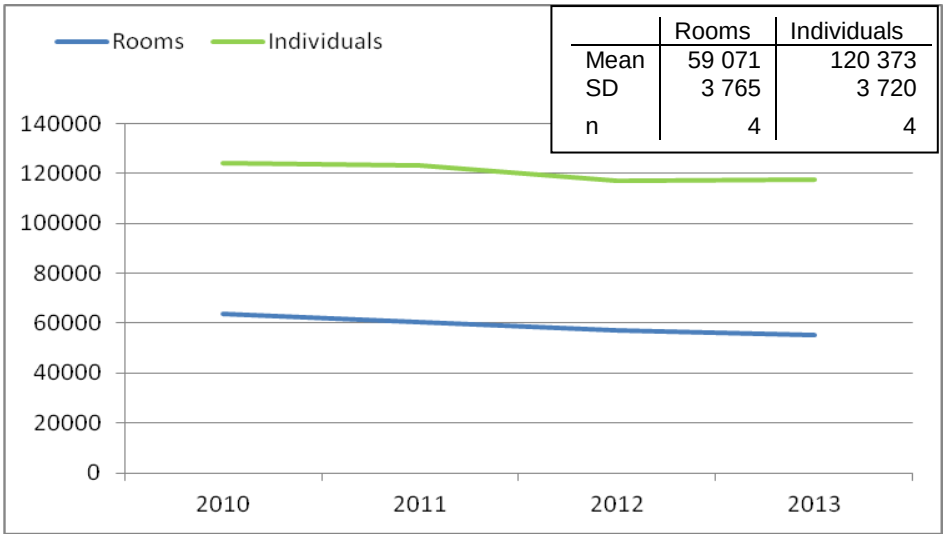


Figure 5.3: Cascades Hotel occupancy

5.3.3 Sun City Hotel

The Sun City Hotel and Casino occupancy rates were fairly constant over the four years. Although the number of rooms occupied increased slightly from 2012 to 2013, the number of individuals staying over has decreased. The highest room rate was in 2010 with 93 287 rooms sold and the most individuals staying over were in 2013, with 208 530 people who resided in the hotel. See Figure 5.4.

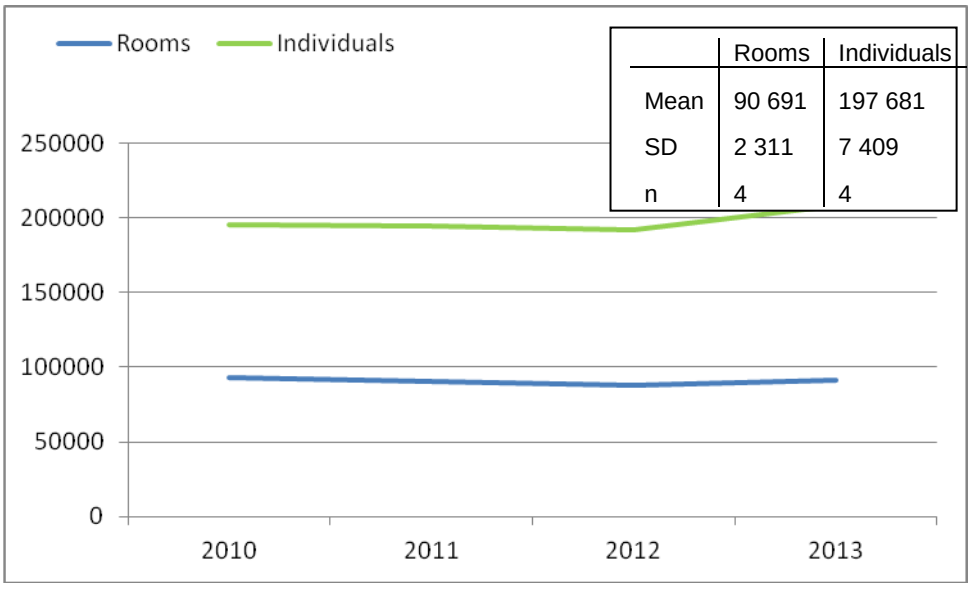
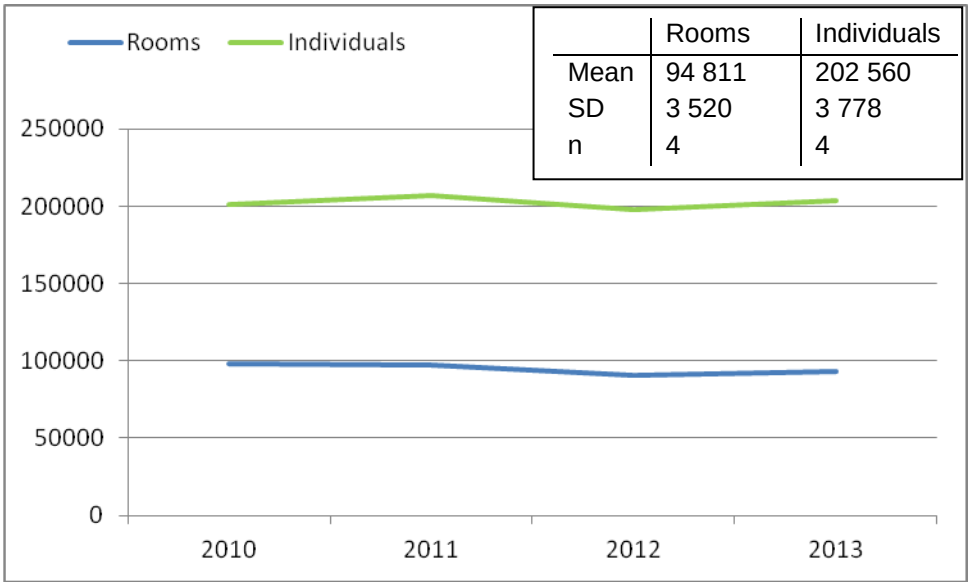


Figure 5.4: Sun City Hotel and Casino occupancy

5.3.4 The Cabanas

The Cabanas experienced a low growth rate in individuals in 2011 compared to the previous years. In 2012 there was a slight decrease in individuals, but this recovered in 2013. See Figure 5.5

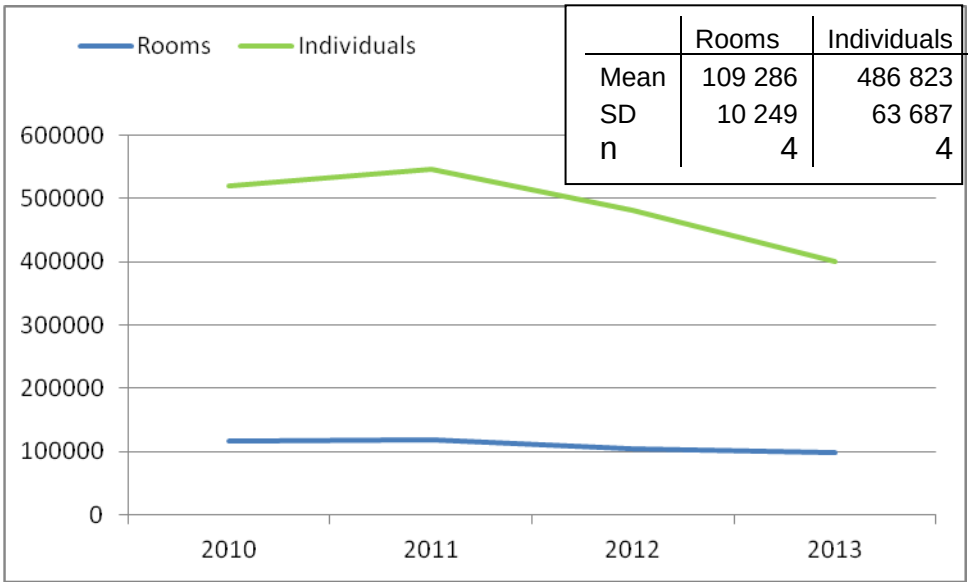


	Rooms	Individuals
Mean	94 811	202 560
SD	3 520	3 778
n	4	4

Figure 5.5: The Cabanas occupancy

5.3.5 The Vacation Club

The Vacation Club had a sharp decline in individuals staying over from 2011. The room rate has stayed fairly stable at around 100 000 rooms per year as illustrated in Figure 5.6.



	Rooms	Individuals
Mean	109 286	486 823
SD	10 249	63 687
n	4	4

Figure 5.6: Vacation Club occupancy

5.4 Results, analysis and discussions for each objective

5.4.1 To determine and analyse the energy consumption of the five accommodation areas and SCR as a whole

5.4.1.1 Electricity consumption

Eskom electricity is used for the majority of the energy requirements on SCR. The resort also makes use of LPG for cooking and coal for heating water for the crocodiles. Vehicles are powered by diesel and petrol. The diesel used to be supplemented with biodiesel, but the plant is out of order. Hot-water supply is delivered through either heat pumps or solar geysers in most hotels and staff villages. Backup power is supplied by 14 generators, of which two are mobile. The unit for measurement for electricity is kilowatt-hours (kWh). This is the same unit used on electricity bills throughout South Africa. This data recorded on the resource tracking database are directly taken from the MKLM electricity bill. The bill equals the total resort electrical consumption. The resort used to have five electricity feeds, but they were merged into one feed to reduce the bulk electricity supply rate and administration processes. From the primary substation the SCR Electrical Department takes over the distribution of electricity and also the monitoring and measurement thereof. From the primary substation the feed goes to two substations on the resort, named Sun City substations 1 and 2. Sun City Substation 1 (Section 1 – See Figure 5.7) supplies electricity to the Entertainment Centre, Cascades Hotel, Sun City Hotel, The Cabanas and the Old Staff Village. Sun City Substation 2 supplies electricity to the Entertainment Centre extension, which includes the Valley of Waves, The Palace, Lost City Country Club and Vacation Club. From the primary substation located on the southern section of the resort across from the learning and development centre, there is a feed towards the south-western business area known as Resort Services. This includes the Electrical Department, transport, maintenance, security barracks, warehouse, crèche, fire station, ID office and South Village. There is also a feed that supplies electricity to the southern and south-eastern businesses (Section 2). These include the WWTW, recycling yard, front entrance, Kwena Gardens, GameTrackers, shebeen and horse stables.

There is a ring feed from the substation to the Sun City Hotel substation (Section 3). The substation supplies electricity to The Cabanas and Sun City Hotel. The feed

continues to the Entertainment Centre substation, which supplies electricity to the Cascades Hotel, Entertainment Centre and Old Staff Village.

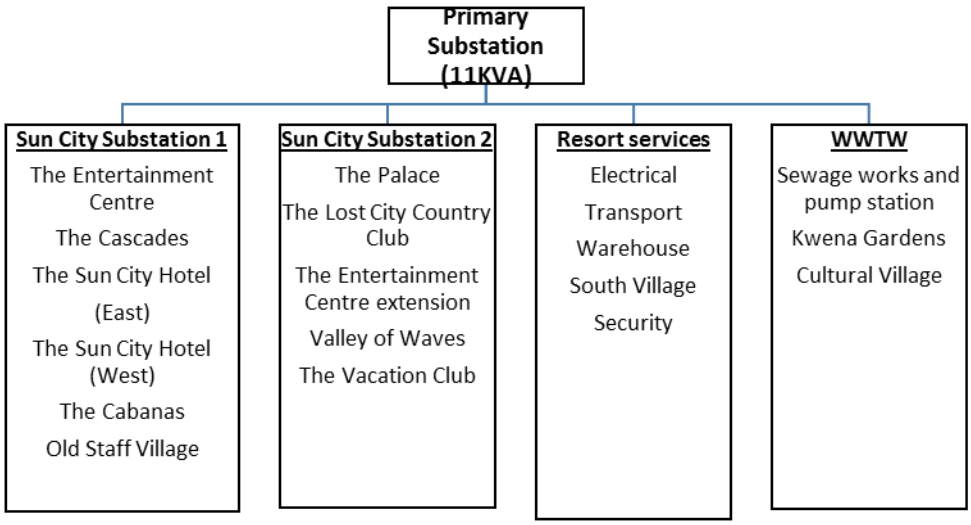


Figure 5.7: Electricity network layout

The hotels are measured as individual units by the Electrical Department. It is therefore possible to determine the kilowatt hour per-room and per-person rates when comparing the hotel energy use with the occupancies. Each hotel was analysed individually and the resort was analysed using hotel occupancies, day visitors and staff that reside on the resort permanently as a combined total of people on the resort per a specific month. Considerable work has been done over the years to reduce energy use. Infrastructure upgrades took place in 2009 to 2010, which included constructing a primary substation to merge five Eskom feeds into one feed to better manage the distribution and management of the electricity grid. The electricity supply cables were replaced in various areas. A separate sleeve was installed for network infrastructure in order to link to electricity users (equipment) to the BMS system. All LPG tanks, walk-in fridges and freezers, gas tanks, lifts, heat pumps and boilers are monitored by the BMS.

Two demand-side management (DSM) projects were completed. These were tripartite agreements and were done in conjunction with Eskom and National Power. The DSM Phase 1 project entailed the load-shedding and load-shifting programme. Major energy users such as boilers, water transfer stations and pool heaters were added onto a load-shedding schedule during Eskom peak periods. This is from 06:00

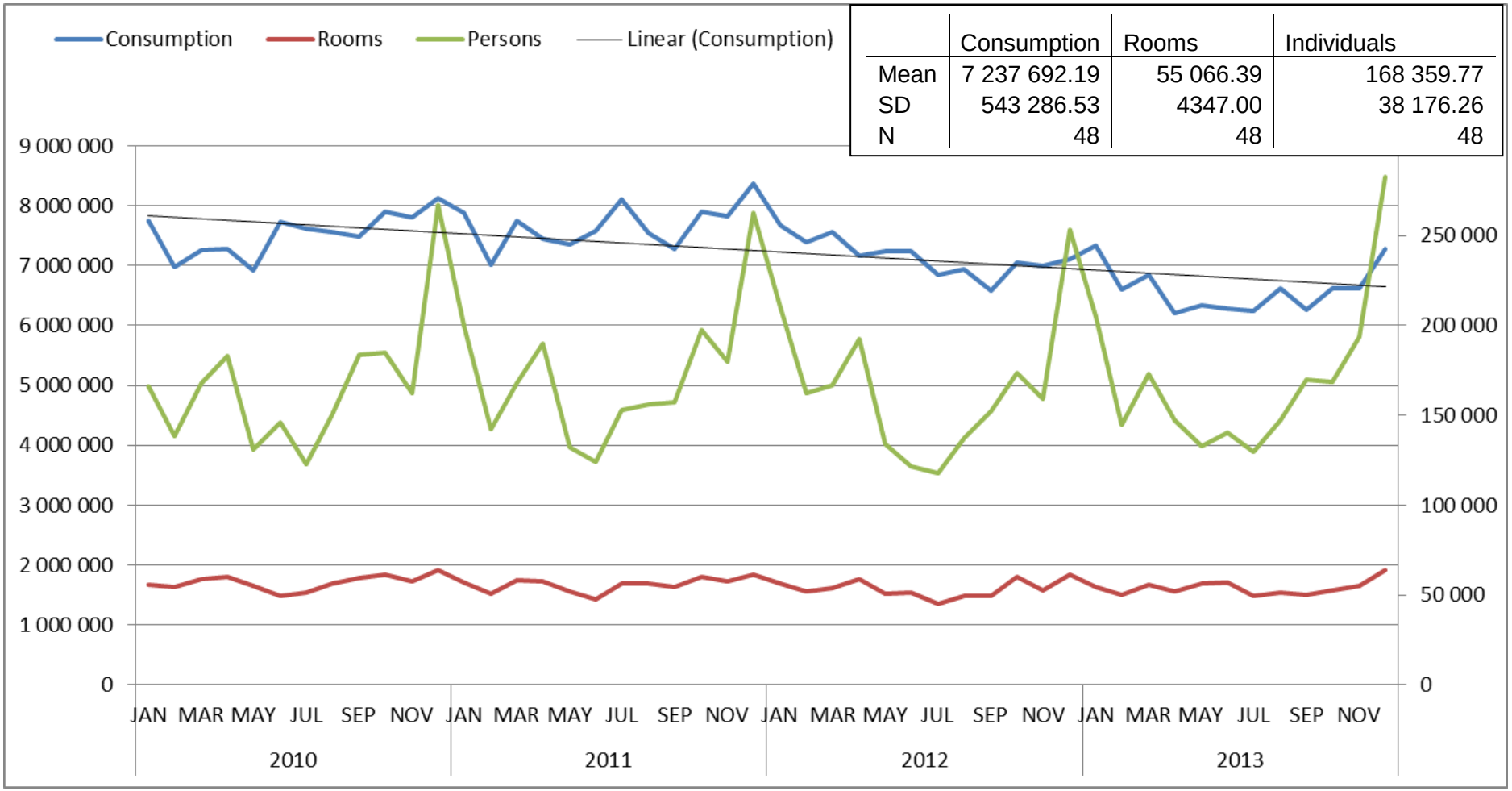
until 10:00 and again in the evening from 18:00 until 20:00. The load shedding only takes place if the water is heated to a certain temperature in the boilers or the reservoirs have sufficient water to last for the period. Guest experiences may not be impacted, therefore certain levels were added to the schedule to ensure that load shedding is bypassed if guest experiences may be affected. This project's outcome was aimed at a reduced rate and a financial saving due to lower rates. It has created much-needed awareness among large energy consumers on the resort and paved the way for future projects.

The DSM Phase 2 project entailed the instillation of 27 heat pumps across the resort. These were fitted to all the bulk water boilers in the hotels and to pool water-heating systems. Solar water geysers were installed in three areas on the resort. A total of 14 solar geysers were fitted at the Cascades staff flats to replace a centralised boiler, reducing the consumption by 77% (Solahart 2010). At the Vacation Club Phase 2, 148 solar geysers replaced 250 electrical geysers reducing the carbon footprint by 425 Tons of carbon dioxide emissions per year (Solahart 2013). In the South Staff Village, 217 solar geysers replaced 396 electrical geysers with a 960mWh/year reduction in consumption (Solahart 2011). In staff villages 2 x 2 bedroom flats share one solar geyser where they previously each flat had its own electrical geyser. In 2012 Karebo Systems replaced 15 000 halogen down lighters with LED lights. Savings were calculated as follows: Palace 123.08 MWh/year (Karebo, 2012a), Cascades 520.26 MWh/year (Karebo, 2012b), Sun City Hotel 888.52MWh/year (Karebo, 2012c), Cabanas 138.30 MWh/year(Karebo, 2012d) and Vacation Club 89.28 MWh/year (Karebo, 2012e) The Palace kitchens were revamped and fitted with energy-efficient equipment. All cooking is done using LPG, which is more efficient than electricity. The gas flare in The Palace King tower is now scheduled to only burn during peak periods instead of every night in order to reduce LPG consumption.

The study period was four years, and all secondary data used in this research paper are from 2010 until 2013, unless otherwise specified.

5.4.1.1.1 The resort

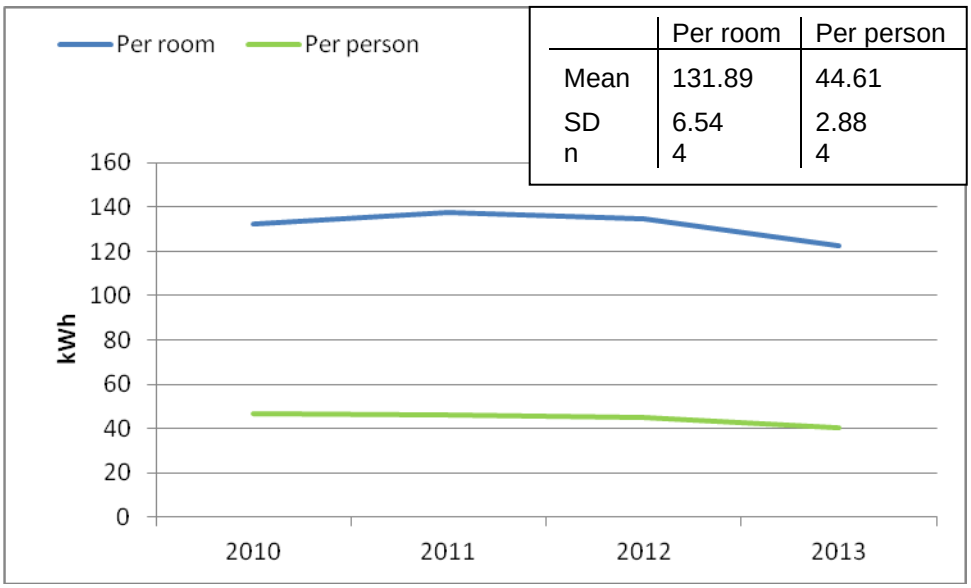
The resort has shown a 12.3% (11 156 046 kWh) reduction in electricity consumption when comparing 2010 and 2013 total annual consumption figures. The linear trend line in Figure 5.8 indicates the lower electricity demand. An average of 55 066 rooms are sold each month across the resort and on average of 168 359 people visit the resort each month. The sharp increase in visitors over peak periods is visible on the graph. School holidays are especially busy, as seen in Figure 5.8. The peak periods are in April, October and December–January each year. The occupancy rate affects the energy-consumption rate. Increases in these periods are seen in the consumption rate. The number of rooms sold do not fluctuate much, but the overnight guests per room and day visitors do.



	Consumption	Rooms	Individuals
Mean	7 237 692.19	55 066.39	168 359.77
SD	543 286.53	4347.00	38 176.26
N	48	48	48

Figure 5.8: SCR: Total electricity consumption, room occupancy and individuals for 2010 to 2013

The number of rooms sold in 2010 was much higher than during any other year in the study and therefore there was a lower electricity use per room due to the higher dividing factor. Compared to the number of people, the rate was the second lowest of the four-year study period. The difference in rooms between 2012 and 2013 is minimal, but the reduction in electricity use per room is much lower. This is due to the steep reduction in actual use and not occupancy as per Figure 5.9.



	Per room	Per person
Mean	131.89	44.61
SD	6.54	2.88
n	4	4

Figure 5.9: Per-room and per-person consumption for SCR from 2010 to 2013

The staff use electricity for cooking and all home appliances. Hot-water supply in the Old Staff Village is supplied by boilers and the South Village was supplied with electrical geysers prior to 2012, after which these were converted to solar geysers. The Vacation Club refurbishment in 2012 and lighting replacements across the resort added to the lower demand.

In terms of overall use, the resort has decreased electricity use by 11 156 046 kWh. To put this into perspective, it is equivalent to four times the annual electricity use of the entire 380-room Cabanas (see Figure 5.10).

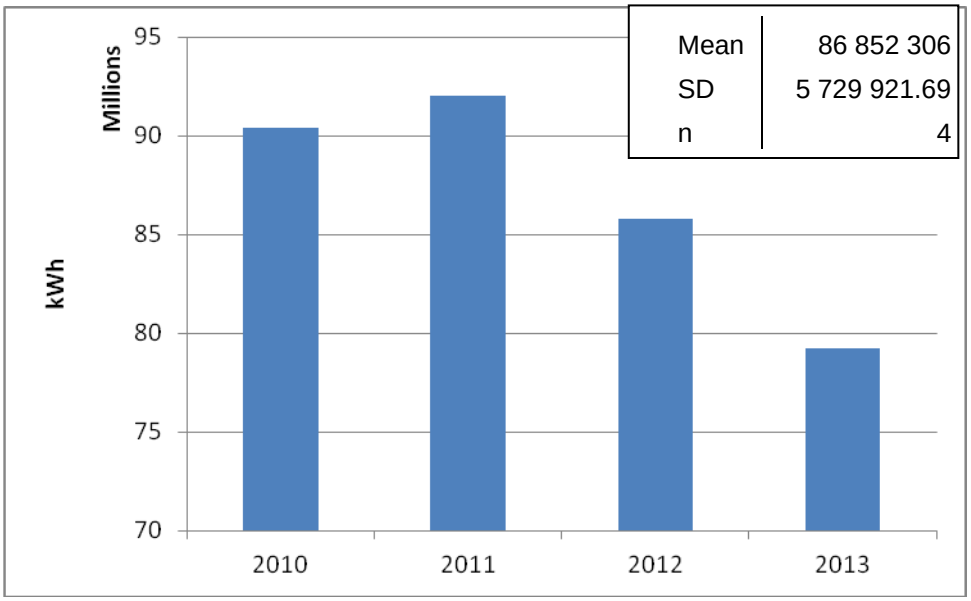


Figure 5.10: SCR: Total electricity for 2010 to 2013

Each of the hotels was examined in the same manner as the resort. Each hotel's electricity use was compared to the rooms sold and the number of individuals who stayed per night. This is relevant for all calculation where rooms and person/individuals are used.

5.4.1.1.2 The Palace

The Palace has the largest physical footprint of all the hotels. The building was not designed to be environmentally friendly. It has enormous open spaces that require heating and cooling. The hotel is also engulfed in manmade waterways, which require pumps to circulate the water. Operating and maintaining the features and ensuring guest comfort require vast quantities of electricity. The hotel is a member of the Leading Hotels of the World programme and it has certain room standard requirements that must be adhered to in order to maintain its Leading Hotel certification. Certain lights and appliances must be on in the room prior to arrival, during turn-down and in vacant rooms. The globes that are used in the lighting of the rooms create a look and feel that a luxury hotel room needs to portray. The globes are not all energy-efficient, which contributes to higher electricity consumption. The hotel shows an increase in consumption from 2010, when it used 11 196 239 kWh per year, until 2012, when it reached a peak of 12 162 419 kWh per year (see Figure 5.11).

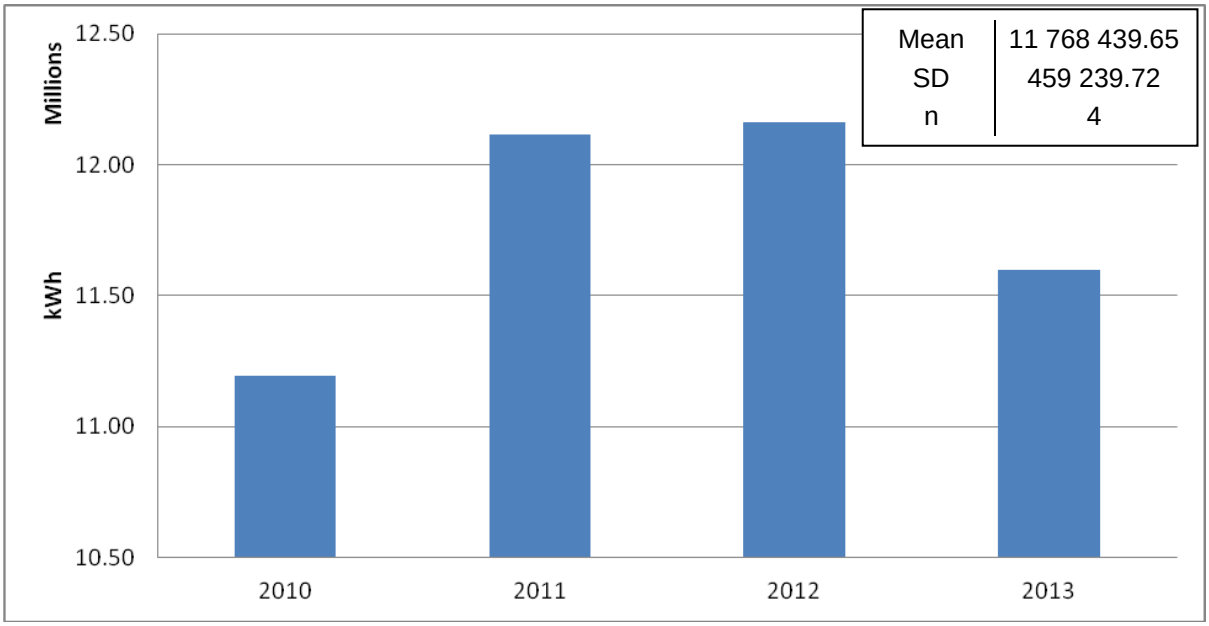


Figure 5.11: The Palace: Total electricity consumption

The hotel showed a reduction of 563 894 kWh (4.6%) in 2013 compared to the previous year. According to Vernon Victor, the electrical and maintenance optimisation technician, “the upper and middle lake pump stations and pool pump room were added to The Palace electricity feed in August 2011, which resulted in an average increase of 150 000 kWh per month (Victor, 2012)”. The pool pumps were previously connected directly on the resort electricity feed and not measured as part of The Palace consumption. The upper lakes are situated on both sides of the entrance road to the hotel (see Figure 5.12). From here the water flows around both sides of the hotel as well as in-between the rooms. It continues through the extensive gardens and finally ends up at the observatory deck pool in the Valley of Waves, from where it is pumped to the upper lakes again.

Figure 5.12: The Palace water feature lakes (the black shade around the hotel is water)

It was only in 2013 when new air-handling units and lights were changed to energy-efficient alternatives that consumption decreased significantly. It was a major achievement to reduce the demand by 4.6% in 2013, regardless of selling 8 300 more rooms than in 2012. More rooms usually means higher consumption, so this is an improvement.

Individuals staying over reduced from 139 414 in 2010 to 119 277 (-14.4%) in 2013. The Palace never managed to equalise the high guest numbers from 2010, with 2011 and 2012 also being 14 253 (-10.2%) and 18 418 (-13.2%) lower respectively. This is visible in the increase in the kWh per-room and per-person rates, shown in Figure 5.13.

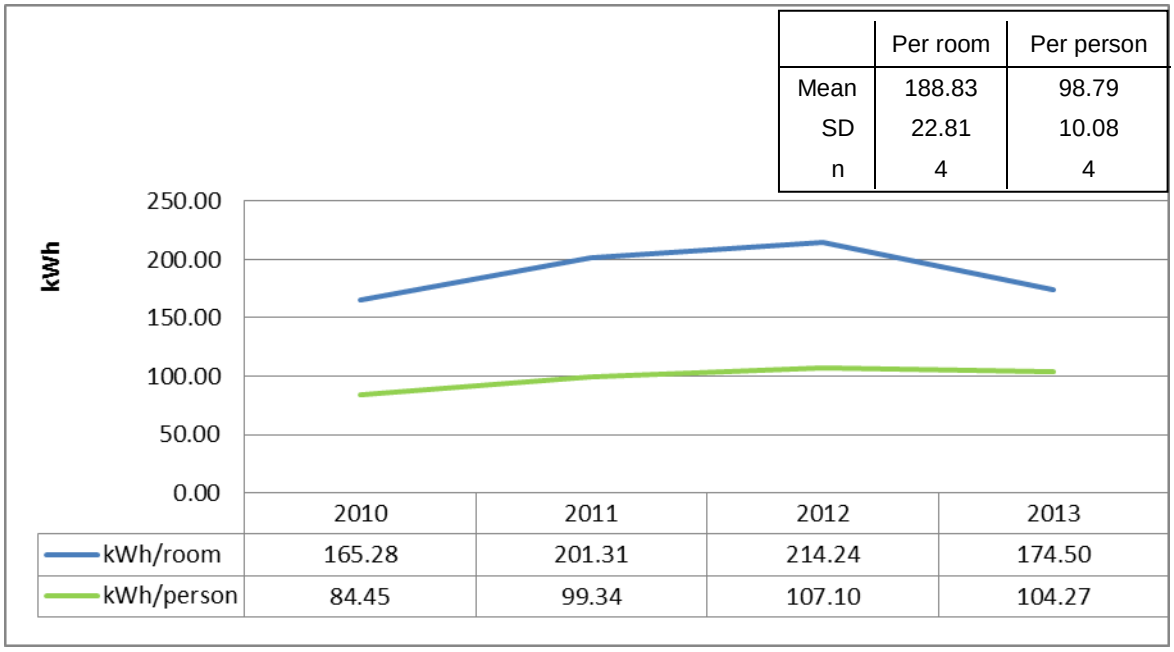


Figure 5.13: The Palace: Electricity consumption per room and per person

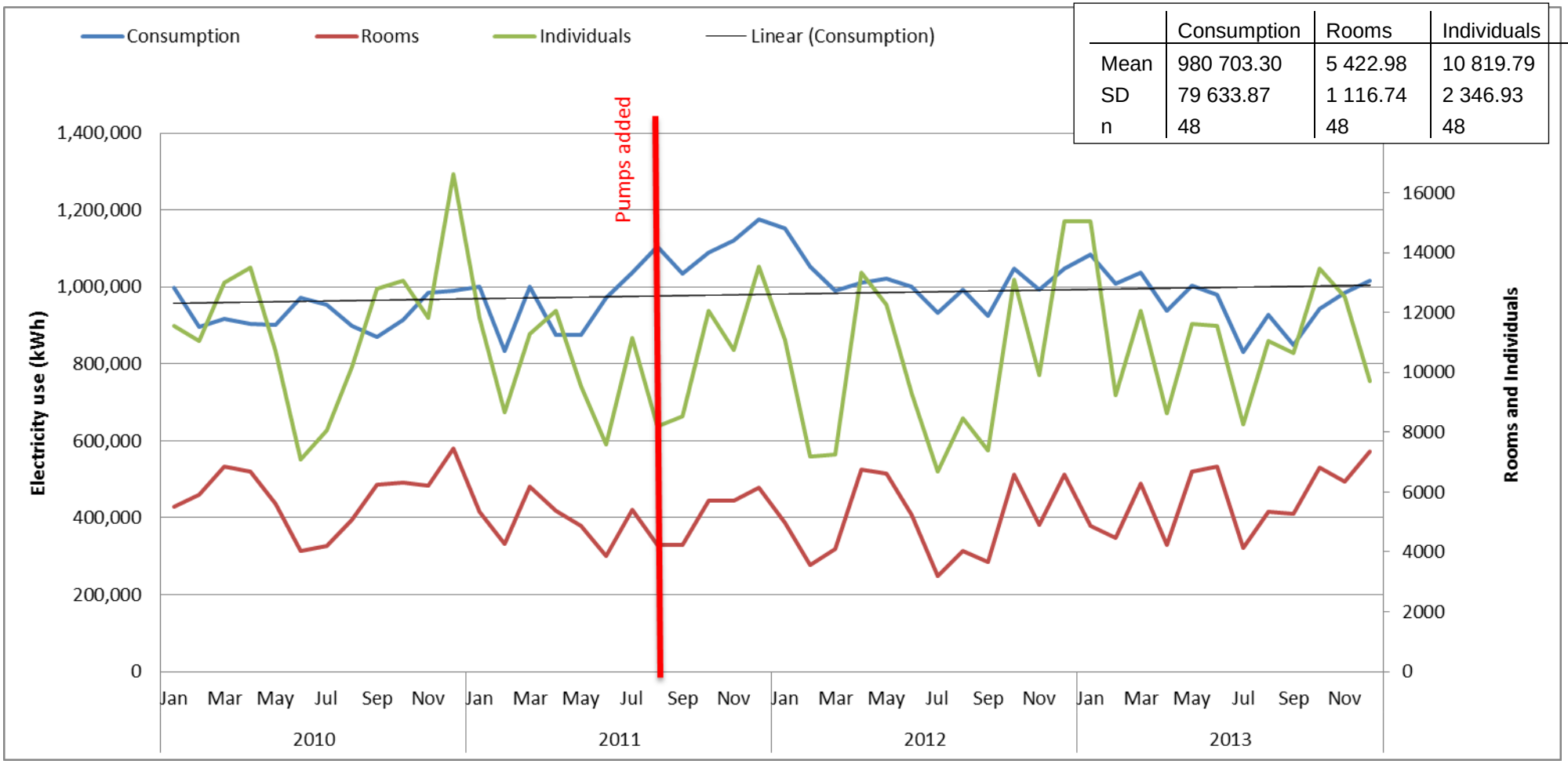
In summary, Figure 5.14 below shows the marginal increase in electricity use in relation to the rooms sold and individuals who stayed during each year of the study. It is evident that there is no correlation between the energy use and the rooms sold or guests who stayed over. The increase in electricity load in August 2011 skewed the graph. The spike is evident in the blue consumption line (Figure 5.14) at the August 2011 mark. The hotel used an average of 980 703 kWh per month. The electricity use per square metre is indicated in Table 5.2 below. On average, 182 kWh is consumed per square metre each year. It is just under 50% of that of an average large hotel internationally, at 365 kWh/m^2 (Bohdanowicz *et al.*, 2001).

Table 5.2: The Palace: kWh per square metre

	2010	**2011**	**2012**	**2013**
Total for year	173.91	188.20	188.92	180.16
Average per month	14.49	15.68	15.74	15.01
Average per day	0.48	0.52	0.52	0.49
Large hotel use internationally per year *	365 kWh/m^2			

* (Bohdanowicz *et al.*, 2001) – large hotels are defined as hotels with more than 150 rooms, with air conditioning, laundry services and a pool

In Figure 5.14, The Palace's electrical consumption is compared to the rooms and occupancy by individuals. The linear trend line plotted on the consumption data range shows the slight increase in consumption over the four years.



	Consumption	Rooms	Individuals
Mean	980 703.30	5 422.98	10 819.79
SD	79 633.87	1 116.74	2 346.93
n	48	48	48

Figure 5.14: The Palace: Total electricity consumption, room occupancy and individuals for 2010 to 2013

5.4.1.1.3 The Cascades Hotel

The hotel has shown a steady reduction in electricity consumption over the study period, with a consumption rate of 6 563 677 kWh in 2010 to 5 424 863 kWh in 2013. See Figure 5.15 below.

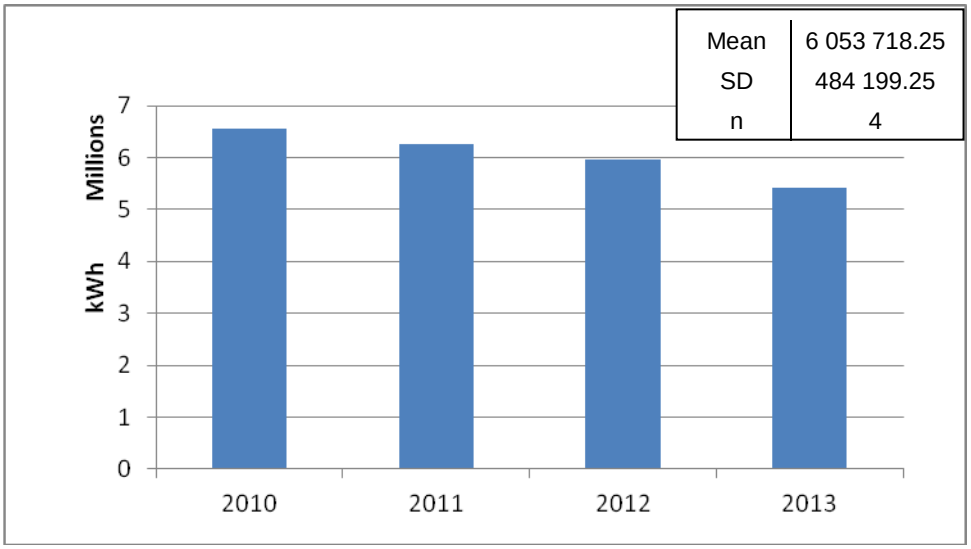


Figure 5.15: Cascades Hotel: Total electricity consumption

Figure 5.16 shows the kWh per-room and per-person rate for the hotel during the study period. Since 2010 the number of rooms sold reduced gradually electricity consumption. The individuals in-house decreased from 2010 to 2012, with a very slight recovery in 2013, with 642 more people than the previous year.

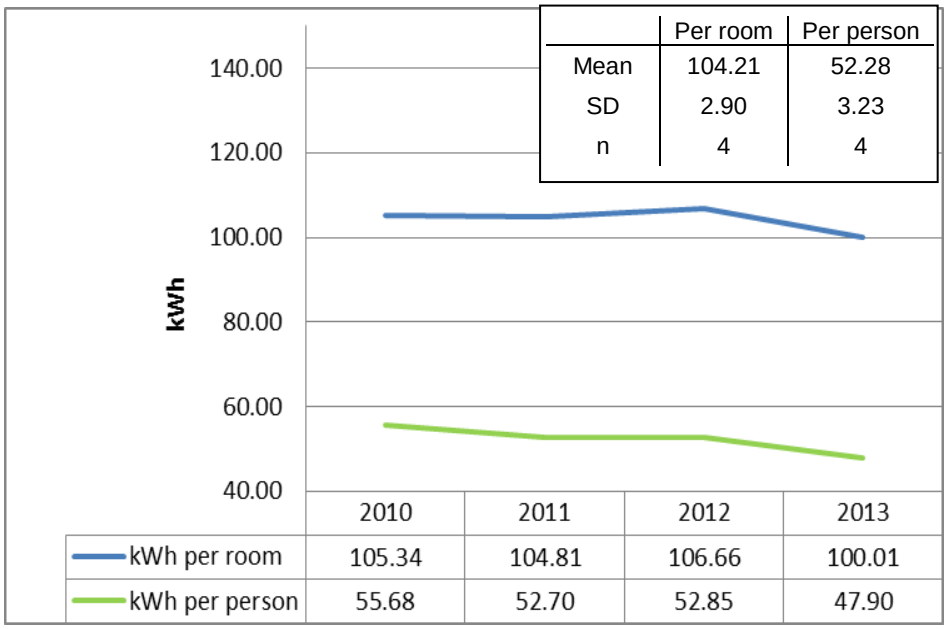
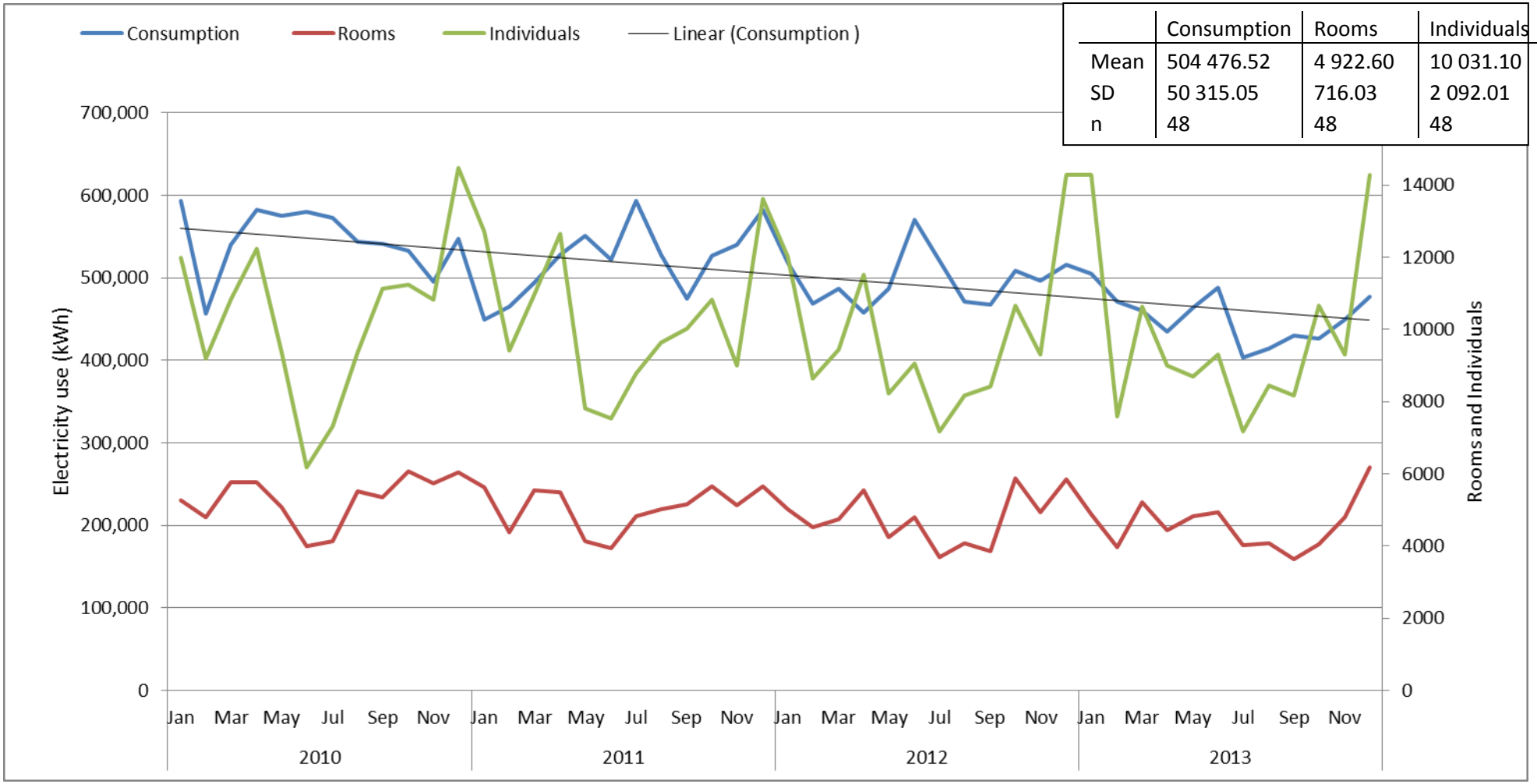


Figure 5.16: Cascades Hotel: Electricity consumption per room and per person

The Cascades Hotel room occupancy is between 4 000 and 6 000 rooms per month, with people occupancy fluctuating right through the year depending on the season. The decline in electricity consumption over the study period is evident as per the trendline in Figure 5.17.



	Consumption	Rooms	Individuals
Mean	504 476.52	4 922.60	10 031.10
SD	50 315.05	716.03	2 092.01
n	48	48	48

Figure 5.17: Cascades Hotel: Total electricity consumption, room occupancy and individuals for 2010 to 2013

The Cascades Hotel managed to reduce its consumption by 1.13 million kWh in four years. Each room of the Cascades Hotel used 240.59 kWh per square metre per year on average. The hotel performed well compared to the international standard of 365 kWh per m^2 per year.

Table 5.3: Cascades Hotel: kWh per square metre

	2010	2011	2012	2013
Total for year	260.86	248.63	237.28	215.60
Average per month	21.74	20.72	19.77	17.97
Average per day	0.72	0.68	0.65	0.59
Large hotel use internationally per year*	365 kWh/m^2			

* (Bohdanowicz *et al.*, 2001) – large hotels are defined as hotels with more than 150 rooms, with air conditioning, laundry services and a pool

5.4.1.1.4 Sun City Hotel

Sun City Hotel is also the location of the casino and the theatre on SCR. It also has a number of conference rooms and restaurants. Although having the highest consumption of all the hotels per month, the hotel has managed so show remarkable conservation in electricity consumption. In 2010, soon after the refurbishment, which saw the implementation of the key card energy-management system, the hotel consumed 18 036 304 kWh. The hotel used 15 246 424 kWh in 2013, which is 15.46% or 2 789 880 kWh less than in 2010, see Figure 5.18. Projects that contributed were the cold-cathode project, where all the light tubes in the slot machines were replaced with cold-cathode tubes, which are far more energy-efficient. Guests can now control the energy use in their rooms by using the key card system, and the majority of the lights were replaced with compact fluorescents or LED technology. The hotel was also affected by the DSM projects, which reduced loads during peak times, as well as the replacement of electric heaters with heat pumps to heat the pool and boilers.

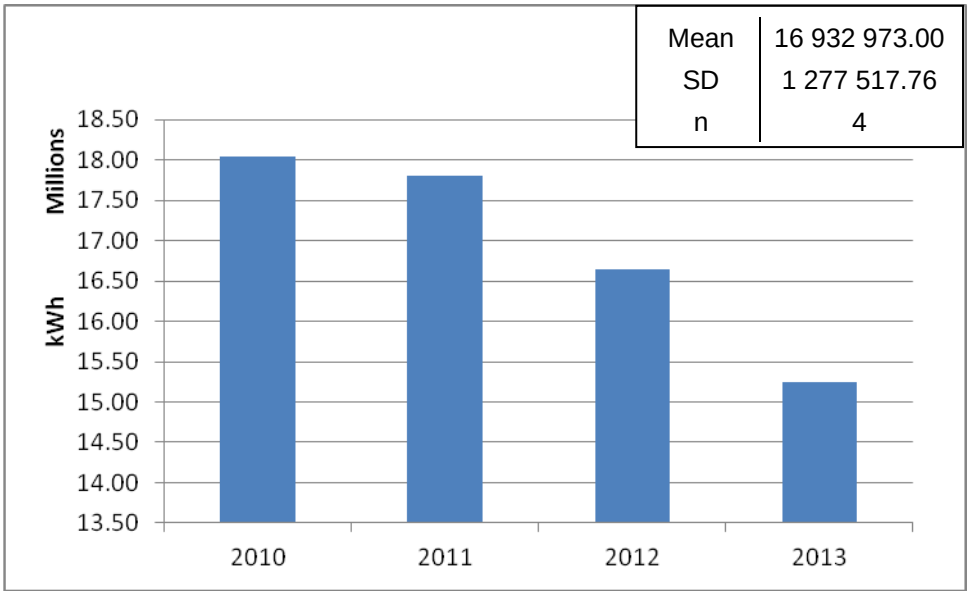


Figure 5.18: Sun City Hotel: Total electricity consumption

Room electricity use reduced from 194 kWh in 2010 to 167 kWh per room night in 2013. Individual consumption reduced from 93.9 kWh in 2010 to 74.2 kWh in 2013 as shown in Figure 5.19. The data is per room or per person per night Keep in mind that many day visitors and guests from other hotels also make use of the casino facilities thus they will also use resources such as electricity and water.

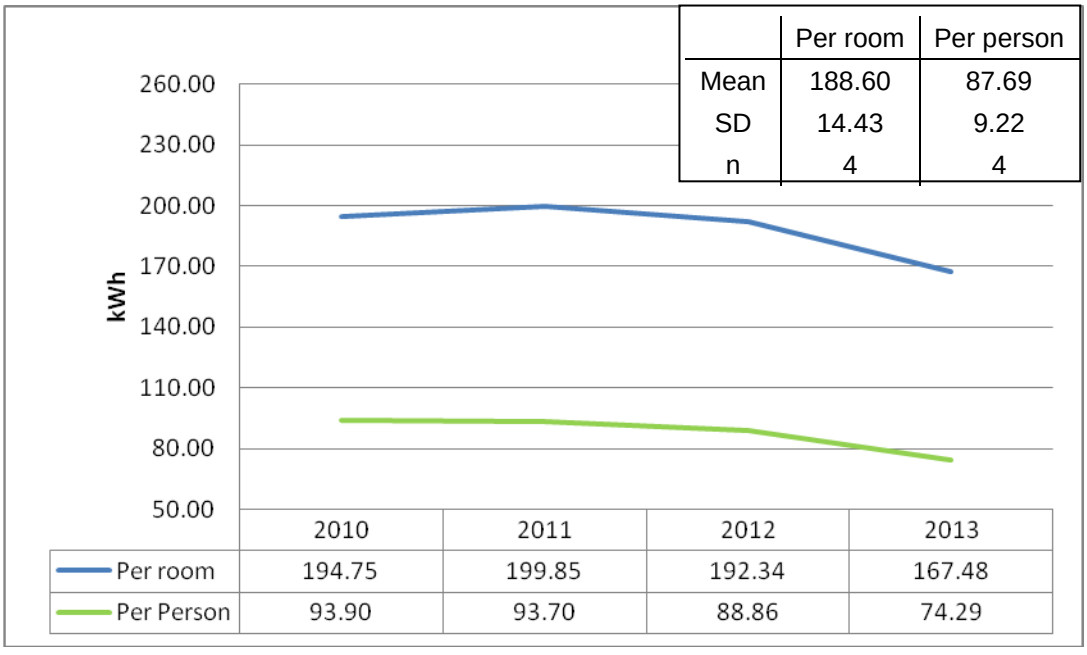
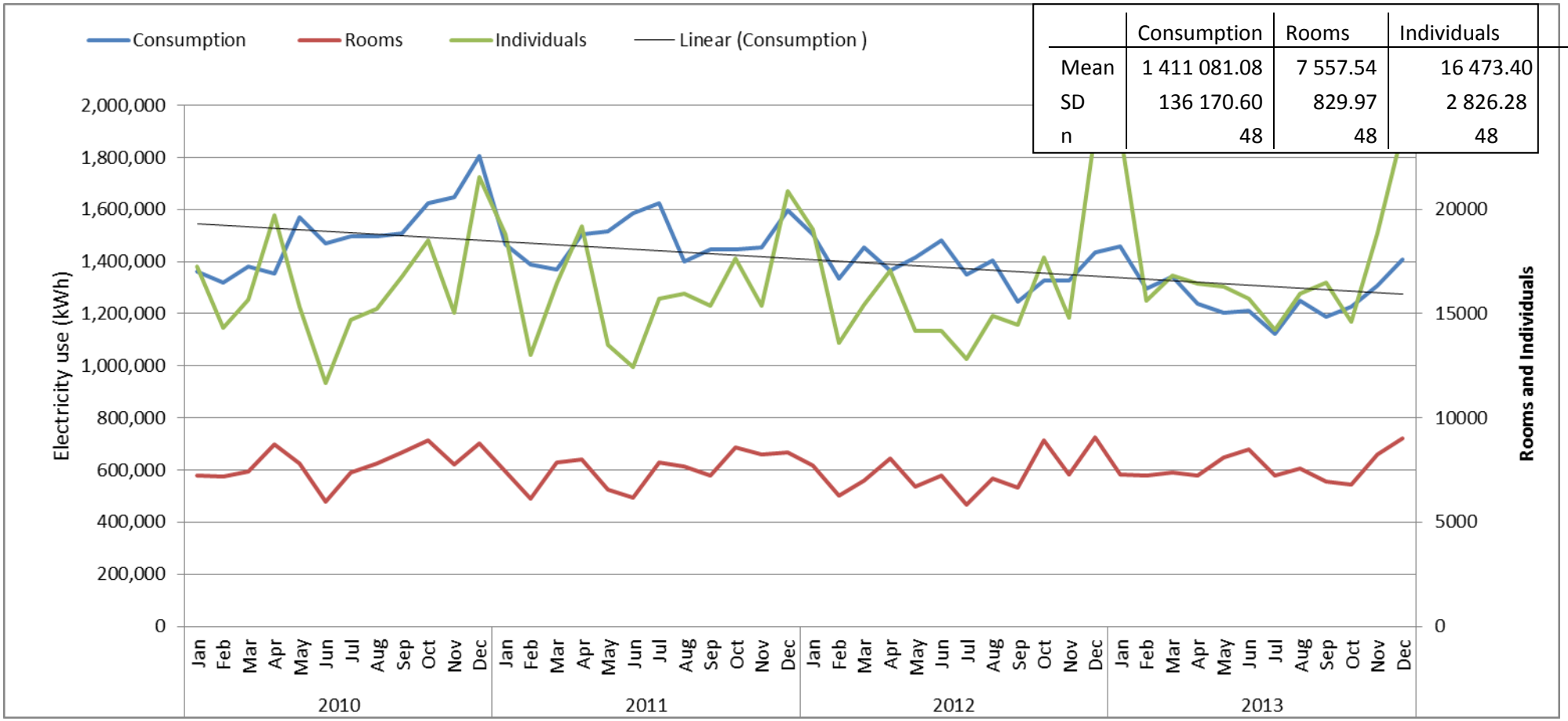


Figure 5.19: Sun City Hotel: Electricity consumption per room and per person

Since the implementation of the key card system, Sun City Hotel has shown a reduction in electricity use, see Figure 5.20.



	Consumption	Rooms	Individuals
Mean	1 411 081.08	7 557.54	16 473.40
SD	136 170.60	829.97	2 826.28
n	48	48	48

Figure 5.20: Sun City Hotel and Casino: Total electricity consumption, room occupancy and individuals for 2010 to 2013

The average annual use per square metre is 515 kWh, which is deemed to be excessive electricity use as indicated in Table 5.4. It is much more that the average large hotel internationally. The Sun City Hotel and Casino has the large casino which is unique to the hotel thus making the comparison difficult because it is much more than just a hotel.

Table 5.4: Sun City Hotel and Casino: kWh per square metre

	2010	2011	2012	2013
Total for year	548.88	541.72	506.64	463.98
Average per month	45.74	45.14	42.22	38.67
Average per day	1.50	1.48	1.39	1.27
Large hotel use internationally per year*	365 kWh/m^2			

* (Bohdanowicz *et al.*, 2001) – large hotels are defined as hotels with more than 150 rooms, with air conditioning, laundry services and a pool

5.4.1.1.5 The Cabanas

The Cabanas use the least amount of electricity of all the accommodation units on the resort. During the study period, the mean use was 3.22 million kWh per year. This is about a third of The Palace's consumption. The electricity use in 2010 and 2011 were very similar, with only a 1% difference. The hotel managed to reduce the demand significantly since the 2010 rate of 3 586 920 kWh and used 2 734 303 kWh in 2013, which is a difference of 852 617 kWh or 23.7%. See Figure 5.21 and Figure 5.23.

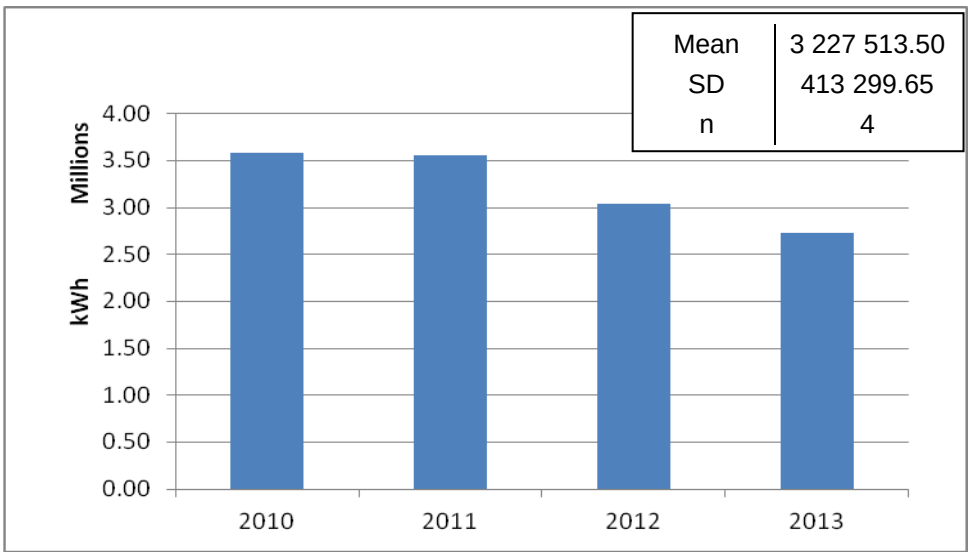


Figure 5.21: The Cabanas: Total electricity consumption

The reduction noted in the annual consumption is also evident in the per-person and per-room rates – see Figure 5.22.

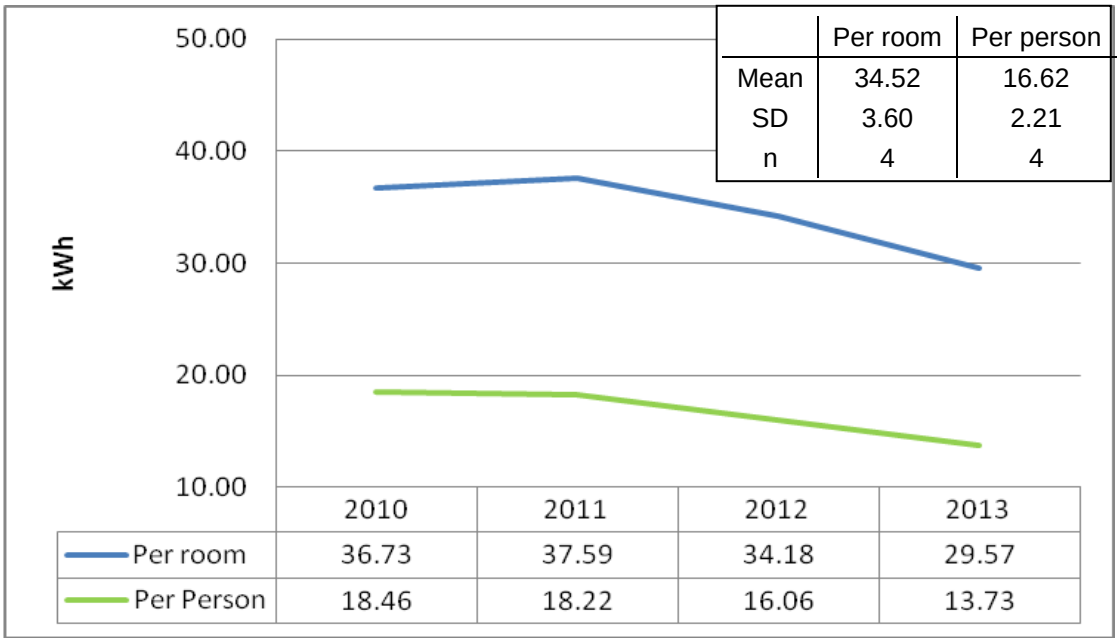


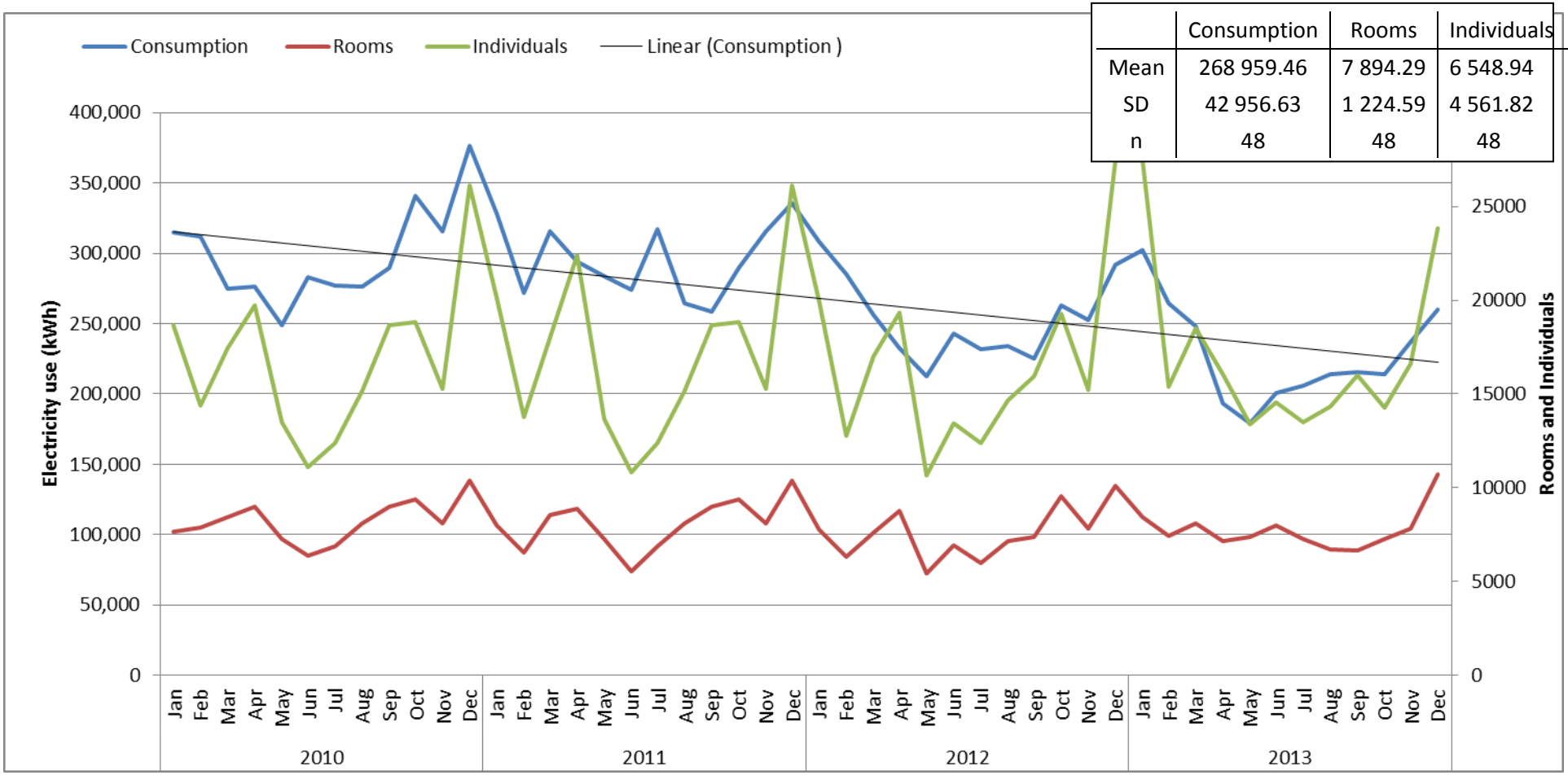
Figure 5.22: The Cabanas: Electricity consumption per room and per person

The mean use per room was 34.53 kWh and 16.62 kWh per person per night. Due to the high number of rooms and the low consumption, the kWh per square metre use is relatively low. The annual average is 146.9 kWh/m^2 (Table 5.5), which is far below the international average of 365 for large hotels compromising of more than 150 rooms.

Table 5.5: The Cabanas: kWh per square metre

	2010	**2011**	**2012**	**2013**
Total for year	163.32	161.65	138.34	124.50
Average per month	13.61	13.47	11.53	10.37
Average per day	0.45	0.44	0.38	0.34
Large hotel use internationally per year*	365 kWh/m^2			

* (Bohdanowicz *et al.*, 2001) – large hotels are defined as hotels with more than 150 rooms, with air conditioning, laundry services and a pool



	Consumption	Rooms	Individuals
Mean	268 959.46	7 894.29	6 548.94
SD	42 956.63	1 224.59	4 561.82
n	48	48	48

Figure 5.23: The Cabanas: Total electricity consumption, room occupancy and individuals for 2010 to 2013

5.4.1.1.6 The Vacation Club

The Vacation Club is different from the other units, as discussed in Chapter 3, in the sense of having multiple-room self-catering units. With the Phase 2 refurbishment in 2012, solar geysers and a key card energy-management system were installed, which is the reason for the major reduction in electricity use compared to 2013 (Figure 5.26). The average electricity use was 8.3 million kWh per year with a high standard deviation of 1.4 million kWh (see Figure 5.24).

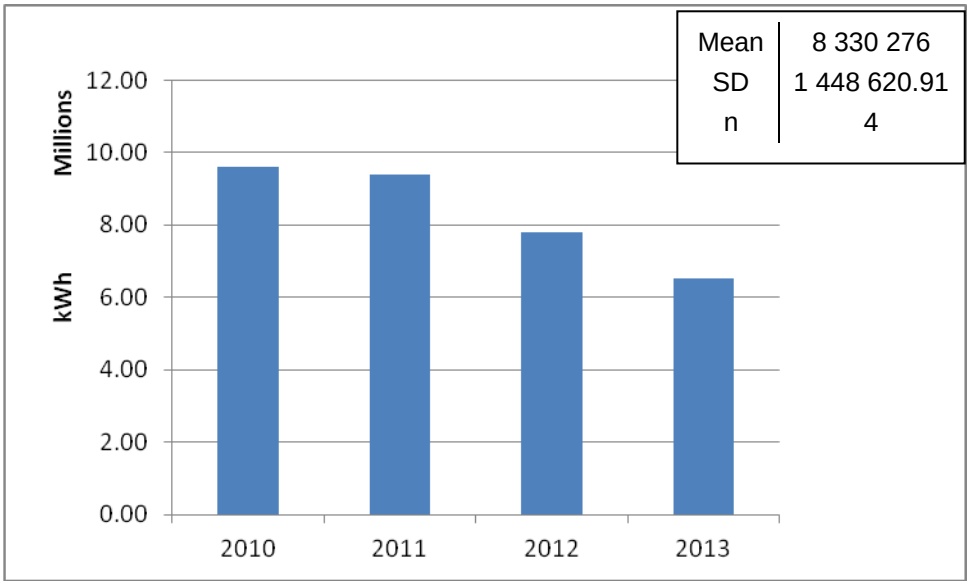


Figure 5.24: Vacation Club: Total electricity consumption

Multiple rooms means that more than two or four people can overnight in one unit, which explains the low per-person rate compared to unit usage, as shown in Figure 5.25. The units have a large refrigerator, dishwashing machine, two or three bedrooms with two or three bathrooms and two or three separate air-conditioning units. The four other hotels usually only have one room, except for the suites. It is expected that the Vacation Club should therefore have higher energy consumption. The other difference is that its back-of-house facilities are not as extensive as that of the hotels.

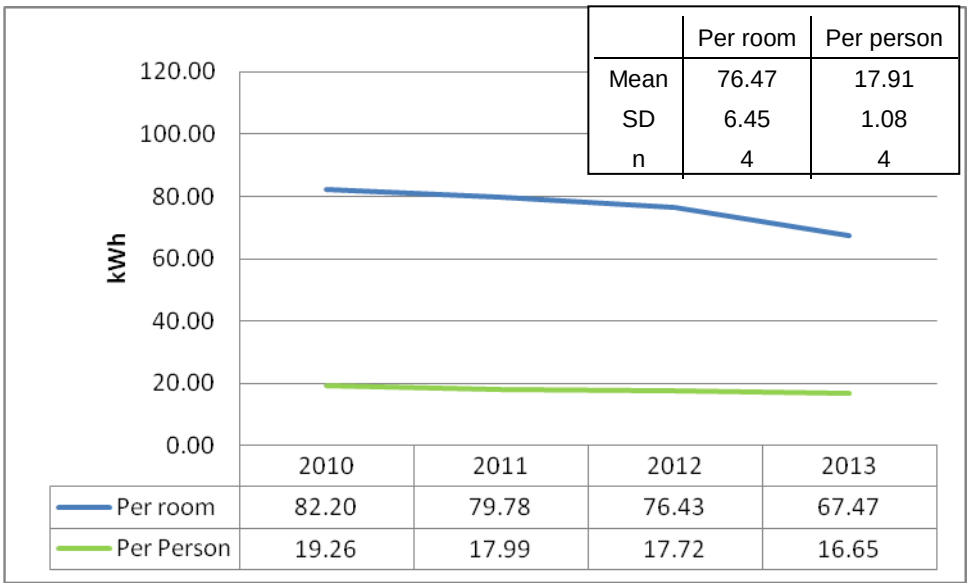


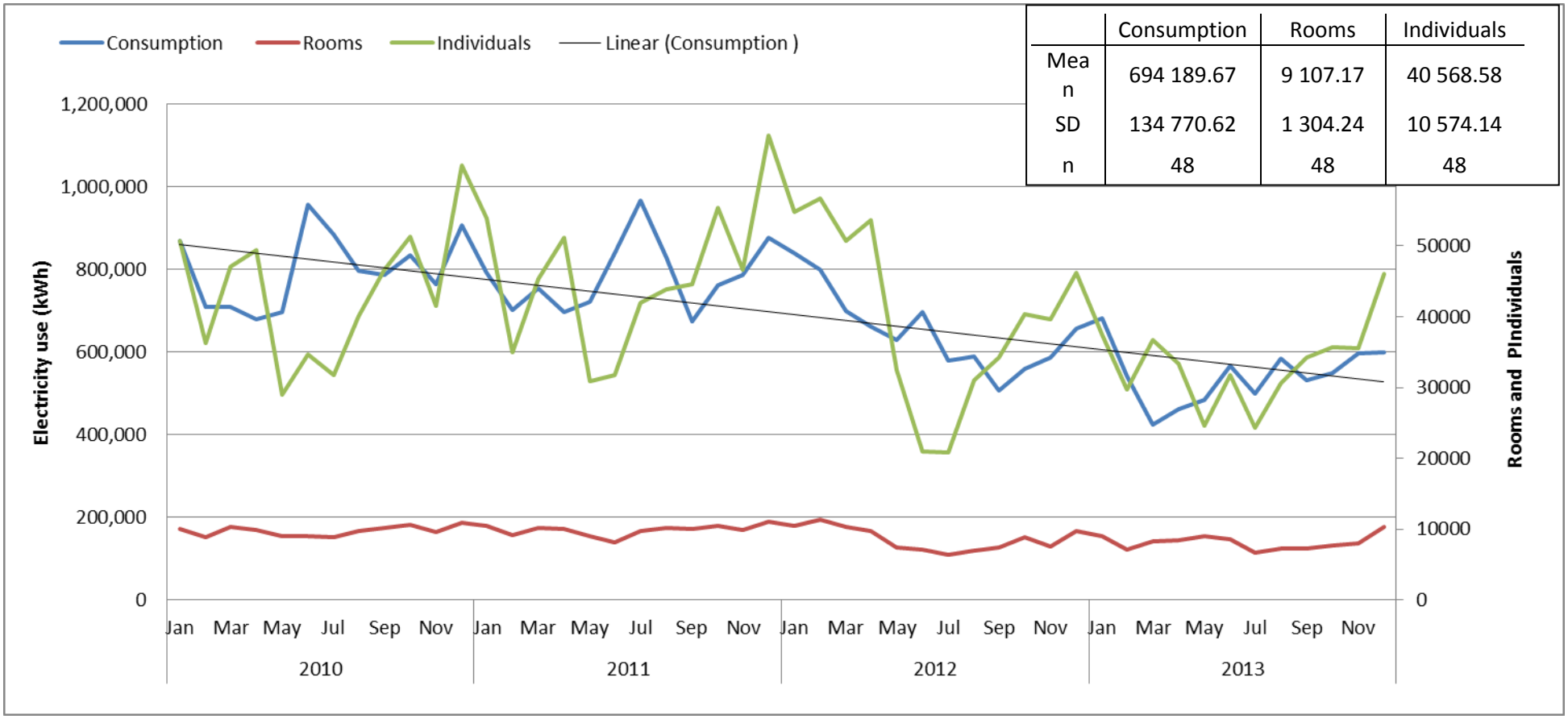
Figure 5.25: Vacation Club: Electricity consumption per room and per person

Due to the large units, the annual total kWh per square metre rate is very low (see Table 5.6). The smallest unit, namely the two-bedroom unit (96 square metres), is three times the size of the largest Cabanas room (29 square metres).

Table 5.6: Vacation Club: kWh per square metre

	2010	2011	2012	2013
Total for year	214.63	210.34	174.57	145.90
Average per month	17.89	17.53	14.55	12.16
Average per day	0.59	0.58	0.48	0.40

* (Bohdanowicz *et al.*, 2001) – large hotels are defined as hotels with more than 150 rooms, with air conditioning, laundry services and a pool



	Consumption	Rooms	Individuals
Mean	694 189.67	9 107.17	40 568.58
SD	134 770.62	1 304.24	10 574.14
n	48	48	48

Figure 5.26: Vacation Club: Total electricity consumption, room occupancy and individuals for 2010 to 2013

5.4.1.2 Liquid petroleum gas

LPG is supplied by Afrox and delivered to four bulk tanks across the resort. The Palace has one tank, there are two that supply the Entertainment Centre, Cascades Hotel and Valley of Waves, and the last tank supplies Sun City Hotel and The Cabanas. Each tank has a 23 000-litre capacity and may only be filled to the 80% mark. The tanks are monitored by the BMS and once any of the tanks reach 50% capacity, the maintenance control room operator will inform the relevant department to order a load. Afrox will send a vehicle that will fill up all four tanks, regardless of the level of LPG inside. LPG is only used for cooking purposes, which occurs in all hotel kitchens and at the Valley of Waves and Entertainment Centre. Staff villages do not have gas infrastructure, but most employees utilise the canteens for daily meals, which is prepared with LPG. The on-site employees were therefore included in the calculation due to their influence on the gas-consumption rate. LPG consumption slightly picked up in 2011 due to higher individual occupancy, but showed a reduction from then onwards. The Entertainment Centre LPG lines were replaced in 2012, which led to reduced gas leaks and possibly contributed to the savings shown year on year (Figure 5.27)

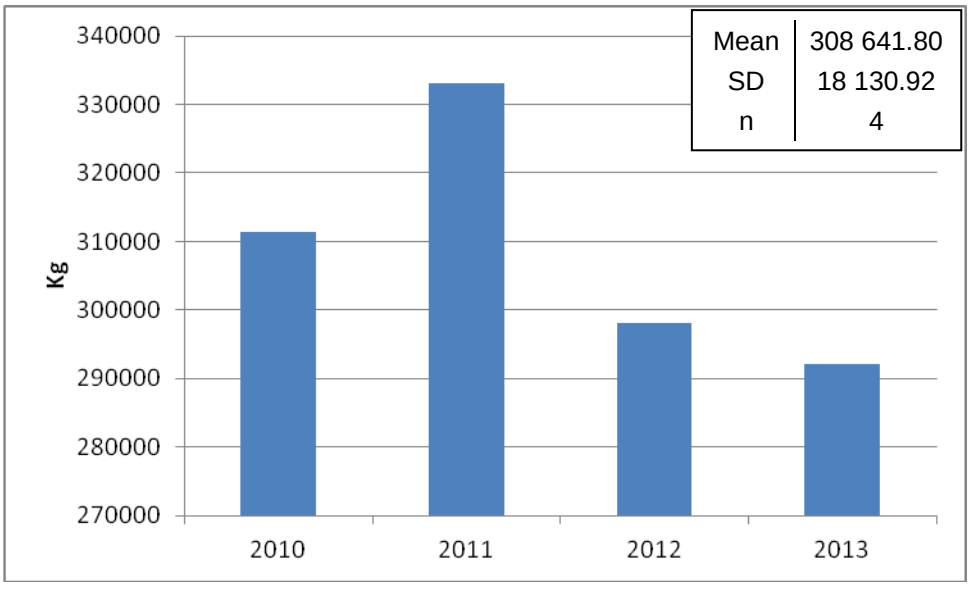
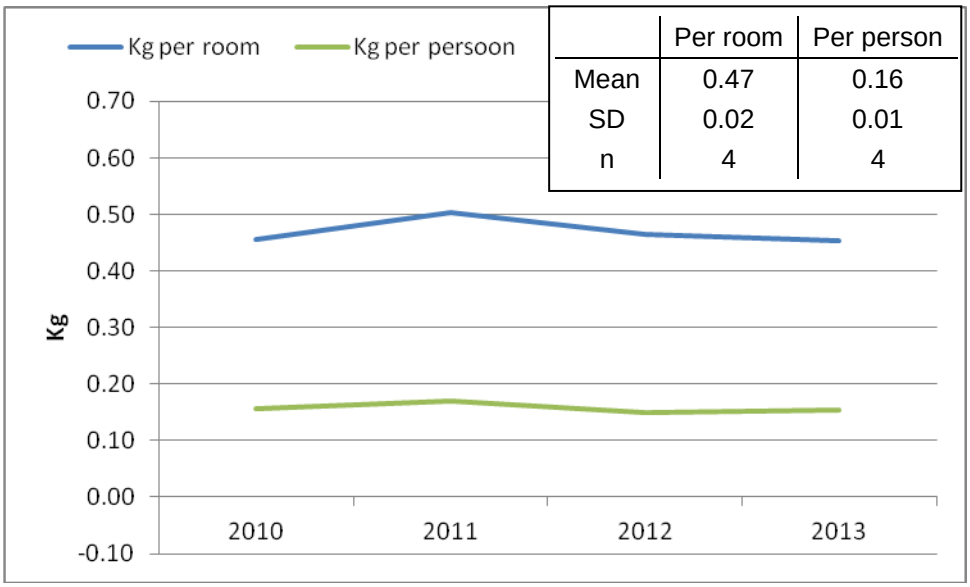


Figure 5.27: Total LPG for SCR

Minimal movement year on year on the per person rate because the LPG use and the amount of people visiting both declined (see Figure 5.28). The room consumption rate increased slightly from 2010 to 2011, but returned to the 2010 level in 2013.



	Per room	Per person
Mean	0.47	0.16
SD	0.02	0.01
n	4	4

Figure 5.28: LPG use per room and per person

The LPG use compared to rooms sold and total individuals at SCR is parallel to each other. The volume of LPG used compared to the occupancy is negligible and therefore had an insignificant impact on the per-person rates (Figure 5.29).

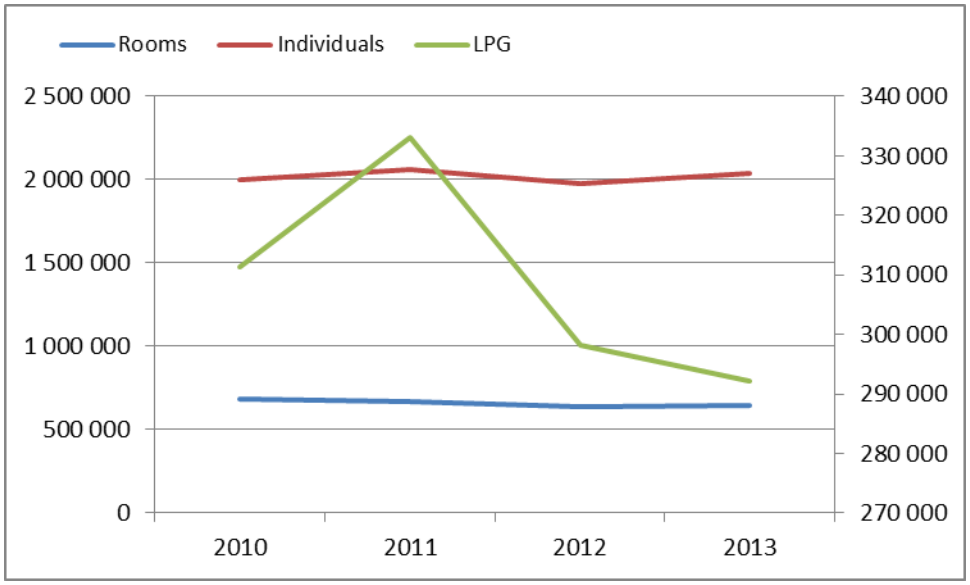


Figure 5.29: Rooms and individuals versus LPG consumption

5.4.1.3 Fuel

There are numerous aspects that contribute to fuel consumption on SCR. Before 2012, SCR had an old bus fleet with long periods of downtime. When a change in management occurred in March 2012, changes were made to the operations and budgets were requested for replacement of the dilapidated bus fleet. A very slight

decrease in diesel consumption was noted since (Figure 5.30). During a personal discussion with Willem van der Westhuizen, the transport accountant and store manager, he explained as follows (Van der Westhuizen, 2015):

> Many initiatives were implemented since 2012 to reduce the fuel consumption of the vehicles. The old busses, some dating back to 1980s, were heavier on fuel because old technology and age cause combustion to be less effective, thus burning more fuel to perform the same task. Busses that stood in the workshop for long periods in 2010–2011 also showed less fuel used, but to the discomfort of guests. To improve on the guests' experience, the old busses were replaced with newer vehicles that are lighter on fuel. More mini-busses for guests were also implemented. There was an increase in non-guest-related travel, such as staff attending training courses abroad, requiring transport. The aging fleet management leases for non-guest vehicles are also reaching 10 years and the vehicles must be replaced with vehicles that are more efficient on fuel.

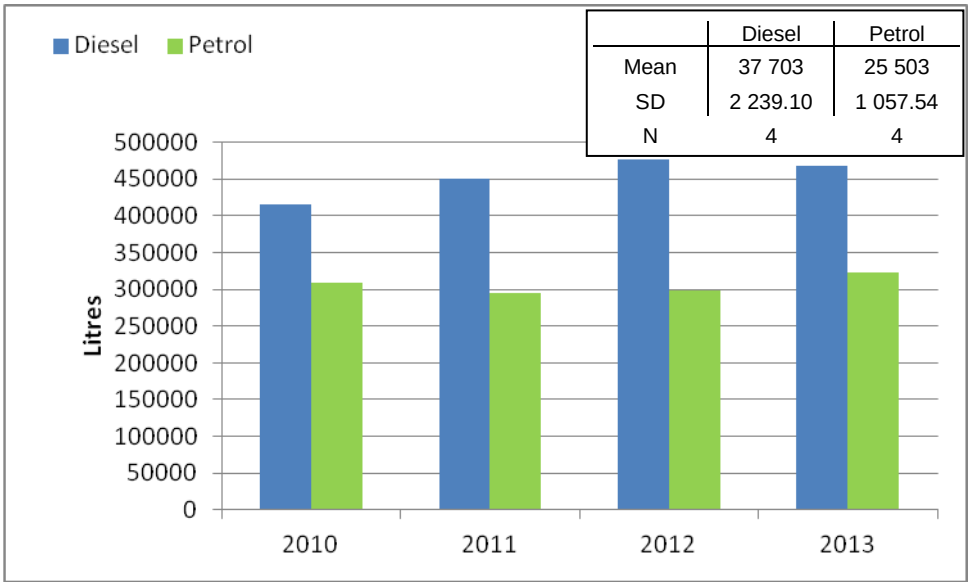
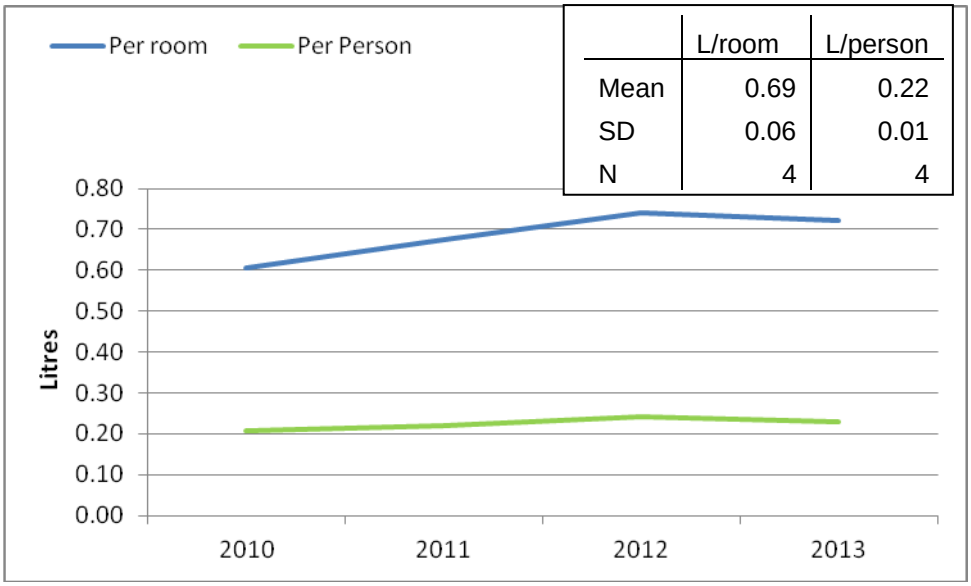


Figure 5.30: Total diesel and petrol consumption for 2010 to 2013

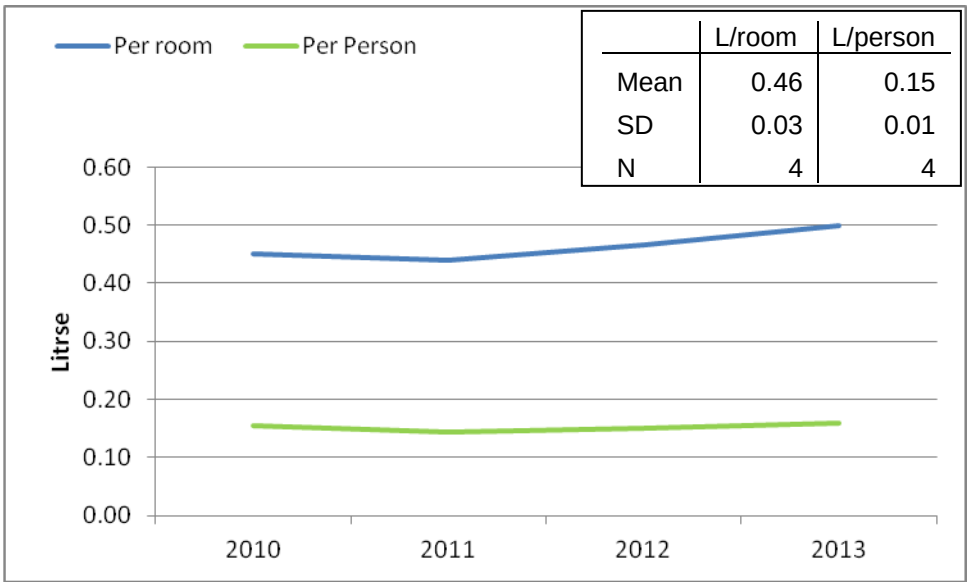
Diesel consumption increased by 12.5% between 2010 and 2013. This is due to high level of bus breakdowns experienced prior to 2012, when SCR started replacing the bus fleet with new vehicles that experience minimal breakdowns. This ensures that higher levels of service can be rendered to guests and staff, but also means more vehicles operating. Per room and per person rates all increased (Figure 5.31).



	L/room	L/person
Mean	0.69	0.22
SD	0.06	0.01
N	4	4

Figure 5.31: Diesel use per room and per person

Petrol consumption only increased by 4.8% between 2010 and 2013. The increased fleet of minibuses is responsible for the higher petrol use (Figure 5.32).



	L/room	L/person
Mean	0.46	0.15
SD	0.03	0.01
N	4	4

Figure 5.32: Petrol use per room and per person

The environmental benefits of using less fuel was weighed against the service offered to the guests and complaints received. It was decided to improve the guest experience and get rid of equipment in disrepair. It is important to maintain a balance between the environment, people and economic benefits of a business in order to be sustainable. This is a fine example of how the minimal impact on the environment will improve guest and employee experience and potentially yield more economic

benefits, which will ensure the existence of the resort. When looking at the fuel usage for the North West province as per figure 2.4 and 2.5, SCR uses 0.07% of the diesel and 0.05% of the petrol brought into the province.

5.4.1.4 Coal

Coal is used for hot-water boilers at Kwena Gardens for supply to breeding ponds. The rate of use depends entirely on the weather. During cold winters the boilers will consume up to eight times more coal than during peak summer. The data supplied for 2010 were not accurate and were not included in the research (Figure 5.33).

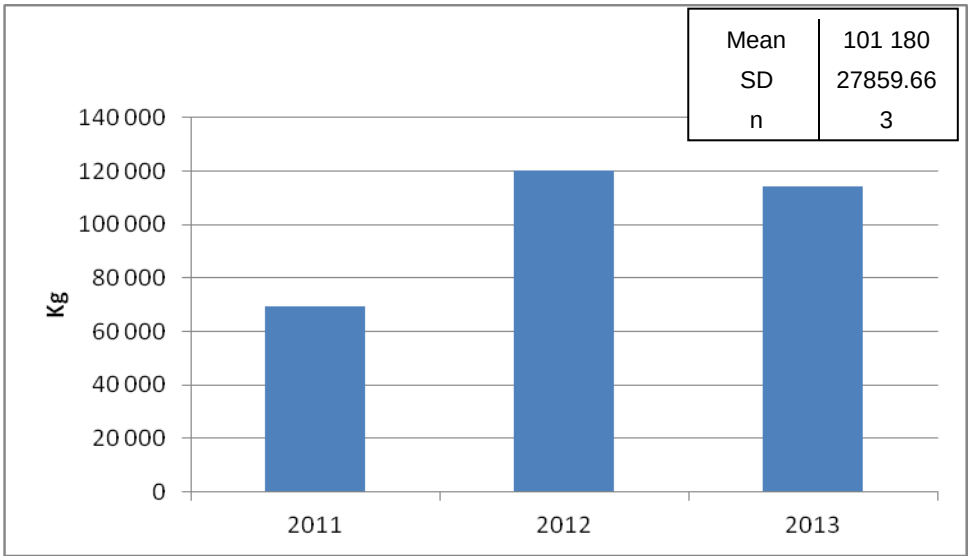


Figure 5.33: Total coal consumption for 2011 to 2013

The 2011 total consumption seems low (Figure 5.34), but it is due to the boilers not being operational from August until November 2011. The boiler plant was decommissioned in February 2015 because the crocodile-breeding programme was stopped.

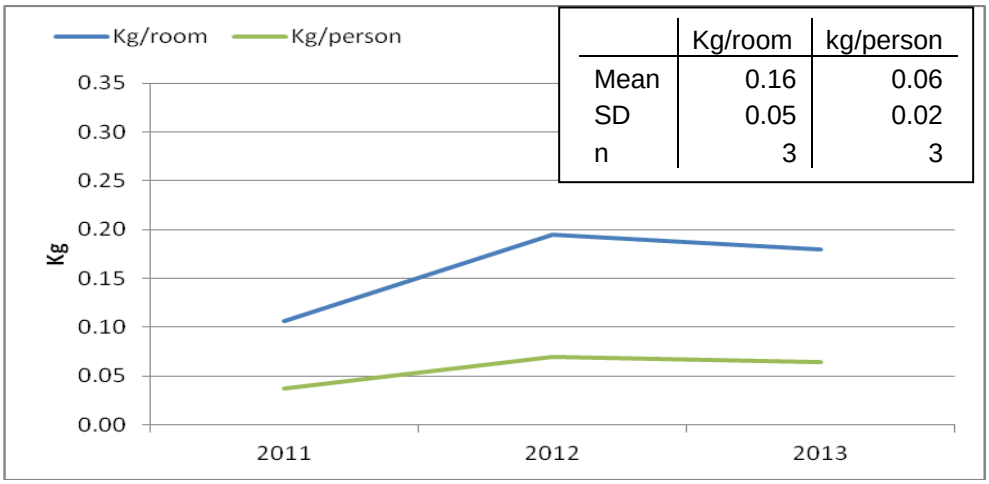


Figure 5.34: Coal consumption per room and per person for 2011 to 2013

5.4.1.5 Energy-management conclusion

UNWTO indicator: Energy management – per capita consumption of energy from all sources

SCR and the majority of the hotels on the resort have shown a reduction in electricity use. The resort has managed to reduce its consumption by 12.3% from 2010 to 2013. The Palace has shown a 3.5% increase in electricity from 2010 to 2013. The consumption went up in 2011 from added pump stations at around 8%, but The Palace management and Green Team managed to reduce it by 4.6% in 2013 replacing globes with energy-efficient alternatives and using electricity wisely. Sun City Hotel and the Vacation Club showed the highest savings (Figure 5.35), mainly because of the fitment of energy-management sockets in the rooms. The room key card is inserted into the socket to activate the electricity in the room. Without a key card, all electricity besides the bar fridge and a small pilot light at the door is deactivated contributing to reduced consumption rates.

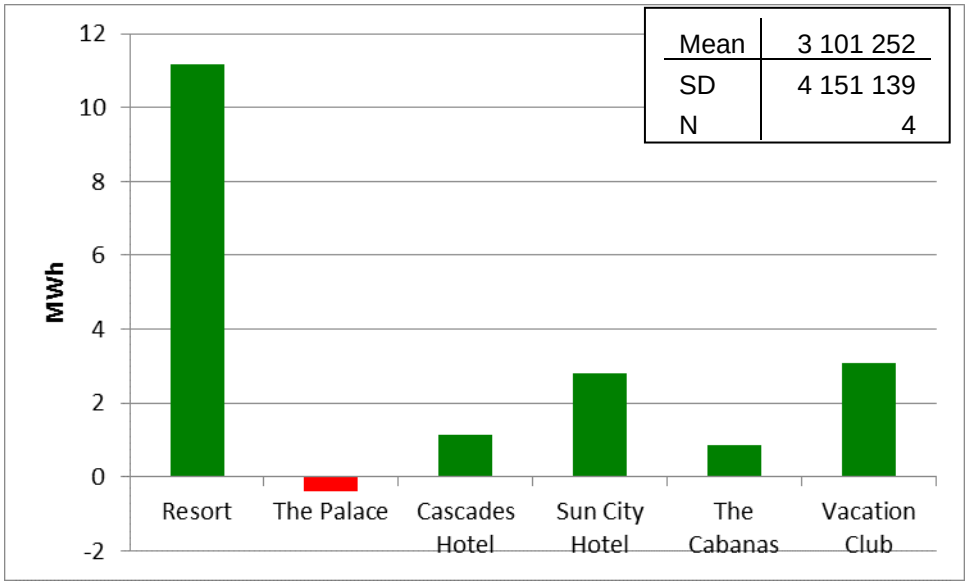


Figure 5.35: Resort and hotel electricity use in 2010 compared to 2013

Table 5.7 shows the highest and lowest consumption use in each hotel from the graphs above. In all cases it was 2010 compared to 2013 except the Palace where the highest was 2012 and the lowest in 2010. The Palace and Sun City Hotel are the highest energy consumers, together responsible for one-third of the resort's energy use per annum. The Palace usually has lower occupancy than the other units and therefore higher per-room and per-person rates, ranging from 174 to 214 kWh (628–

771 MJ) and 84 to 107 kWh (303–385 MJ) respectively. The Cascades Hotel has minimal back-of-house facilities, which results in lower use. This reduces the per-room and per-person rates. The hotel uses 100 to 106 kWh (360–383 MJ) per room and 47 to 55 kWh (172–200 MJ) per person for an occupied room. Sun City Hotel and Casino has the second highest consumption rates, ranging from 167 to 199 kWh (602–719 MJ) per room night and 74 to 93 kWh (267–338 MJ) per person per night. The Cabanas has the most hotel rooms, which are small with individual air conditioners and high occupancy. The lowest room rate was 29 kWh (106 MJ) and the highest 37 kWh (135 MJ), and 14kWh (49MJ) to 19 kWh (69 MJ) per person staying over. The Cabanas is a three-star establishment, whereas The Palace, Cascades Hotel and Sun City Hotel are all five-star establishments, which automatically mean more amenities and facilities available to guests. The Vacation Club has self-catering units, not hotel rooms, which are much larger, and with many energy-efficient installations completed it uses minimal electricity per guest night. The occupancy rate is also high with units that can accommodate up to eight people. The room consumption rates range from 67 to 82 kWh (242–295 MJ) and per-person use ranges from 16 to 19 kWh (145–214 MJ).

Table 5.7: High and low electricity consumption per hotel (kWh and MJ)

(Conversion 1 kWh = 3.6 MJ)

Unit		Year	Per room		Per person		Per sq. m	
			kWh	MJ	kWh	MJ	kWh	MJ
The Palace	Highest	2012	214.24	771.26	107.10	385.56	188.92	680.11
	Lowest	2010	174.50	628.20	84.40	303.84	173.91	626.08
Cascades Hotel	Highest	2010	106.61	383.80	55.60	200.16	260.86	939.10
	Lowest	2013	100.01	360.04	47.90	172.44	215.60	776.16
Sun City Hotel and Casino	Highest	2010	199.85	719.46	93.90	338.04	548.88	1 975.97
	Lowest	2013	167.48	602.93	74.29	267.44	463.98	1 670.33
The Cabanas	Highest	2010	37.59	135.32	18.46	66.46	163.32	587.95
	Lowest	2013	29.57	106.45	13.73	49.43	124.50	448.20
Vacation Club	Highest	2010	82.20	295.92	19.26	69.34	214.63	772.67
	Lowest	2013	67.47	242.89	16.65	59.94	145.90	525.24

When comparing SCR accommodation units to international hotel electricity use, the SCR units managed to align well with the published figures, as seen in Table 5.8.

Table 5.8: Electricity use comparison between SCR accommodation and international hotels (UNWTO, 2012)

SCR accommodation units	MJ per person per day
The Palace: 5-star	303–385
Cascades Hotel: 5-star	172–200
Sun City Hotel and Casino: 5-star	267–338
The Cabanas: 3-star	49–66
Vacation Club	59–69
International hotels	
5-star hotel, Oman	3 717
4-star hotel, Vietnam	288–853
Summer houses, Sweden	246
Holiday village, Germany	91

The SCR global energy use per room and per person is shown in Table 5.9. This includes all the energy types that people use when at SCR. The global energy use is divided by the guests, staff and day visitors to reach a 2013 year total of 161 MJ per person.

Table 5.9: Summary of energy use (kWh and megajoule) in 2013 for SCR

	Per room		Per person		Conversion rate
	kWh	MJ	kWh	MJ	
Electricity	122.65	441.54	40.38	145.37	1 kWh = 3.6 MJ
LPG	0.45	10.49	0.15	3.50	1 L = 13.099 MJ
Diesel	0.72	25.85	0.23	8.26	1 L = 10.169 MJ
Petrol	0.49	15.78	0.15	4.83	1 L = 9.348 MJ
Coal	0.18	0.00432	0.06	0.00144	1 kg = 0.0078 MJ
Total	**124.49**	**493.66**	**40.97**	**161.95**	

When comparing the UNWTO published global estimates with the SCR results, it is slightly higher (see Table 5.10). During the research on benchmarks for resort energy use, there was no suitable data found to compare with on the same data range. The benchmarks found was measured on room only excluding all facilities like this study. The energy use is expected to be higher for a resort-based hotel that relies on pump stations to pump its water, WWTW for sewage treatment and a large bus fleet to transport its guests and staff. It is not comparable, hence the importance of this study to make data available for mass tourism establishments and resorts to be able to compare their data accurately.

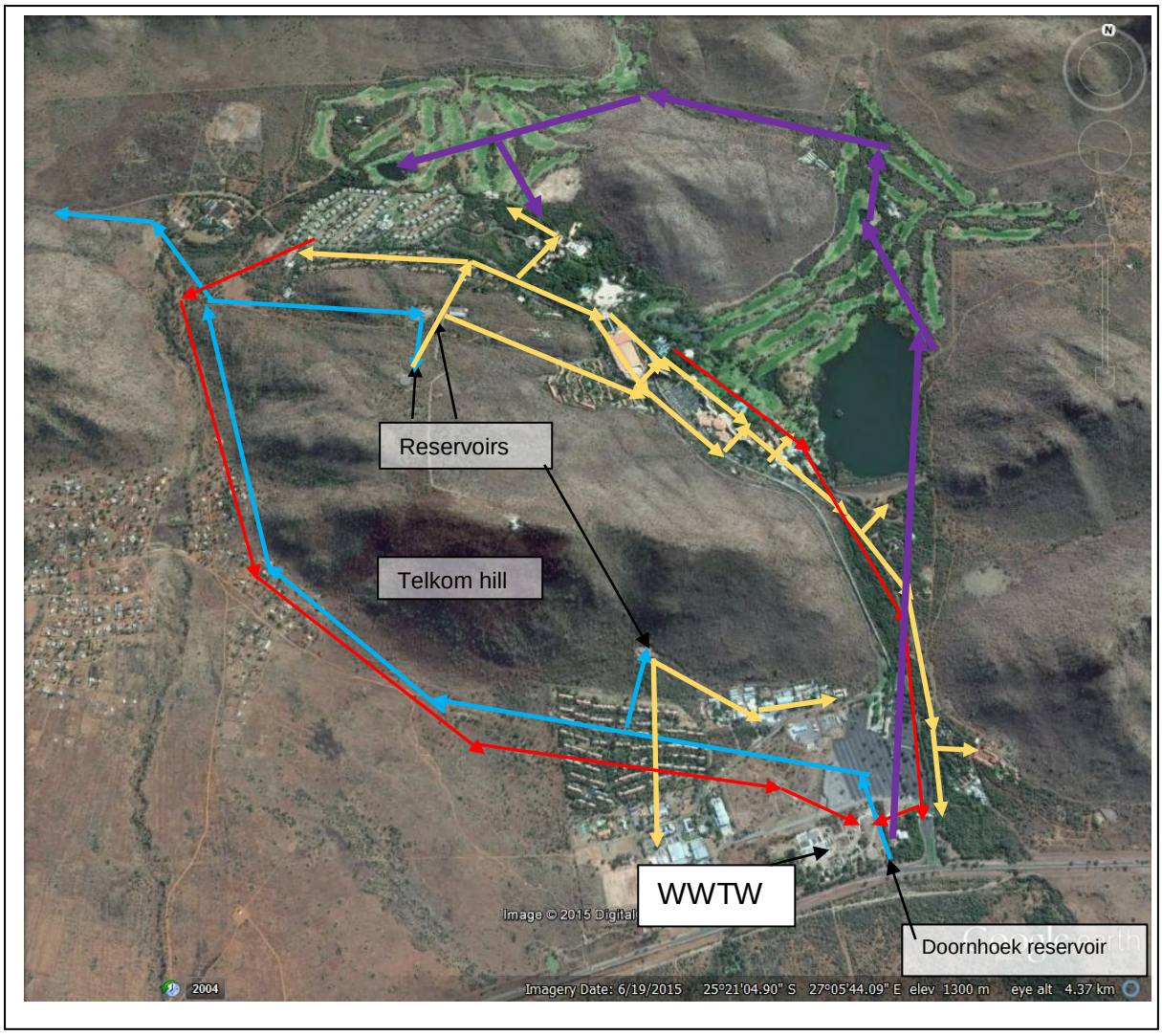
Table 5.10: Global estimate averages (conservative) (Gossling, 2004)

Type of accommodation	MJ
SCR (whole resort)	161
Hotels	130
Self-catering	120
Camping	50

5.4.2 To determine and analyse the water consumption of the five accommodation areas and SCR as a whole

SCR is regarded as a water supplier due to the remarkable infrastructure to distribute water to end users. The resort has an agreement with the local water supplier, Magalies Water, to use a maximum of 11.6 megalitres per day, although this has not been necessary. The only time during the year when the maximum is reached is during the Valley of Waves shutdown, when 12.4 megalitres of water for pools and water facilities are required to refill them. The infrastructure manager informs Magalies Water in advance of the dates when the water will be needed. When the pools are emptied the water ends up in the recreational lake. The same goes for rainwater. All the rainwater collected in storm water drains across the resort leads to the recreational lake which acts a rainwater harvesting collection point. From here water can be extracted to supplement the recycled waste water (treated effluent –see Section 5.4.3) irrigation on the golf courses if needed. The recreational lake gets its name from the Waterworld Company that offer various recreational watersport activities on the lake.

As discussed in Chapter 2, Magalies Water pumps water from the Vaalkop Dam to SCR 70 km away with a pipeline built exclusively and paid for by SCR in the 1980s. The pipeline is now used to supply many areas in the region. Magalies Water's responsibility ends at the Doornkop reservoir situated next to the SCR WWTW (see Figure 5.36). The Infrastructure Department takes over from here and is responsible for distributing the water across the resort. There is a small pump station next to the Doornhoek reservoir that supplies water to the Ledig community on occasion. From the 10 million litres Doornhoek reservoir on SCR, water is pumped to Telkom hill, where there is a range of reservoirs. En route here, water is supplied to the South Village reservoir and also to Bakubung Game Lodge in Pilanesberg. The South Village reservoir supplies water to the South Staff Village, fire station, maintenance, warehouse and other departments on the southern slopes of Telkom hill.



	Potable water to reservoirs		Potable water to resort
	Waste water		Treated effluent

Figure 5.36: Water reticulation systems

The main water supply enters two reservoirs on Telkom hill, known as the intermediate reservoirs. These are 3- and 7-megalitre reservoirs. From here water is pumped up to a 10 million litre reservoir named the Upper-Upper reservoir. From here water is gravity-fed to the rest of the resort.

Waste water generated in the kitchens and rooms flow to the WWTW by gravity alone. No pumps are used, except for at the South Village, which has a pump station at the police station. Up to 30% of the potable water used is returned to the WWTW as waste water, which is generally around 2 to 3 million litres. All waste water is

recycled through the WWTW and the treated effluent is reused for irrigation on the two championship golf courses. The process and the data are discussed in Section 5.4.3.

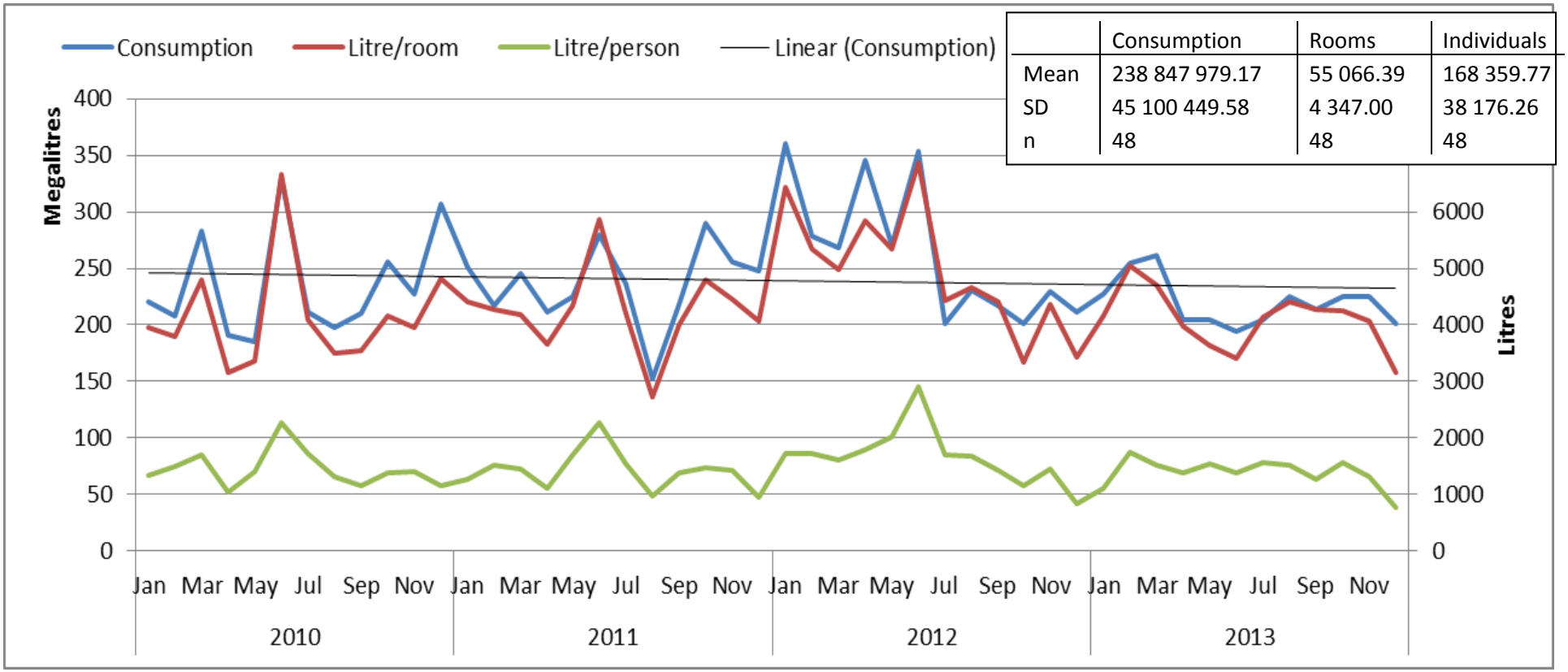
The water use for each hotel includes usage of all facilities in and around the hotel. Included in the meter reading is boiler and air-handling unit supply, food preparation and cleaning water, drinking water, room and toilet use, staff toilet and bathing water, garden irrigation, pool and water features, and fresh water lakes around the hotel. In short, it is all the water used for any and every operation in the hotel. In the study the consumption rates were also determined per room and per person. However, it should be kept in mind that this is not the actual use of the guests only, but all the water requirements in order to complement the guest experience, as described above.

All the hotels have fitted low-flow shower heads in all the rooms and the staff change rooms. These shower heads can reduce the water use up to 50%. Dual flush systems for the toilets were fitted in all hotels and staff change rooms. Aerators were also fitted to taps to reduce the flow of water by mixing air into the stream of water. The flow rate is three litres per minute. In The Palace and the Cascades Hotel kitchens water-purification plants were installed to offer guests still and sparkling water in specially designed bottles from filtered and purified municipal water. This to offer guests an odourless fresh water in summer when municipal water can have a muddy odour. The Entertainment Centre restrooms have sensor taps and urinals to automate water use. The irrigation system on the Gary Player Country Club is fitted with rain sensors and sprinklers, which are regularly reset to ensure that water lands on designated areas and not on the roads or pathways. Both golf courses almost exclusively uses treated effluent which is recycled waste water for irrigation. Freshwater is only supplemented if pipe breaks occur.

5.4.2.1 The resort

The graphs below represent the total water use for the entire resort between 2010 and 2013. The readings are taken at the main water feed from the municipality, and therefore include all water uses on SCR. The sharp drop in August 2012 was a result of fixing a massive leak in the Valley of Waves (Figure 5.37), which reduced the monthly consumption by around 50 million litres. Most hotels also repair and maintain their pools once a year during the winter. During the study the average

monthly consumption was 238 million litres per month with 55 000 rooms sold and just over 168 000 people visiting SCR each month. This includes guests, day visitors and staff that reside on the resort. There is a link between the consumption rate and the rooms and individuals.



	Consumption	Rooms	Individuals
Mean	238 847 979.17	55 066.39	168 359.77
SD	45 100 449.58	4 347.00	38 176.26
n	48	48	48

Figure 5.37: SCR: Total water consumption, rooms and individuals from 2010 to 2013

The reduction in water use in August 2012 can also be seen in Figure 5.38 and the lower full-year use in 2013 compared to 2010 and 2011.

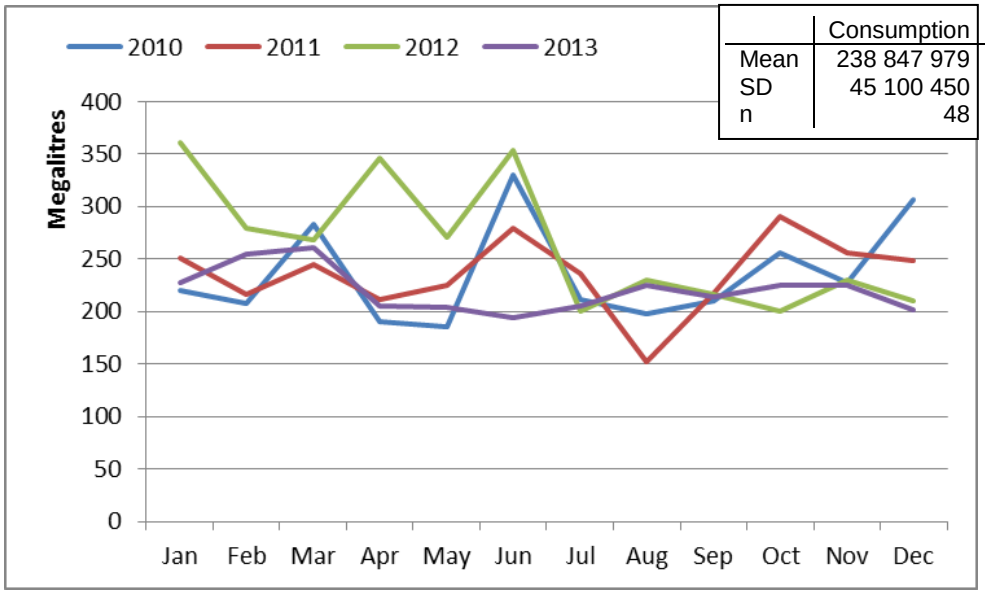


Figure 5.38: SCR: Total water consumption per year comparison

The average use per room is 4 343 litres per night. This figure includes all irrigation, the Valley of Waves, the Entertainment Centre, offices, support services and all operations that make up the resort. The average rate per person is 1 420 litres per day. The demand increased from 2011 to 2012 (Figure 5.39), followed by a steep decline after fixing various pipe breaks and implementing water-saving initiatives.

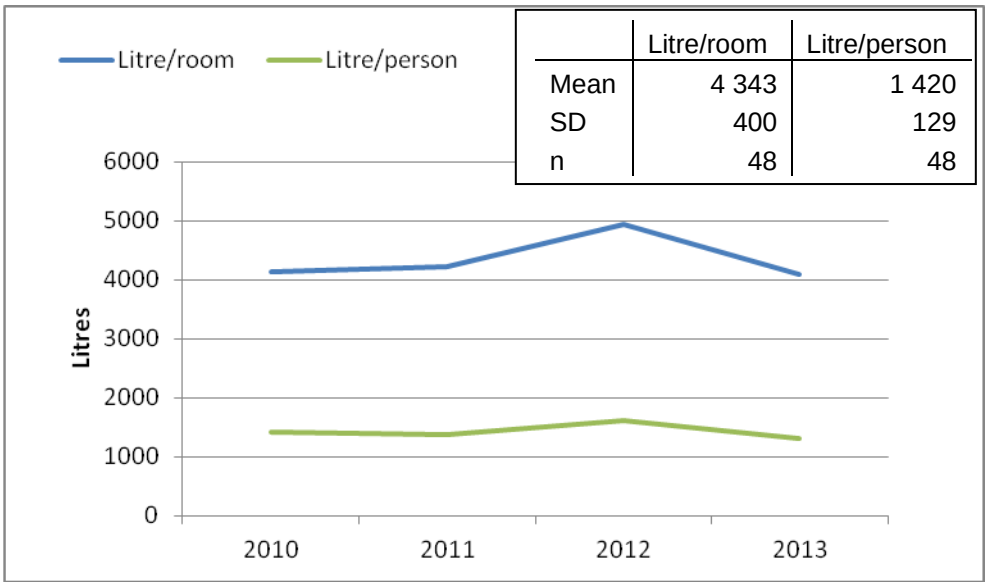


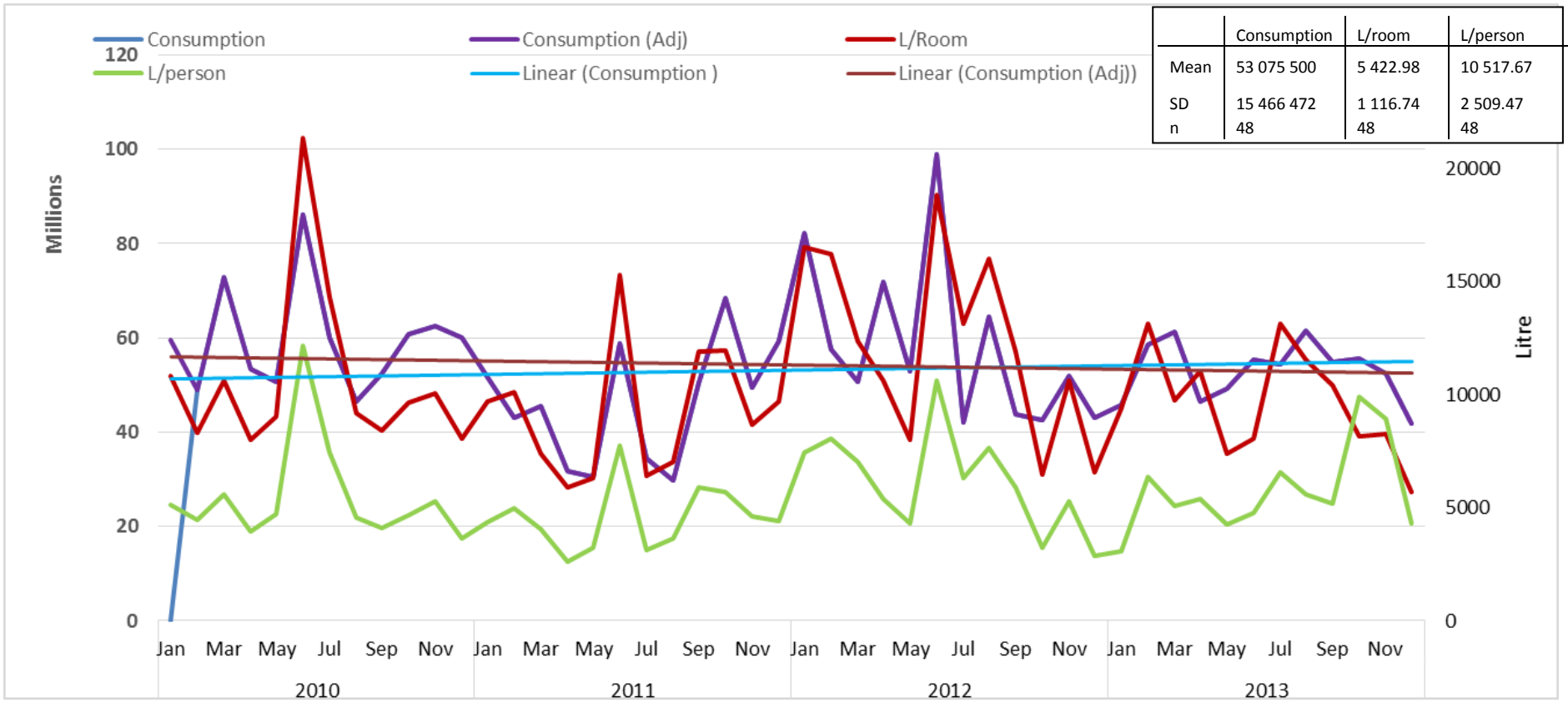
Figure 5.39: SCR: Water consumption per room and per person

Although 36 739 fewer rooms were sold in 2013 compared to 2010, the water use per room has remained fairly constant. This is because the water consumption was reduced by 183 million litres since 2010. The reduction in water consumption per person took place regardless of 31 912 more people visiting the resort in 2013 compared to 2010.

5.4.2.2 The Palace

The Palace has a large water footprint compared to the other hotels on SCR. The Palace is surrounded by waterways, which originate at the lakes situated at the entrance. They flow down on both sides of the hotel to the lakes at the Valley of Waves observation deck and are pumped up to the origination point. The lakes being shallow and covering a vast surface area allow for high evaporation. During the study period the evaporated water was replenished with potable water. Only in 2014 was a new pipe fitted to supply treated effluent instead of drinking water for the replenishment of the lakes.

The flow meter connected to the main incoming water supply line at The Palace Hotel was faulty in January 2010. Without a measurement for this month, it would be difficult to accurately compare the year-on-year meter readings. The researcher generated a figure for this month using a monthly average for 2010. The total water consumption for four years for The Palace was compared with the rooms sold and the individuals in-house (Figure 5.40). Because The Palace has various major water uses, the rooms sold and the number of individuals have little effect on the consumption. When a trend line is added to the available data, The Palace shows a small increase (blue trend line). When the omitted reading of January 2010 is replaced with an annual average, The Palace shows a small reduction in water use (adjusted – red trend line).



	Consumption	L/room	L/person
Mean	53 075 500	5 422.98	10 517.67
SD	15 466 472	1 116.74	2 509.47
n	48	48	48

Figure 5.40: The Palace: Total water consumption, rooms and individuals for 2010 to 2013

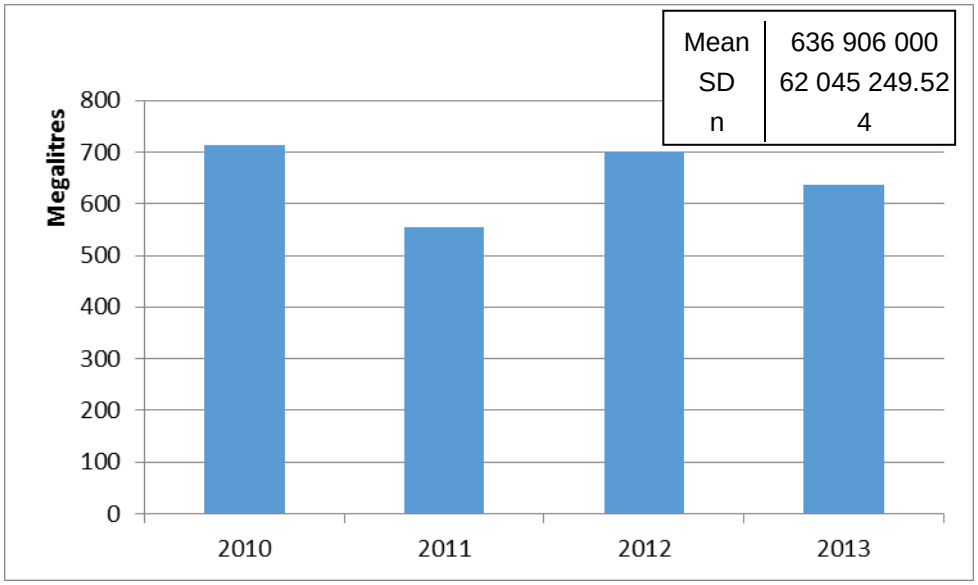


Figure 5.41: The Palace: Total water consumption for 2010 to 2013

The water consumption at The Palace is exceptionally high due to the extensive 19.85-hectare gardens and regular subsidising of potable irrigation water to the Lost City Country Club. Potable water for irrigation is only required when problems are experienced with the pump station or when low quantities are pumped from the Gary Player Country Club, in other words, if the Gary Player Country Club uses too much of the treated effluent and the remainder is insufficient for the Lost City Country Club to irrigate. It is impossible to determine the usage of the golf course per month due to the lack of a meter for the supply. It is therefore not a true reflection of the per-room and per-person usage in the hotel.

The clam shell fountain at the main pool had a major leak in a pipe under the foundation. It was repaired from within the pipe using new no-dig technology. The main pool also leaked since 2013. The leak was isolated in 2014 after a long process to detect it and fixed during the 2015 pool maintenance shutdown Phase 2.

Figure 5.42 illustrates the consumption rates per room and per person. It includes all the water uses in the hotel after the installation of the flow meter.

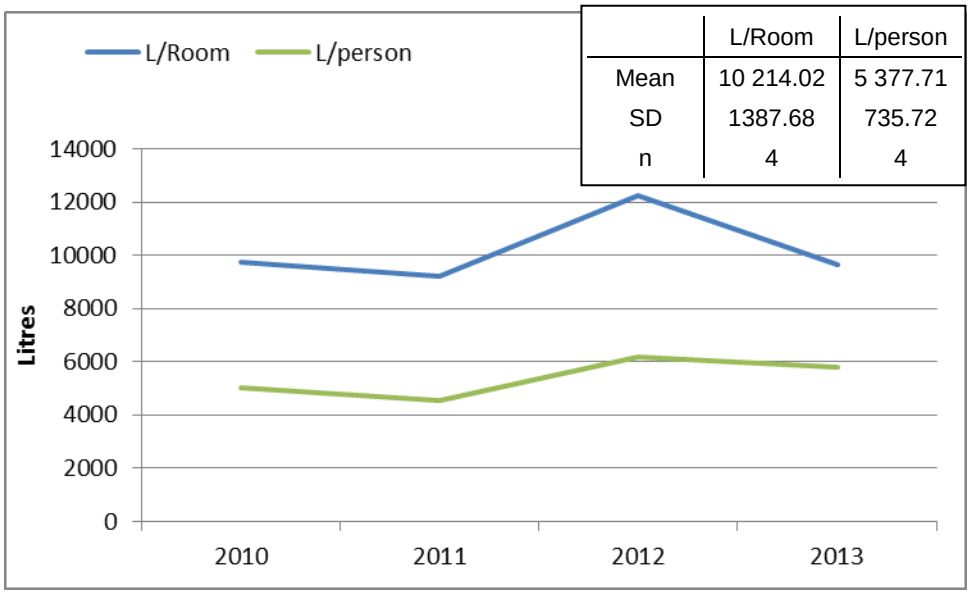


Figure 5.42: The Palace: Water consumption per room and per person

The Palace sold 1 384 fewer rooms and accommodated 5 635 fewer people in 2013 compared to 2010. This meant that although showing a reduction in the amount of water used, the water use per room rate stayed fairly even. The per-person rate had a 735-litre per night standard deviation because of significantly fewer guests staying at the hotel in 2013. The total consumption per year divided by the square metre area of the hotel gives a litre per square metre rate in Table 5.11. The annual figure was divided into 12 months and then into 30.4 days to give a monthly figure. The Palace consumes between 23.57 and 30.39 litre per day per square metre.

Table 5.11: The Palace: Water consumption per square metre

	2010	**2011**	**2012**	**2013**
Total for year	11 087.44	8 597.31	10 910.02	9 900.85
Average per month	923.95	716.44	909.17	825.07
Average per day	30.39	23.57	29.91	27.14

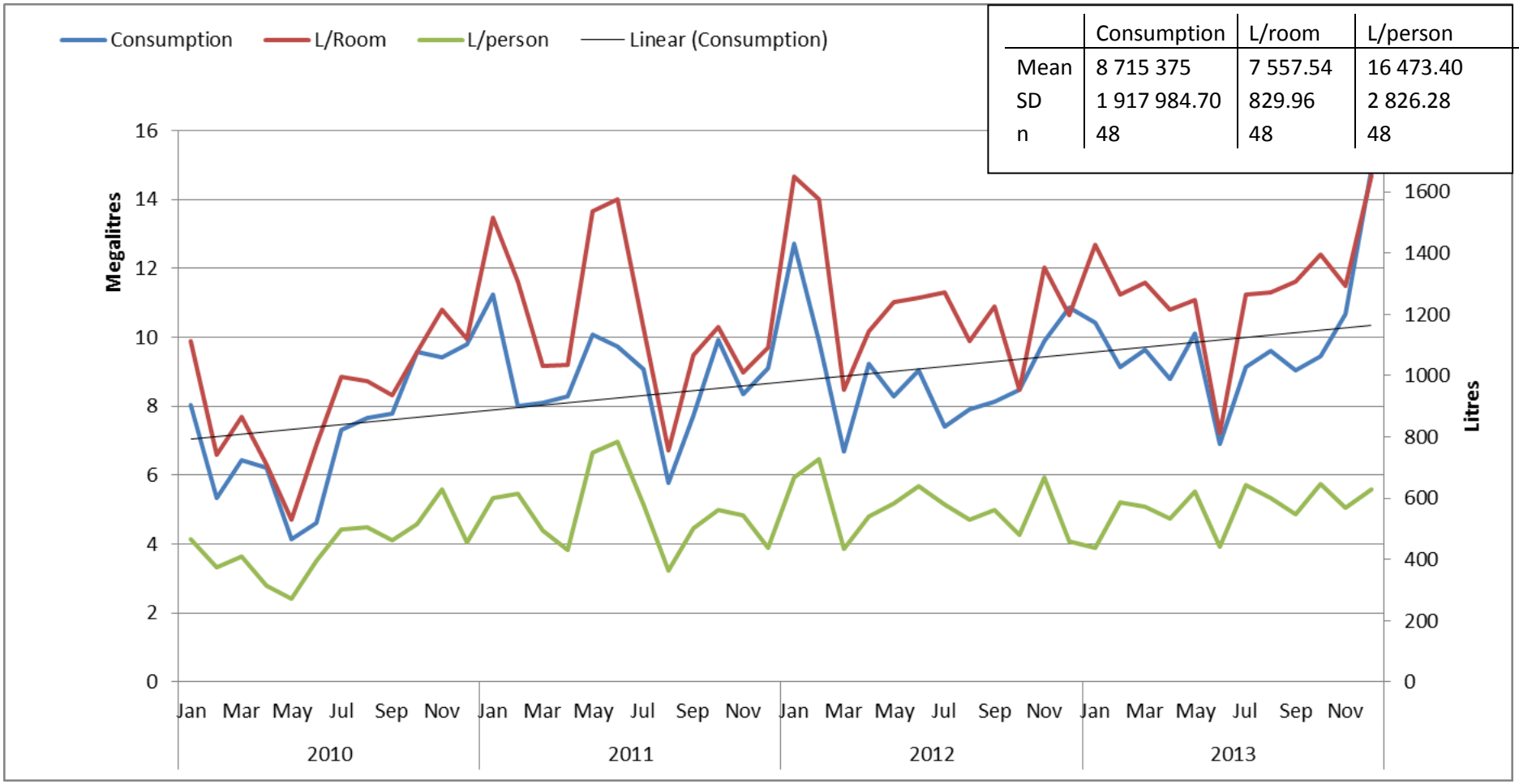
5.4.2.3 The Cascades Hotel

The Cascades Hotel has two water supply lines. From 2009 only one of the water supply lines was fitted with a water flow meter. It was only in October 2012 that the second supply line was fitted with a meter to monitor the total water use. The water data for the Cascades Hotel were excluded from this study because they are not a true reflection of the actual water consumption.

5.4.2.4 Sun City Hotel

Sun City Hotel has shown an average increase of 13 million litres per year, as is evident in the trend line in Figure 5.43. The spikes during the December holiday water use confirms the lower room and person water use due to high occupancy. Sun City Hotel and Casino uses between 7.21 and 9.83 litres per square metre per day.

The Sun City Hotel and Casino total occupancies per year had a standard deviation of 2 311 rooms (2.5%). Spikes in the water consumption in July and December are because of school holidays, the NGC and winter pool maintenance, which consumes an additional two million litres.



	Consumption	L/room	L/person
Mean	8 715 375	7 557.54	16 473.40
SD	1 917 984.70	829.96	2 826.28
n	48	48	48

Figure 5.43: Sun City Hotel: Total water consumption, rooms and individuals from 2010 to 2013

The water consumption of the hotel increased by 18% from 2010 to 2011, by 2.8% from 2011 to 2012 and by 7.9% from 2012 to 2013 as per Figure 5.44.

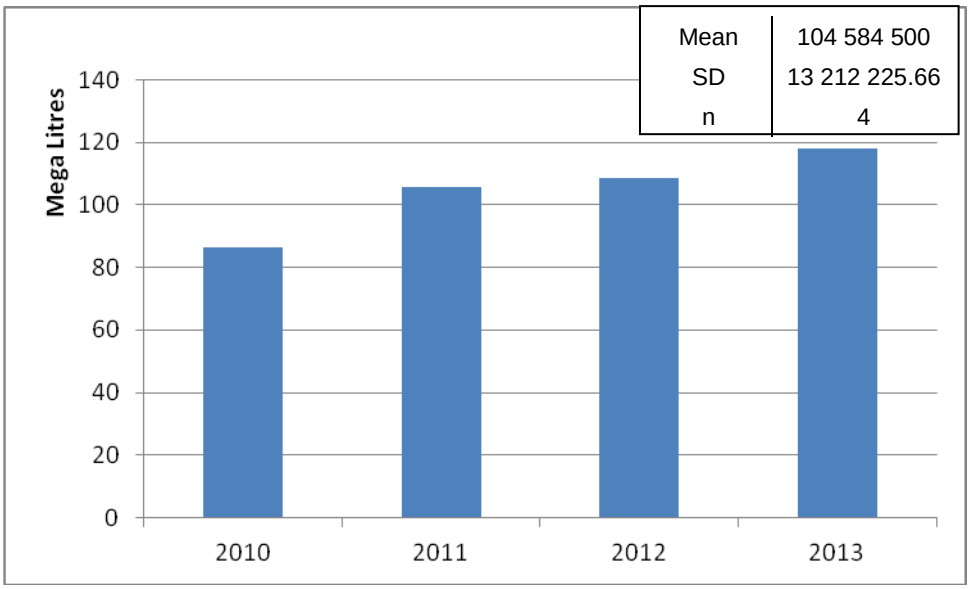


Figure 5.44: Sun City Hotel: Total water consumption for 2010 to 2013

The individuals visiting the hotel between 2010 and 2013 increased by 12 646 and they stayed in 1 769 fewer rooms. This contributed to the higher consumption per-room and per-person rates (Figure 5.45).

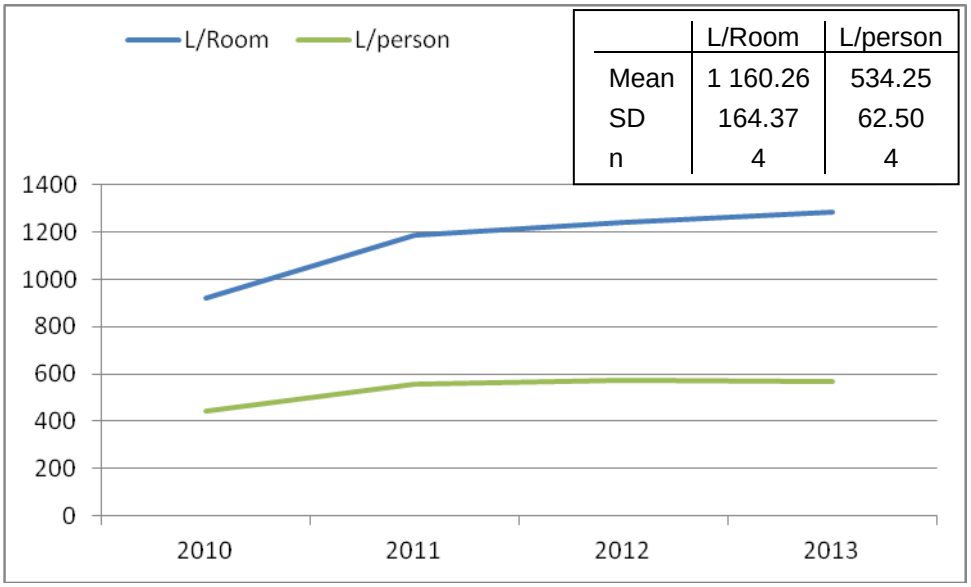


Figure 5.45: Sun City Hotel: Water consumption per room and per person

Sun City Hotel uses between 2 629 and 3 586 litres per square metre per year (see Table 5.12).

Table 5.12: Sun City Hotel and Casino: Water consumption per square metre

	2010	2011	2012	2013
Total for year	2 629.34	3 210.56	3 304.32	3 586.70
Average per month	219.11	267.55	275.36	298.89
Average per day	7.21	8.80	9.06	9.83

5.4.2.5 The Cabanas

The overall consumption of The Cabanas has increased from 2010 and this trend continued until 2012, as per Figure 5.46. There was a decrease of 29.2 million litres from 2012 versus 2013, although 5 509 more rooms were sold. Hot and cold water plumbing pipes were replaced on the room supplies which reduced water leaks. Environmental notices were added behind the toilet doors to request guests to reuse towels and save water and electricity. The water readings for January to March 2010 and also for June 2011 are not available. This had an impact on the graphs below. The monthly average over 48 months was calculated at 10.6 megalitres. Where the averages are used in the months with missing data, the projected consumption levels are indicated in Figure 5.46 as 2010 and 2011 adjusted.

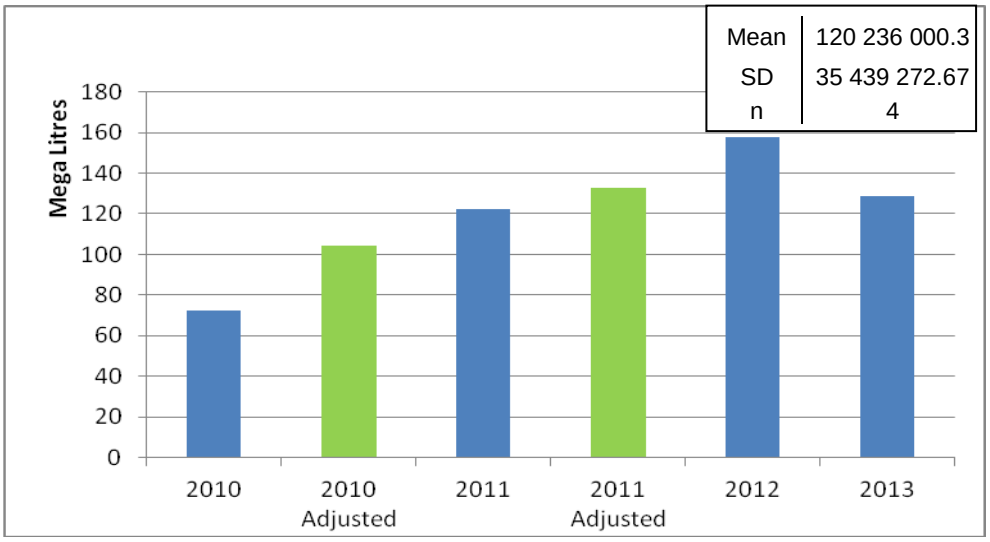
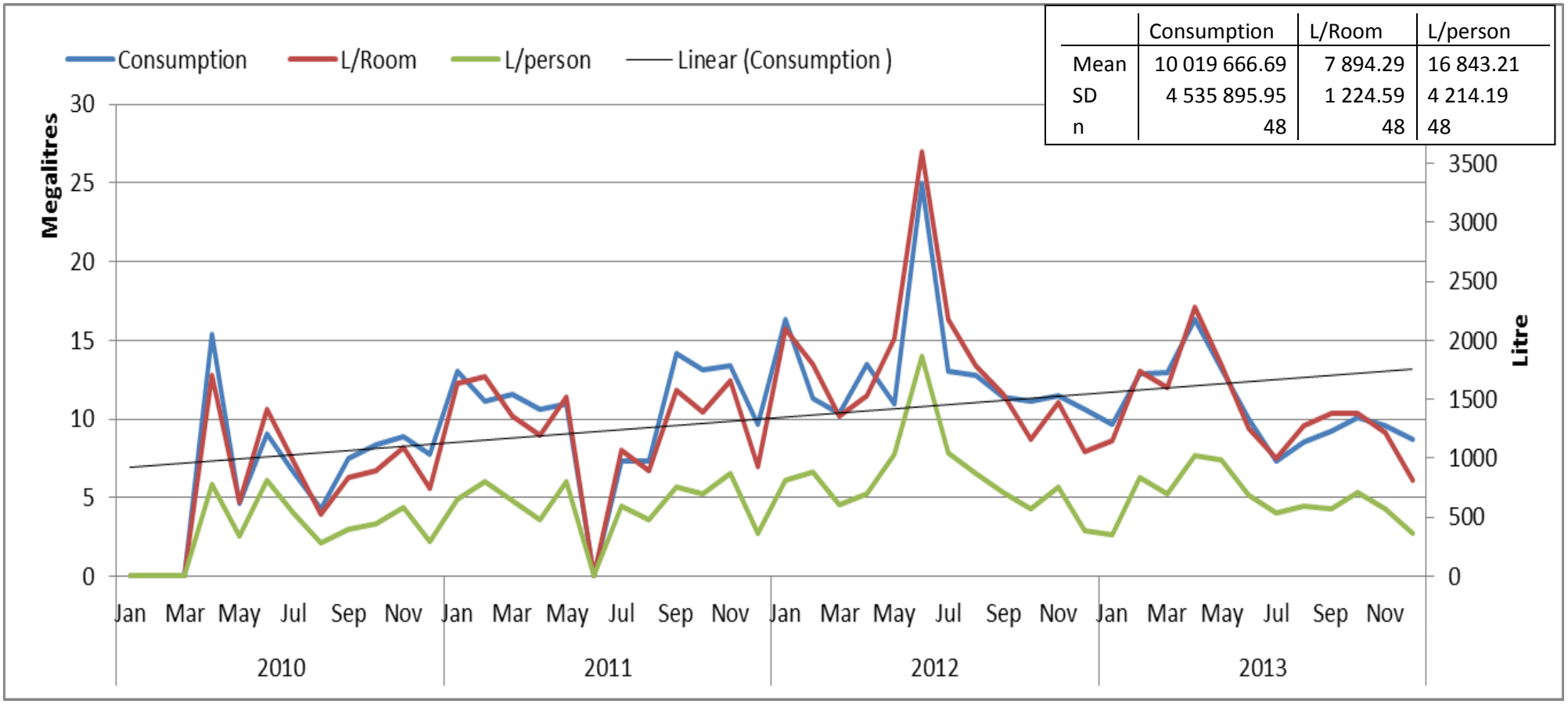


Figure 5.46: The Cabanas: Total water consumption for 2010 to 2013

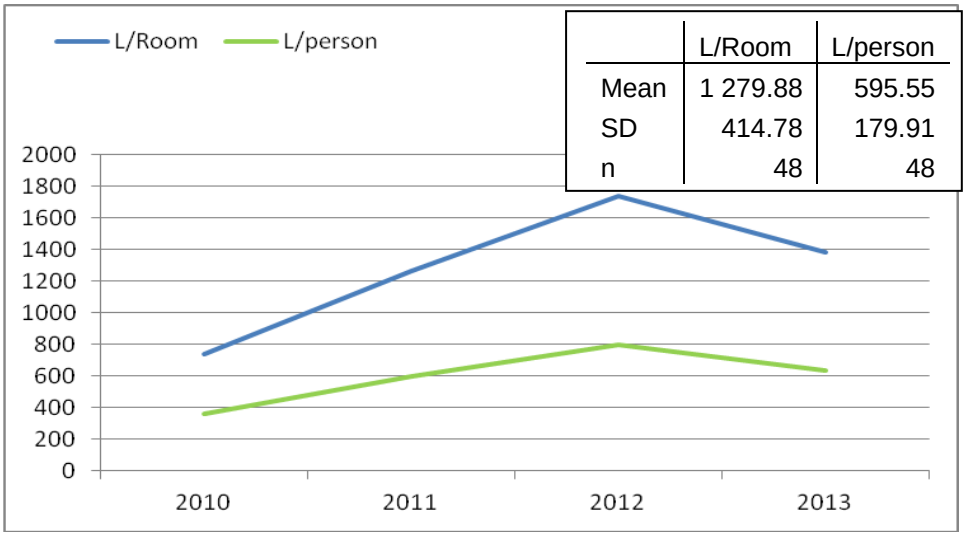
Even when adding the extrapolated data, The Cabanas still shows an increase in water consumption until 2012, with 2013 being slightly lower than the projected 2011 total. The Cabanas has the highest occupancy of all the hotels. The months with no readings affected the graph severely. Some of the December peaks are visible in the number of guests that stayed, but overall there is not much correlation between the consumption and the rooms or individuals as illustrated in Figure 5.47.



	Consumption	L/Room	L/person
Mean	10 019 666.69	7 894.29	16 843.21
SD	4 535 895.95	1 224.59	4 214.19
n	48	48	48

Figure 5.47: The Cabanas: Total water consumption, rooms and individuals from 2010 to 2013

The litres per room and per person in Figure 5.48 show the same trend as the consumption rates in Figure 5.46



	L/Room	L/person
Mean	1 279.88	595.55
SD	414.78	179.91
n	48	48

Figure 5.48: The Cabanas: Water consumption per room and per person

The average consumption per room night is 1 279 litres and 595 litres per person. The Cabanas uses between 9.04 and 19.69 litres per square metre per day (Table 5.13).

Table 5.13: The Cabanas: Water consumption per square metre

	2010	2011	2012	2013
Total for year	3 297.32	5 567.00	7 183.72	5 849.88
Average per month	274.78	463.92	598.64	487.49
Average per day	9.04	15.26	19.69	16.04

5.4.2.6 The Vacation Club

The Vacation Club's water consumption has increased from 2010 and continued to do so until 2012, when it reached just over 253 million litres a year (Figure 5.49). It has decreased in 2013 to a total of 240 million litres. The Vacation Club is divided into two sections that were built in two phases. Phase 1 is irrigated with potable water and Phase 2 with treated effluent from the WWTW. The sudden increase in water use was due to the irrigation of potable water in Phase 2. A main line transferring the treated effluent broke on 4 July 2011 for the second time. It could still transfer water while leaking and was shut down eventually in September. Repairs

took place on 12 October 2011 (Sun City Environmental Department, 2011). This meant that the areas had to use the remainder of the effluent in the storage dams and then change over to potable water for a few months.

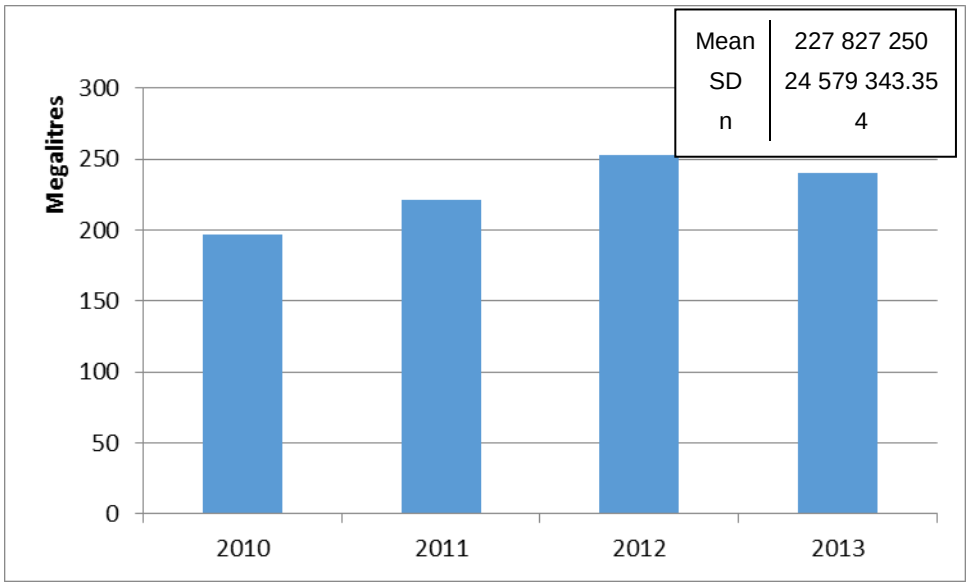
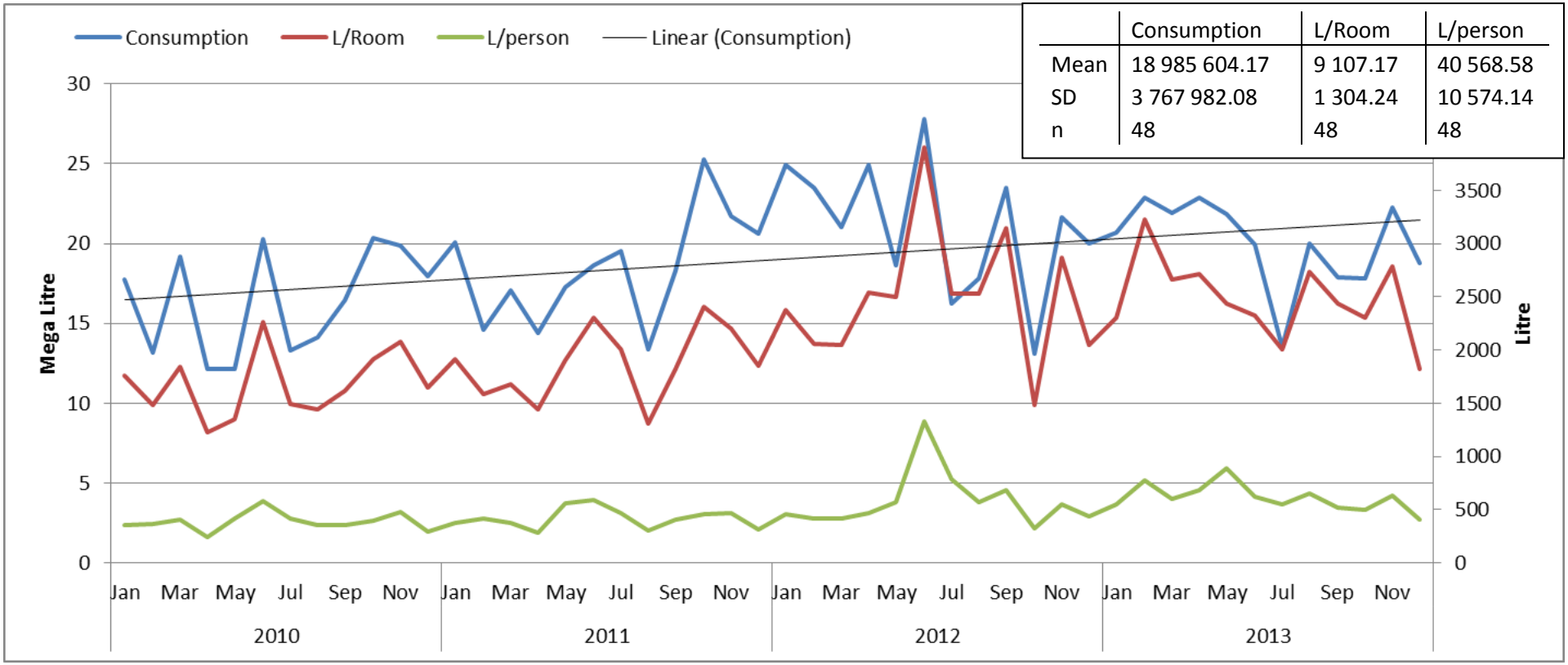


Figure 5.49: Vacation Club: Total water consumption for 2010 to 2013

Because the Vacation Club has blocks of flats in Phase 1 and free-standing units in Phase 2, it covers a large area. The Vacation Club Phase 1 is situated on 11.37 hectares of landscaped ground and Phase 2 on 17.23 hectares. Phase 2 was converted to treated effluent, but Phase 1 requires fresh water for irrigation Figure 5.50).

There are definite links between the occupancy and consumption rates, especially in 2010 and 2011. The consumption was sporadic after this due to the potable water irrigation. The standard deviation is over 3.7 million litres between the months.



	Consumption	L/Room	L/person
Mean	18 985 604.17	9 107.17	40 568.58
SD	3 767 982.08	1 304.24	10 574.14
n	48	48	48

Figure 5.50: Vacation Club: Total water consumption, rooms and individuals from 2010 to 2013

One of the highest uses of water in hotels is irrigation. This is true for the entire resort and the hotels with extensive gardens. The Vacation Club Phase 1 irrigation has increased since 2010 with consumption of around 36 million litres to 54 million litres in 2013. The trajectory of the graphs is similar and it has a definite impact on the consumption rates, see Figure 5.51.

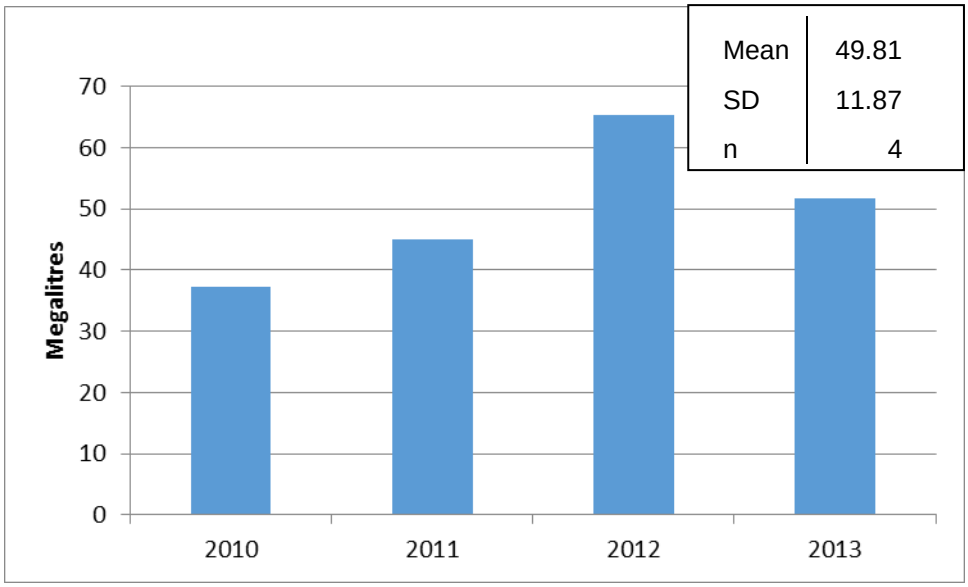


Figure 5.51: Vacation Club: Irrigation readings

The Vacation Club units consume around 2 111 litres per night and around 477 litres per person per night. That equates to an average of 4.42 people per unit per night. This includes maintenance of three pools and irrigation for Phase 1 gardens.

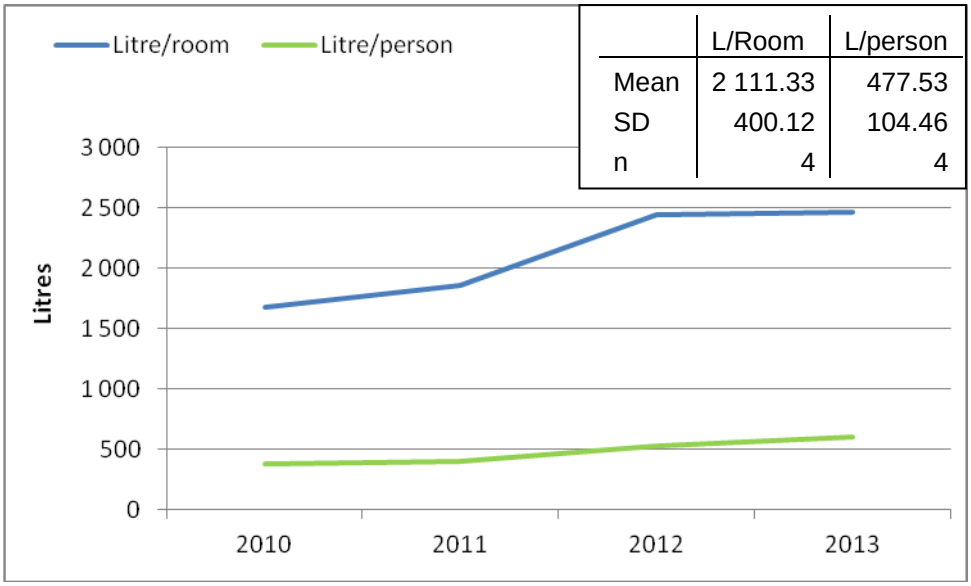


Figure 5.52: Vacation Club: Water consumption per room and per person

5.4.2.7 Water-management conclusion

The resort has managed to reduce its water use by 183 million litres (6.5%) comparing 2010 to 2013 (Figure 5.53). It is important to note that the water consumption increased from 2010 until it peaked in 2012 at 3.16 billion litres. With repairs to infrastructure that took place and the implementation of water-saving initiatives, the resort managed to reduce the demand by 525 million litres (18.4%). The Palace has managed to also reduce its demand by 76 million litres. Sun City Hotel, The Cabanas and Vacation Club have all increased their water use. The reasons for this have been discussed in the above sections. Water use at Sun City Hotel has increased by 31 million litres compared to 2010 and at The Cabanas by 56 million litres. Be reminded that The Cabanas did not have readings for three months in 2010. If corrected by replacing the zero readings with annual average consumption rates, the projected increase will be in the order of 23 million litres. The Vacation Club has increased its water use by 22% over the four years. The increase in potable water irrigation is largely responsible for the higher use.

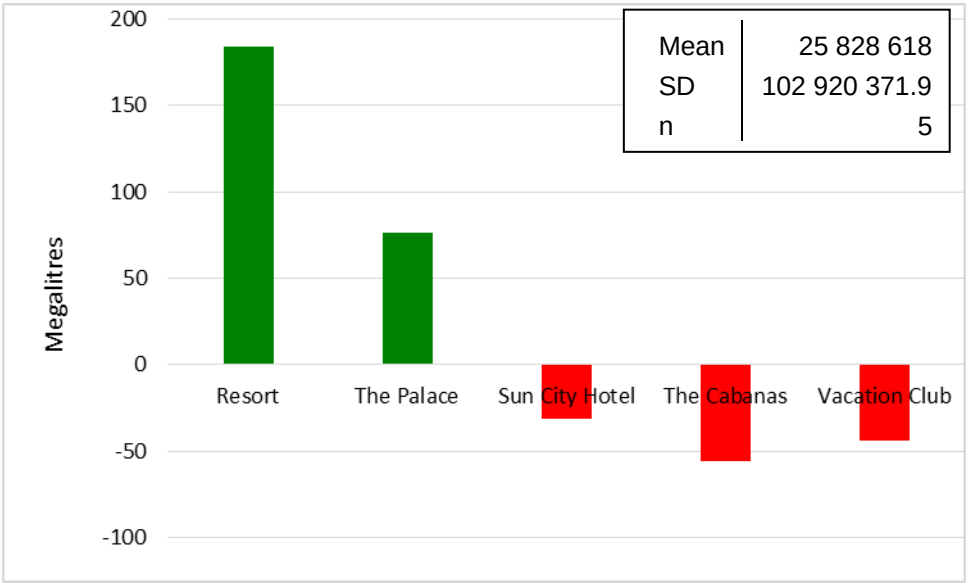


Figure 5.53: SCR and hotel water savings in 2010 compared to 2013

UNWTO indicator – Water availability and conservation

Determine the water use per room and per person. This is discussed below and shown in Table 5.14.

The resort per-room and per-person rates include the staff villages, which are multiple-person dwellings with washing machines, gardens and various bathrooms.

The water use per room ranged between 4 078 and 4 936 litres, with consumption per person that fluctuated between 1 298 and 1 600 litres over the study period. This also included the Vacation Club, which comprises of large units, and The Palace Hotel, with its densely vegetated garden half the size of a golf course. The Cascades Hotel was excluded due to insufficient data. Sun City Hotel uses between 922 and 1 288 litres of water per room and each overnight person requires 441 to 572 litres of water. The three-star Cabanas uses between 735 and 1 737 litres and 360 and 796 per room and per person per night respectively. The 389-unit Vacation Club uses between 1 677 and 2 502 litres per room each night and between 389 and 616 litres per person. The units have two to three bedrooms and can accommodate up to eight people.

Table 5.14: Unit comparisons on total consumption, per room and per person use

Unit			**Litre**			
			Consumption	**Per room**	**Per person**	**Per sq. m**
Resort	Highest	2012	3 167 086 000	4 936	1 600	
	Lowest	2013	2 641 506 000	4 078	1 298	
The Palace	Highest	2010	713 809 090	12 264	6 166	11 087
	Lowest	2011	553 495 000	9 744	4 523	8 597
Cascades Hotel	Highest					
	Lowest					
Sun City Hotel and Casino	Highest	2013	117 859 000	1 288	572	3 587
	Lowest	2010	86 400 000	922	441	2 629
The Cabanas	Highest	2011	157 776 000	1 737	796	7 184
	Lowest	2010	72 419 000	735	360	3 297
Vacation Club	Highest	2012	253 162 000	2 502	616	5 936
	Lowest	2010	196 789 000	1 677	389	4 614

Comparing SCR to international hotels (Table 5.15), most of the hotels compare very well with global water-consumption rates, except The Palace, which has far above the average tourist use. The SCR average, although including a range of other non-hotel-related water uses, falls within the 100 to 2 000 litres international average range.

Table 5.15: Water consumption SCR versus international hotel use (UNEP & UNWTO, 2012)

Type of accommodation or region	Litres per person per day
Resort	1 298–1 600
The Palace	4 523–6 166
Sun City Hotel and Casino	441–572
The Cabanas	360–796
Vacation Club	389–616
International rates	
Average tourist use	100–2 000
Zanzibar	685
Mediterranean	440–880
Thailand	913–3 423
Hong Kong	336–3 198
USA	282–787
Germany	90–900

5.4.3 To determine and analyse the waste generation and recycling rates of SCR

5.4.3.1 Resort waste management

The resort generates large volumes of waste, which must be managed effectively to ensure clean and odourless back-of-house areas. In 2004 SCR appointed a waste-management company to manage the waste on the resort. This was also the start of the recycling process. Prior to this the waste was disposed of on the Sun City landfill site as is. Since 2004 the resort recycled various waste streams to reduce the waste-to-landfill and sell recyclables for an income. In 2005 a new contractor was appointed to manage the domestic waste and was present on the resort from October 2005 until July 2014, when it was replaced by a new contractor that started implementing a new and improved waste-management system from August 2014 onwards. The new contract included the domestic waste and various hazardous waste streams to achieve an integrated waste-management system. This allows SCR management to manage all the waste streams through one contractor. There are three infrastructure components that make an effective waste-management system at SCR possible. These include (1) the waste-collection areas across the

resort, (2) the recycling yard and (3) the landfill site. A short description of each follows.

5.4.3.1.1 The waste-collection areas

There are 53 waste-collection areas across the resort (see Table 5.16). Each area is allocated a number of 240-litre wheelie bins ranging between 3 and 85 bins.

Table 5.16: Waste-collection areas (Sun City Environmental Department, 2013)

Waste Collection Area	
1. Entertainment Centre and Cascades Hotel	27. Sports and Social
2. Squire's	Old Staff Village (OSV)
3. The Palace	28. OSV – G block
4. Sun City Hotel & Casino	29. OSV – C block
5. The Cabanas	30. OSV – N block
6. Waterworld	31. Cascades Flats
Vacation Club	32. Sunset Drive 1–3
7. Cheetah	33. Learning and Development Centre
8. Hippo	34. CSI Yard
9. Rhino	35. Crèche
10. Buffalo	36. Horse Riding Centre
11. Phase 2 – Deli	37. Shebeen and Cultural Village
12. Maze	38. Kwena Gardens
13. Tree Tops Restaurant	39. Gametrackers
14. Valley of Waves	40. Front Gate
15. Life Landscapes Yard	41. Sky Train
16. Gary Player Country Club Clubhouse	42. WWTW
17. Gary Player Country Club workshop	43. Gaming Store
18. Lost City Country Club Clubhouse	44. Electrical Department
19. Lost City Country Club workshop	45. Robbies Electrical
South Village (SV)	46. Projects and Functions Office
20. SV – Barbet	47. Décor Department
21. SV – Weaver	48. Transport
22. SV – Heron	49. Maintenance
23. SV – Starling	50. Security Barracks
24. SV – Ibis	51. 24/7 Security
25. SV – Eagle	52. Fire station and EMS
26. SV – Crane	53. ID office
	54. Composting area

The waste-collection areas are captured on the Google image as per Figure 5.54.

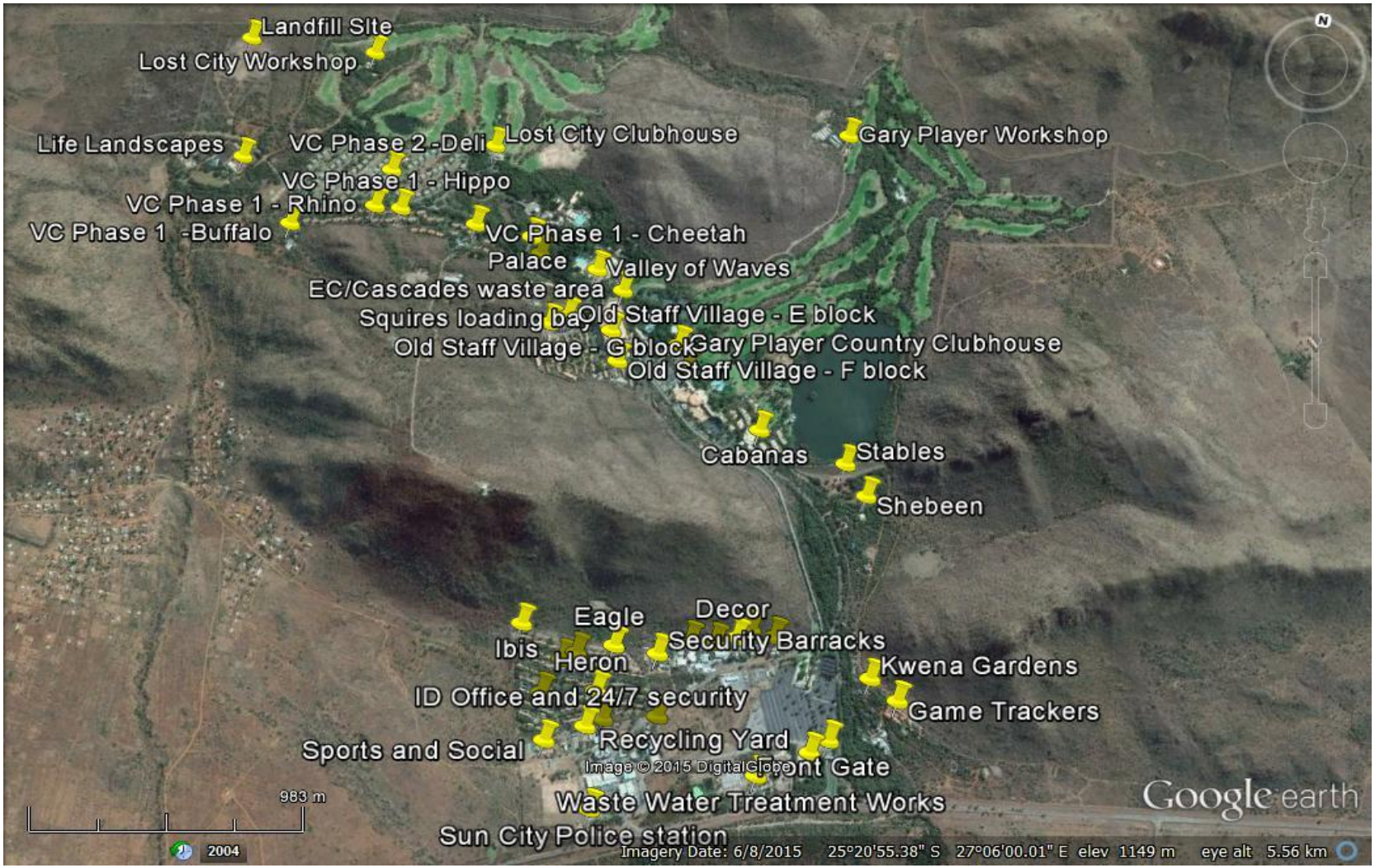


Figure 5.54: Sun City waste-collection areas (Sun City Environmental Department, 2014)

Prior to the new waste-management company being contracted, most sorting took place within the collection areas. When the waste truck arrived to collect the waste, the remainder of the recyclables was removed from the waste, as it was dumped inside the back of the truck. This was not very effective and many recyclables were missed. It is also a dangerous method that had to be changed because the mechanical compactor scoop can injure employees while busy working in the load bin of the truck. The recovered waste was taken to recycling for processing and selling. In 2014 with the new company on board, some sorting still took place in the hotels and Vacation Club, while the rest of the waste is taken down to the central recycling yard for sorting.

5.4.3.1.2 The recycling yard

All waste goes to the recycling yard. Sorted and unsorted bins arrive in the yard as well as hazardous waste streams. The domestic waste is placed on a conveyor belt with eight employees called sorters that pick recyclables off the passing line to ensure that all recyclables are removed. From the total waste generated there are three types of waste: (1) general waste going to the landfill site, (2) recyclables that are bailed and sold, and (3) hazardous waste that is mainly disposed of to the hazardous landfill site. Five of the 34 waste streams are disposed of to the landfill, 16 are recycled, three are reused and six are hazardous waste that is disposed of to a hazardous landfill site, as per Table 5.17. The reused materials are recovered from the waste system and used on site instead of disposal. Waste tyres are reused for motorsport events or activities. Cutlery is returned to the hotels to be cleaned and reused. Waste wood is taken to a facility at the landfill site and temporarily stored. Local community members can then collect wood for carpentry work at no cost.

5.4.3.1.3 The landfill site

SCR operates an Environmental Conservation Act Section 20-permitted landfill site. The SCR landfill was established in 1997 after the local landfill was decommissioned and rehabilitated. The lifespan was projected at 10 years on the 1996 waste data. With effective recycling implemented in 2004, the projected lifespan was increased significantly due to lower volumes disposed of to the landfill. Annual airspace assessments are conducted and there are still a few years remaining. SCR started the process to obtain an integrated waste license in 2012. The application includes

an expansion of the landfill site, licenses for the composting and recycling waste-management facilities, storage of waste tyres and the biodiesel plant. When hazardous waste is disposed of or treated, it must have a waste manifest document to prove collection and who transported the waste, as well as a certificate to prove safe disposal for landfilling or treatment of the waste for incineration.

Table 5.17: Waste streams and disposal methods (Sun City Environmental Department, 2015)

Waste type	Waste stream	Disposal method
General waste	General waste – food waste	Landfill site
	Seafood waste	Landfill site
	Boiler ash	Landfill site
	Dry sludge	Landfill site
	Animal carcasses	Landfill site or Kwena Gardens (crocodile meals)
Recyclables	Paper	Recycled
	K4 cardboard	Recycled
	Plastic (LD)	Recycled
	Plastic (HD)	Recycled
	Plastic (PVC)	Recycled
	Plastic (PET)	Recycled
	Glass	Recycled
	Tin	Recycled
	Scrap metal	Recycled
	Used cooking oil	Recycled
	Thinners	Recycled
	Paint and cans	Recycled
	Used engine oil	Recycled
	E-waste	Recycled
	Printer cartridges	Recycled
	Garden waste	Recycled – composted
Re-used	Tyres	Reused
	Cutlery	Reused
	Wood	Reused
Hazardous or other waste	Asbestos	Hazardous landfill site – off site
	Batteries	Hazardous landfill site – off site
	CFL and fluorescents tubes	Hazardous landfill site – off site
	Décor – glues and art wastes	Hazardous landfill site – off site
	Dry screenings	Hazardous landfill site – off site

	Hydrocarbons – filters, used parts	Hazardous landfill site – off site
	Chemical containers	Hazardous landfill site – off site
	Fat trap waste	Hazardous landfill site – off site
	Sanitary waste and nappies	Incinerated – Roodepoort
	Medical waste	Incinerated – Roodepoort

Waste management is a fairly new industry in South Africa with effective legislation such as the National Environmental Management: Waste Act 59 of 2008 only being promulgated in July 2009 to govern the way in which South Africans manage waste. The contractor and Environmental Department had to discover and implement new methods to manage the waste. One such method was to accurately report on the wet waste component that is disposed of on the landfill site on the South African Waste Information System. The on-site company that managed the waste from 2004 until 2013 used 1 cubic metre of wet waste weighing 1 metric ton as the density in their monthly reports. There was no basis for this density to be used. It did not make sense for the team to continue using this, and a set average for SCR was required prior to having a weighbridge at the landfill site. An exercise was done to determine the densities of the main waste streams generated on SCR. Ten wheelie bins of wet waste was weighed and an average of 600 kg was set. The new weight was used from January 2011, hence the reason for the steep decline in waste weights seen in Figure 5.55 below.

No data are available for each waste-collection area, only for SCR as a whole. The data exclude garden waste, which is composted, and carpentry wood, which is given to the local community, as well as all hazardous waste that is either safely disposed of or recycled.

As shown in Figure 5.55, the waste-generation volumes increase during peak periods and school holidays. In July when the room occupancy is low, the waste per room rate increases because the total waste must then be divided by less guests. The more people that visit the resort, the higher the waste generation will be, and this is visible in the graph below.

The recyclable rate (Figure 5.56) in June 2010 during the Soccer World Cup was high, although the number of guests did not correlate, adding to a higher per-person rate. Similar to the waste-generation graph, the recyclable volumes are linked to school holidays.

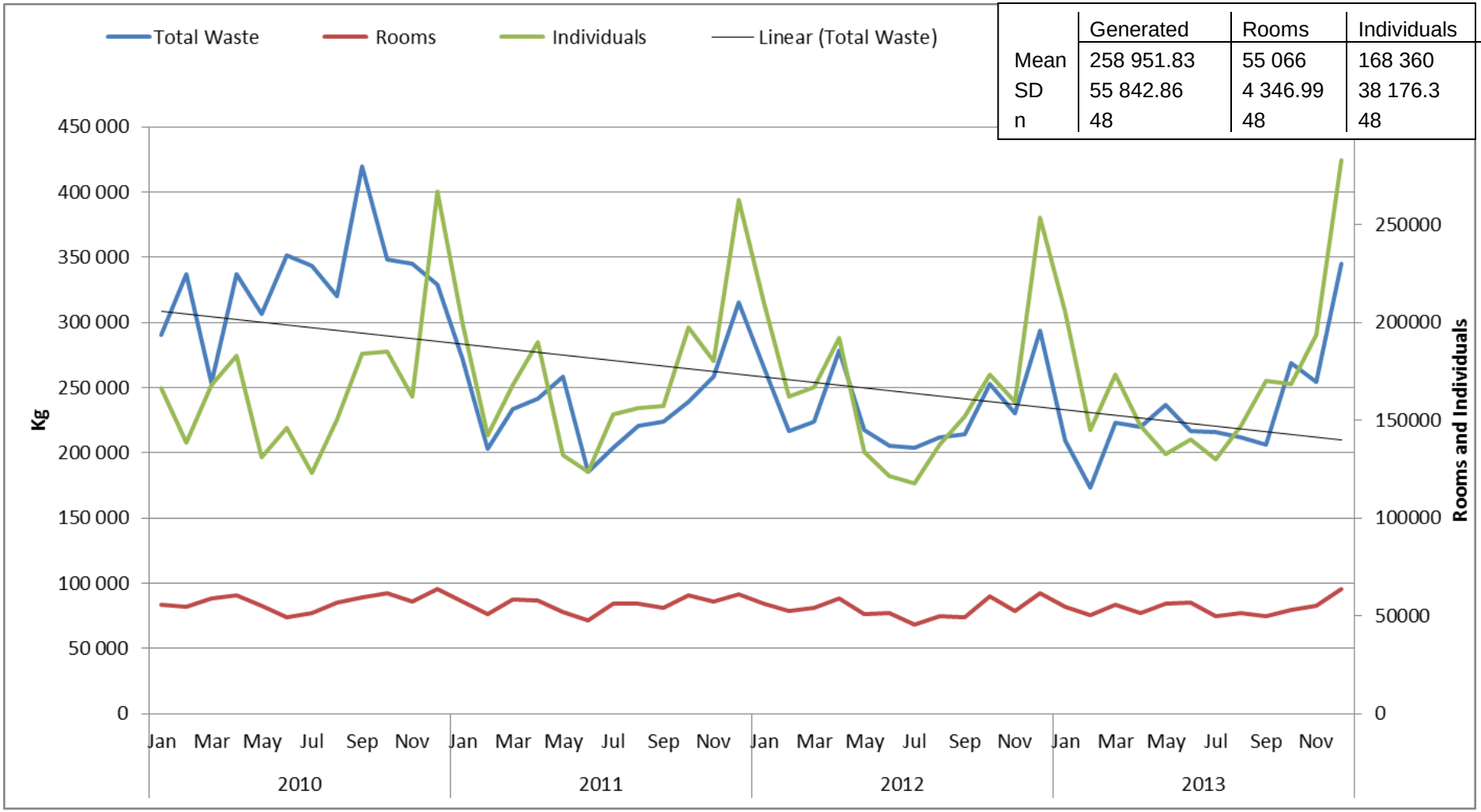
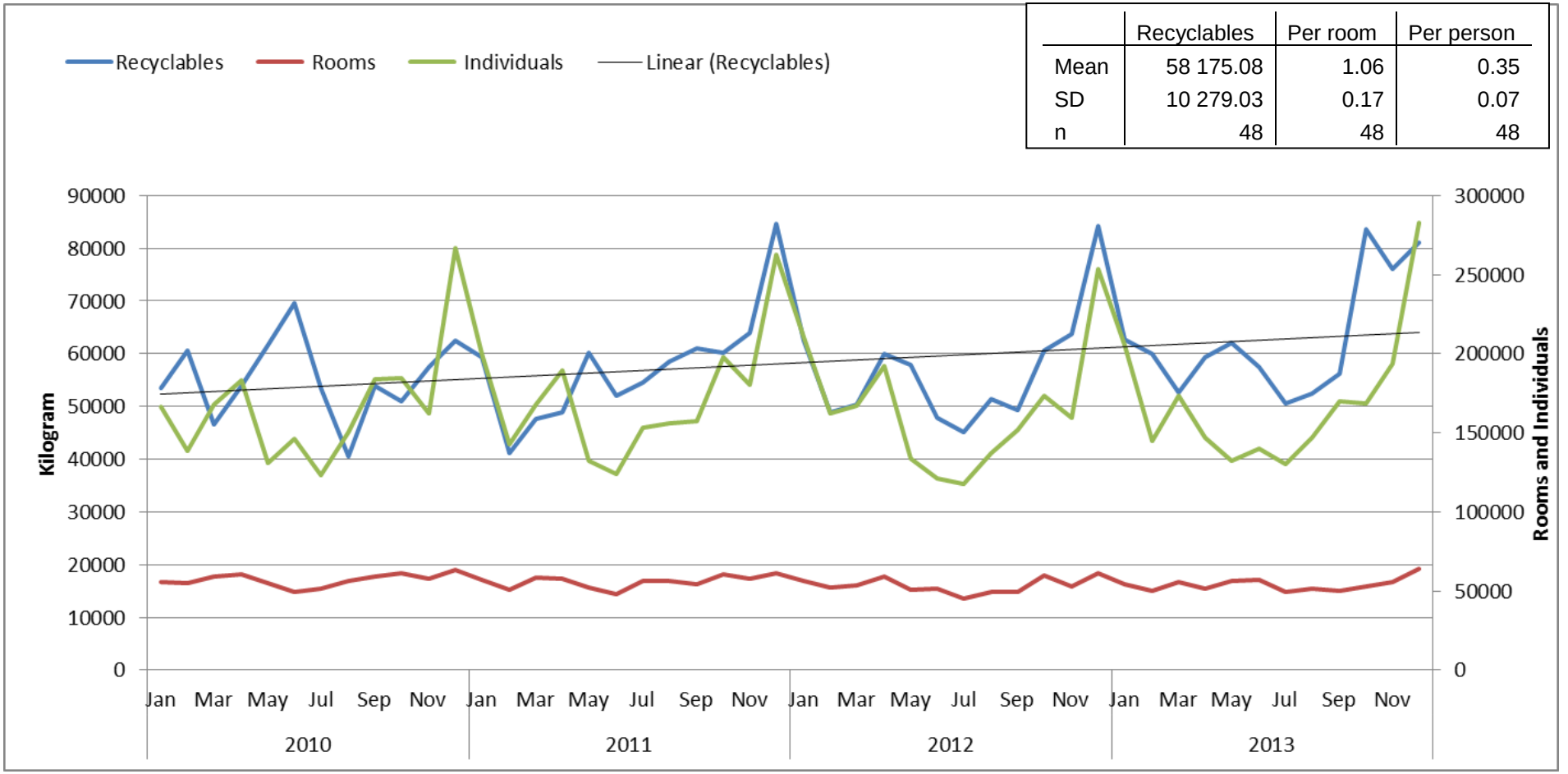


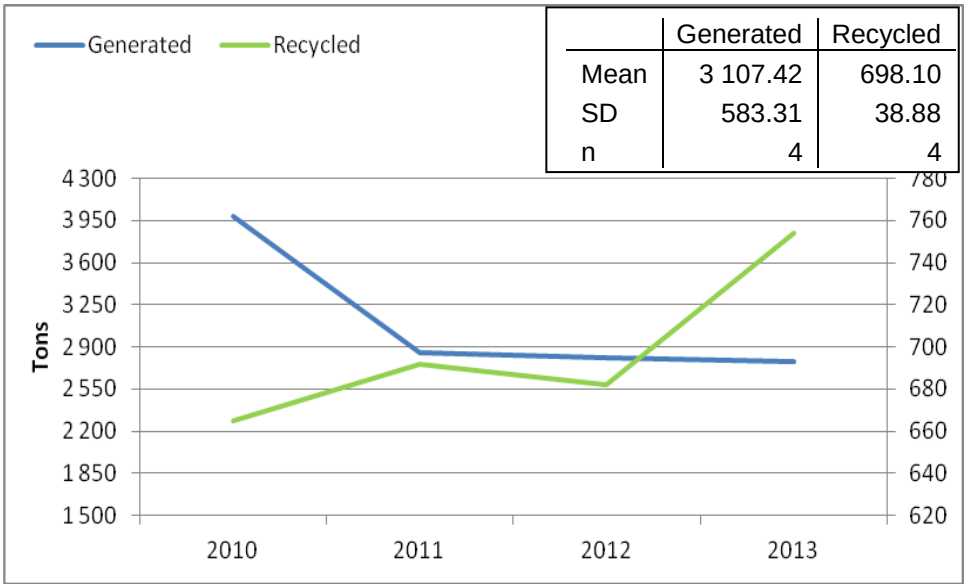
Figure 5.55: Total waste generated for SCR, rooms and individuals from 2010 to 2013



	Recyclables	Per room	Per person
Mean	58 175.08	1.06	0.35
SD	10 279.03	0.17	0.07
n	48	48	48

Figure 5.56: Total waste recycled for SCR, rooms and individuals from 2010 to 2013

The four-year comparison between waste generated and waste recycled (Figure 5.57) clearly shows an initial decline due to density changes and then a steep increase in recyclables in 2013. This is mainly due to an increase in plastic, cans and especially scrap metal (Table 5.18).



	Generated	Recycled
Mean	3 107.42	698.10
SD	583.31	38.88
n	4	4

Figure 5.57: Total waste generated versus total waste recycled

The recyclable weight per waste stream is shown in Table 5.18. Some of the streams increased in 2013, which resulted in the higher recycling rate compared to the waste generated**.**

Table 5.18: Recyclables per year (Metric tons)

	Recyclables	Year				Total
		2010	2011	2012	2013	
Recyclables	K4 cardboard	212.37	230.47	227.06	204.12	**874.01**
	All paper	32.90	27.22	23.28	27.56	**110.95**
	Glass	235.67	274.21	239.49	267.74	**1 017.11**
	Plastic	81.07	54.91	57.86	99.59	**293.42**
	Cans	74.87	69.10	64.34	77.30	**285.61**
	Steel	27.90	35.99	69.76	77.64	**211.30**
Recyclables		664.78	691.90	681.78	753.95	**2 792.40**
Landfill (Disposal)		3 316.44	2 162.68	2 131.30	2 026.87	**9 637.28**
Total waste		3 981.22	2 854.58	2 813.07	2 780.82	**12 429.69**

Besides the initial decline in 2010, the waste generated per room and per person stayed relatively the same. The standard deviation was 750 g per room per night and only 300 g per person per night (Figure 5.58).

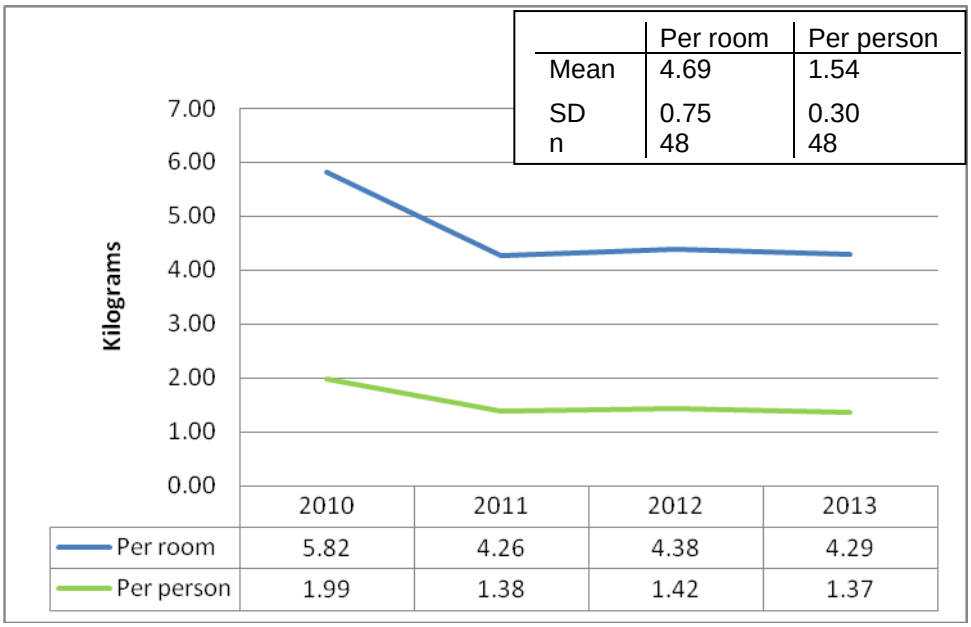


Figure 5.58: Waste generated per room and per person

Recycling rates ranged between 17% and 27% in weight. The amount of recyclables recovered increased slightly from 2010 to 2013. On average each room generated 4.69 kg of waste, of which 1.06 kg were recycled. Each person generates roughly 1.54 kg of waste, of which 0.35 kg is recyclable material, see Figure 5.59.

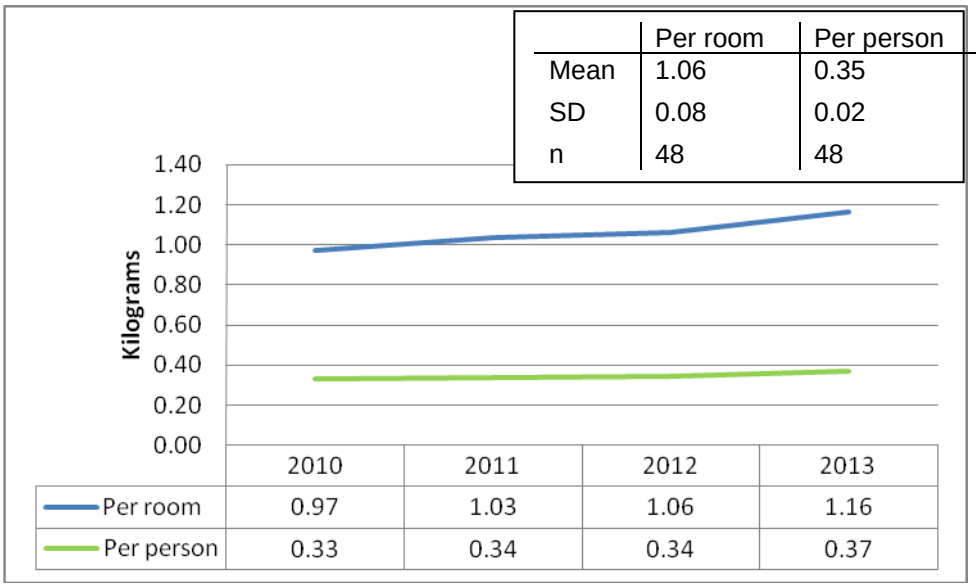


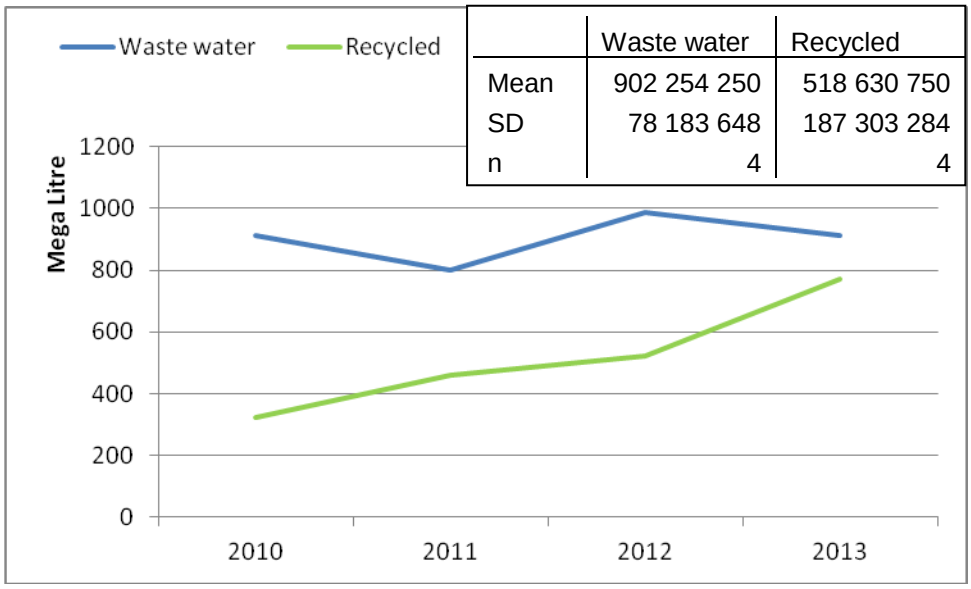
Figure 5.59: Waste recycled per room and per person

From April 2012 until June 2014 SCR has recycled 189 242 kg of scrap metal. The scrap metal is largely from clearing old storerooms and metal waste from construction projects.

Due to nuisance and litter issues with wildlife and especially primates raiding refuse bins, most waste-collection areas have been enclosed. The Entertainment Centre, The Palace, The Cabanas, Squire's, the front gate, the training centre and Kwena Gardens were refurbished and expanded from 2010 until 2016 to improve waste management and recycling.

5.4.3.2 Waste water management

As discussed under Section 5.4.3, the resort recovers waste water at the WWTW and treats the water, which includes purification and disinfection. The treated effluent, as it is known, is then pumped to the golf courses for irrigation. The pump station was upgraded in 2010 to increase the capacity from 60% to 100%. The treated water is pumped to the Gary Player Country Club irrigation dam on hole 2 and from there to the Lost City Country Club irrigation dam 3. The transfer line from the Gary Player Country Club irrigation dam 2 to the Lost City Country Club was replaced. The Gary Player Country Club can draw from the recreational lake if a breakdown occurs on the effluent water transfer line. The average raw sewage that enters the site per year is just over 900 million litres, of which 518 million litres are recycled on average (Figure 5.60).



	Waste water	Recycled
Mean	902 254 250	518 630 750
SD	78 183 648	187 303 284
n	4	4

Figure 5.60: Waste water received and recycled

In order to generate waste water, fresh potable water is needed. In Table 5.19 the potable water is compared to the waste water received and the effluent recovered from that. The average monthly waste water received from the total water initially used is 31.54%. The effluent treatment recovery has increased due to pump house upgrades from 35% to 84% over the four years.

Table 5.19: Freshwater consumption, raw sewage recovery and treated effluent (Litres)

	2010	2011	2012	2013
Consumption – fresh water	2 825 439 000	2 830 672 000	3 167 086 000	2 641 506 000
Waste water	911 477 000	798 579 000	988 492 000	910 469 000
Treated effluent	322 250 000	460 510 000	521 546 000	770 217 000
% of fresh water returned as sewage	32.26	28.21	31.21	34.47
% of raw sewage treated and effluent reused	35.35	57.67	52.76	84.60

5.4.3.3 Waste-management conclusion

Waste management includes two of the UNWTO core indicators namely solid waste management and Waste water management (sewage treatment).

UNWTO indicators – Solid waste management

I. Waste volume produced by the destination (tons) by month
II. Volume of waste recycled (m3) / Total volume of waste (m3) (specify by different types)
III. Waste per capita

The waste-management system at SCR is unique and complex. A wide variety of waste streams exists, which often require special recycling or disposal procedures. The landfill site and composting facility add to the process of recovery and disposal and need to be managed carefully to ensure compliance and longevity.

The most waste was generated in 2010. This was before the new wet waste density was implemented. If the 2010 wet waste had to be converted, it would be a total of 2 664 kg, which is the lowest waste generated for any year (Table 5.20). The recycling rate would also improve from 17% to 24.9%, which is the second highest of the four years.

The per-room waste generated rates were between 5.82 kg and 4.26 kg per night and recycled waste rates were between 1.16 kg and 0.98 kg. Each person generated between 1.99 kg and 1.4 kg of waste, of which 0.38 kg to 0.34 kg was recycled.

Table 5.20: Waste summary (tons)

		Year	Annual Total	Per night	
				Per room	Per person
Generated	Highest	2010	3 981	5.82	1.99
	Lowest	2013	2 780	4.26	1.40
Recycled	Highest	2013	754	1.16	0.38
	Lowest	2010	665	0.98	0.34

When comparing international waste rates per country with that of SCR, its rates fall within the norm. It is slightly above Europe and just under USA averages (Table 5.21). It is much higher than India; however, they have one of the highest populations in the world.

Table 5.21: Waste generation per capita comparison (UNEP & UNWTO, 2012)

Country	Kg per day
SCR	1.4–1.99
Europe	1
USA	2.3
Austria	1.18
Mexico	0.68
India	0.4

5.4.3.4 Waste water conclusion

Waste water and the treatment thereof is one of the biggest water-saving projects on the resort. All the recycled water called treated effluent is used for irrigation thus constituting fresh water. This project saves the resort around 2 million litres of water a day. The current recovery rate per day is 1.6 million litres. On average a room generates between 1 193 and 1 541 litres of waste water per day (Table 5.22), of which between 471 and 1 189 litres are recovered. Each person will generate between 387 and 499 litres and 161 to 378 litres will be recovered.

Table 5.22: Waste water summary (Litres)

		Year	Received/ transferred	Per room per night	Per person per night
Waste water	Highest	2012	988 492 000	1 541	499
	Lowest	2011	798 579 000	1 193	387
Treated effluent	Highest	2013	770 217 000	1 189	378
	Lowest	2010	322 250 000	471	161

UNWTO indicators – Waste water management (Sewage Treatment)

I. % of sewage from site receiving treatment (to primary, secondary & tertiary levels).
II. % of tourism establishments (or accommodation) on treatment system(s)

All (100%) of the waste water from the resort that enters the sewage system will undergo treatment. There are two waste products that result from the treatment process. The first waste is dry screenings, which is the biological hazardous waste that is disposed of into a 6-m^3 container and taken to a hazardous waste landfill site, upon which a safe disposal certificate is issued. The second waste is dry sludge solids from the reactors, which is dried in special dry beds and disposed of to the landfill. The end product is the treated effluent, which is the treated and disinfected water used for irrigation on the golf courses. The 2013 difference in received water versus the treated effluent was 84%. The remainder is sludge, evaporation and screenings.

The entire SCR is connected to the sewage system, except the 10 septic tanks. The tanks are however cleaned with a honey sucker and the waste water is disposed of into the sewer system at the helipad, which goes to the WWTW. Although it is not directly linked, it still ends up at the same place. The pool backwash water is also not connected and is recommended under Objective 6 as a project that SCR management must look into.

5.4.4 To investigate the perception of staff of SCR's energy and water consumption and waste generation and recycling

A total of 60 questionnaires were completed by staff members. The questionnaires were divided into two sections. The first concerned the demographics of the person completing the questionnaire and the second section contained questions related to the perception of the environmental performance of SCR. The demographics of the participants was summarised in Chapter 4. The analysis of the employees' perception of the research-related questions are illustrated and discussed below in the awareness, participation and perception sections:

5.4.4.1 Awareness

Which of the following have you noticed in the workplace?

Employees can be reached through various internal communication channels. As seen in Figure 5.61, the employees highlighted that posters, newsletters, eco-briefs and email campaigns were the most obvious media used to share interesting environmental information.

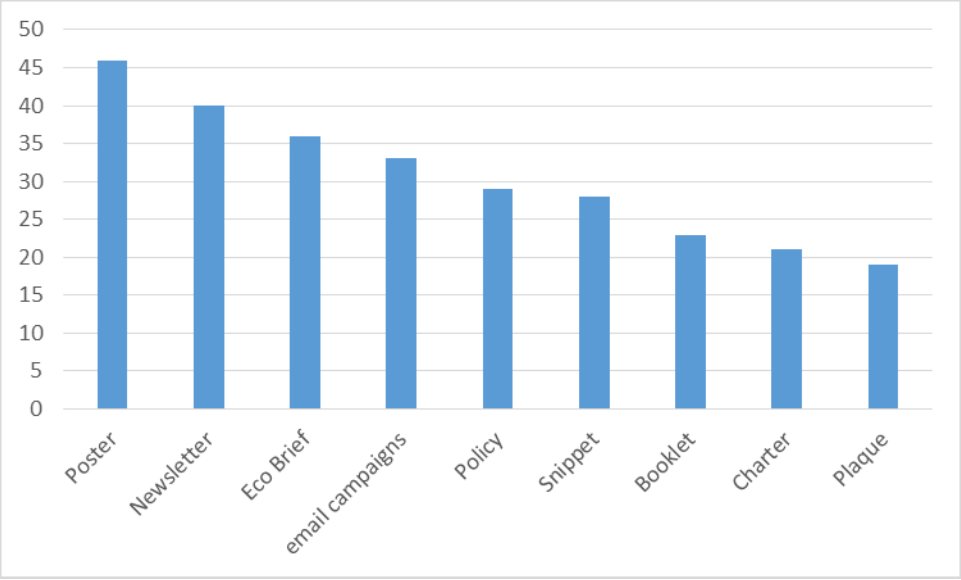


Figure 5.61: Awareness material in the workplace

At the time of the study, all employees had to attend the compulsory one-day environmental awareness training. The training is crucial to create an environmental culture. At the time of the study, 950 staff have attended this since inception in 2009. Each month an environmental awareness event is hosted by a selected Green

Team. The events are based on various environmental days that appear on the annual calendar, for example World Environmental Day on 5 June each year or World Water Week.

5.4.4.2 Participation

Are you a Green Team member?

Green Teams are groups of people usually consisting of the management in each department and volunteers. There are 13 Green Teams on the resort. Green Team members made up 61% of the respondents. If a person attends Green Team meetings, he or she will be inclined to know more about environmental initiatives and impacts than the rest of the workforce.

Do you participate in water-saving initiatives on Sun City Resort?

Most of the employees indicated that they participate in water-saving initiatives. The 81% of the staff that save water responded that they were “closing taps”, “only wash full loads of washing, family bath in same water and place a brick in the toilet cistern” and “report leaks and wash less vehicles”.

Do you participate in electricity-saving initiatives on Sun City Resort?

Similar to water, 85% of the employees indicated that they partake in electricity-saving initiatives (see Figure 5.62 below). Employees said that they “only boil enough water for one cup of coffee” and “unplug and switch off unused appliances”. A number of staff also said they are “switching off lights and computers after work.”

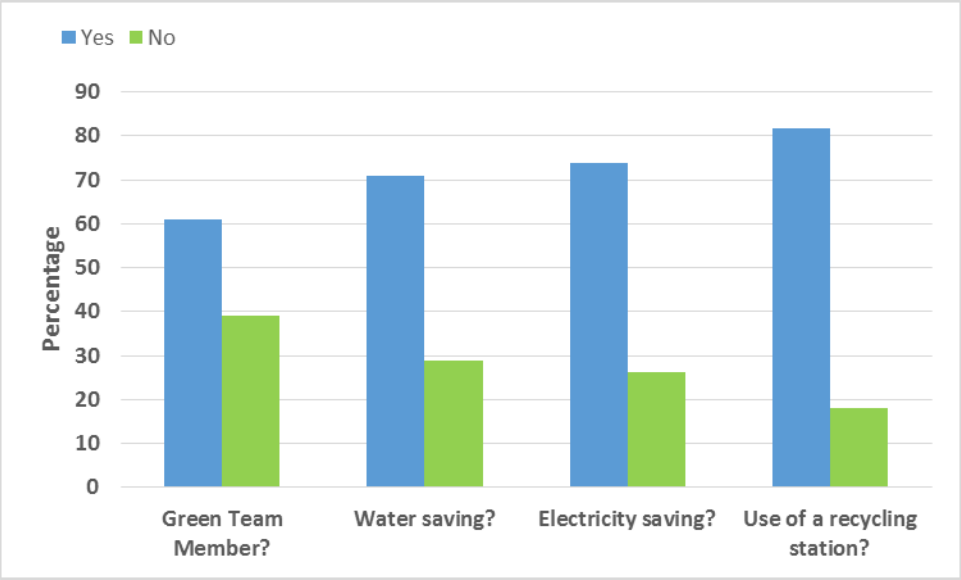


Figure 5.62: Participation responses

5.4.4.3 Perception

When asked whether the employees felt that they work at a sustainable tourism destination, 95% indicated that they perceive it to be sustainable.

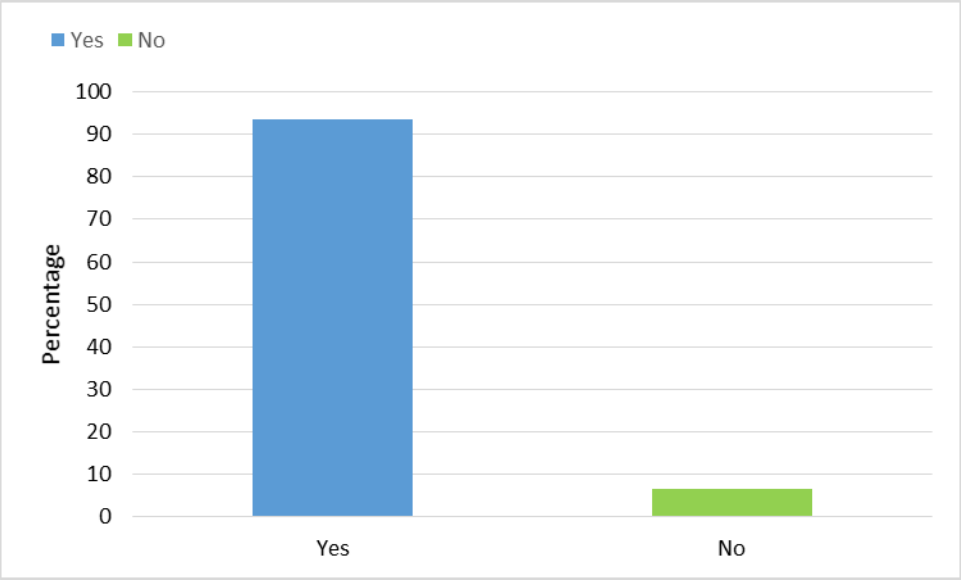


Figure 5.63: Sustainable destination

The questions worked on Likert scale of 5 sections. An average score was determined out of 5. Most of the staff indicated that they are aware of the EMS (Average Score (AS): 4.4), that they view it as important in a business (AS: 4.4) and that they support the EMS (AS: 4.5). The staff felt proud to work at a sustainable resort (AS: 4.4) and the majority indicated that they prefer environmentally friendly holiday destinations (AS: 4.2) as illustrated in Figure 5.64.

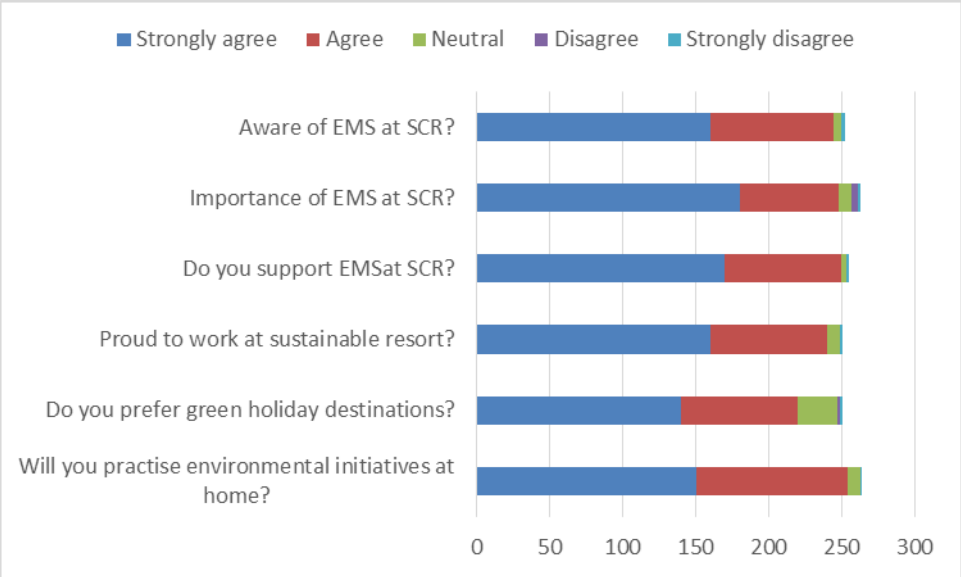


Figure 5.64: Staff perception of the EMS and sustainability

Most participants also indicated that they will practise environmental initiatives at home (AS: 4.4).

It takes years to establish a culture where people protect the environment and save natural resources. To manage the impacts with an EMS, the management team must develop objectives and targets and conduct annual management review sessions to review the EMS.

5.4.4.4 Conclusion of staff questionnaires

This section summarises the staff questionnaires.

5.4.4.4.1 Awareness

The staff indicated that they have noticed many forms of awareness material in and around the resort.

5.4.4.4.2 Participation

More than half of the participants were Green Team members and over 80% said they participate in resource-conservation practices.

5.4.4.4.3 Perception

More than 50% strongly agreed that an EMS is important, that they are aware of the system and that they would refer to the resort as a sustainable destination. The staff also showed positive feedback when asked whether they will practise sustainable practices at home and indicated that they prefer environmentally friendly destinations.

5.4.5 To investigate the perception of guests of SCR's energy and water consumption and waste generation and recycling

5.4.5.1 Awareness

Have you noticed any environmental signage during your stay/visit?

Figure 5.65 shows the response to the question, to which 56% of guests answered that they noticed environmental signage during their stay or visit. The follow-up questions asked the participants to mention where they have seen signage. Some of the feedback was as follows: "Bathroom towel tent card", "haven't noticed, haven't paid enough attention" and "Beware of snakes and description of trees". One guest also commented that "perhaps the signs are not big enough".

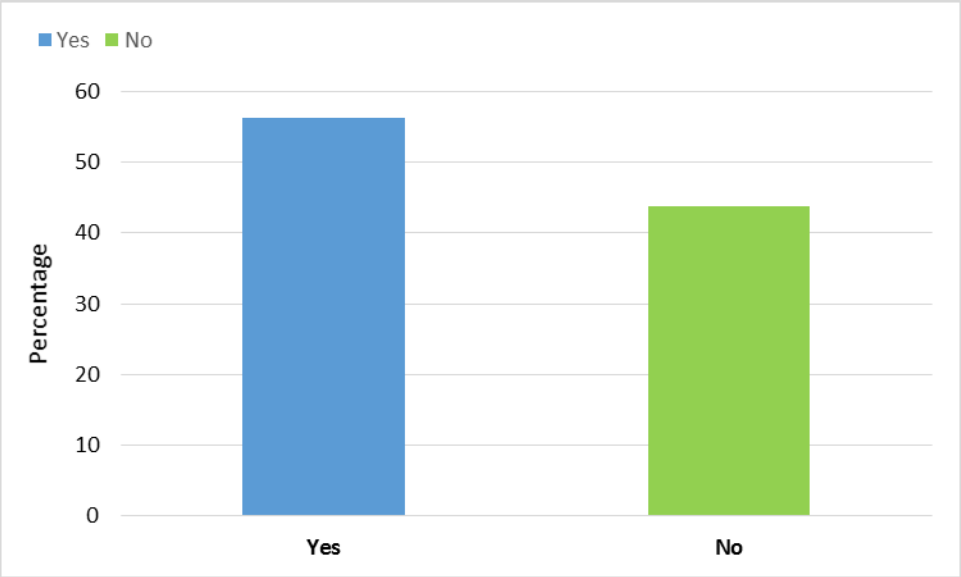


Figure 5.65: Visitor reaction on whether they noticed environmental signage at SCR

Which of the following have you noticed in the front-of-house area of the hotel?

The response rate on this question was not high, with only 37 instances where guests noticed awareness signage in the front-of-house area. Branding and certification company changes are often responsible for awareness material being removed and never replaced as required.

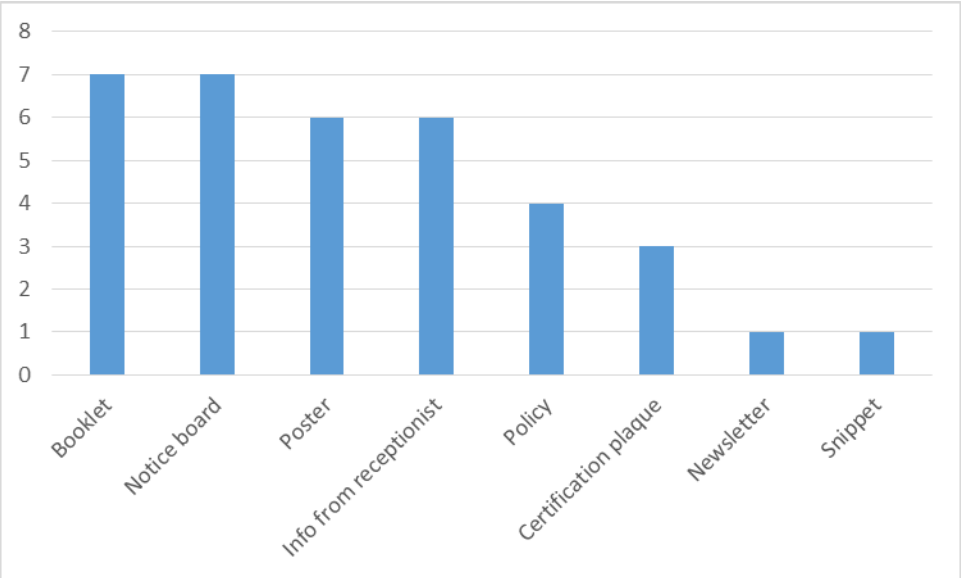


Figure 5.66: Front-of-house awareness material

Which of the following have you noticed in the rooms?

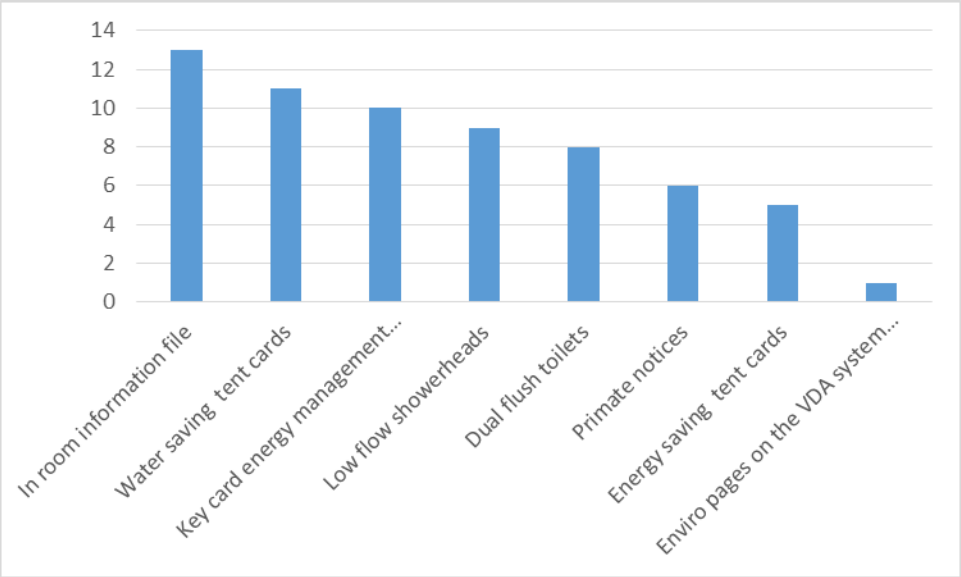


Figure 5.67: In-room awareness material

5.4.5.2 Participation

The following questions tested whether the guests were actively involved in saving electricity and water and supporting the recycling process.

Did you participate in our electricity-saving initiatives during your stay/visit on Sun City Resort?

More than half of the participants indicated that they had not participated in any electricity-saving initiatives (see Figure 5.68).

Did you participate in our water-saving initiatives during your stay/visit on Sun City Resort?

Despite the awareness material, 55% of the guests indicated that they did not participate in water-saving initiatives during their stay (see Figure 5.68). Some guests who participated had the following responses to how they participated: “shower not bath”, “keep used towels on the rack” and “conscientious use”.

Have you made use of a recycling station?

Guests were equally divided on whether they have used a recycling station or not. There are not many available on the resort besides at the Valley of Waves and conference rooms and in some of the hotel foyers.

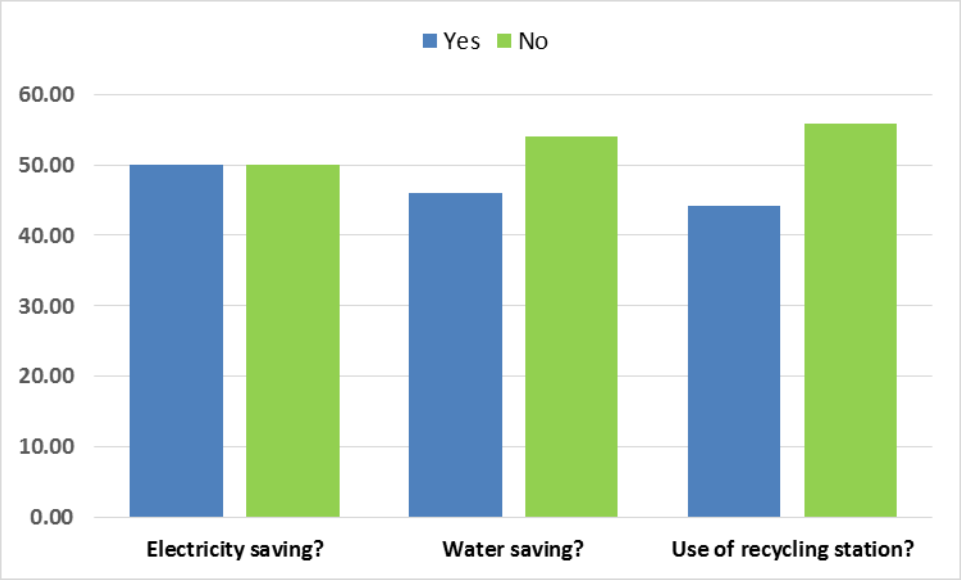


Figure 5.68: Participation in conservation of resources and reduction in waste

5.4.5.3 Perceptions

In your opinion, would you say Sun City Resort is a sustainable tourism destination?

Most of the guests (83%) perceived SCR as being a sustainable tourism destination.

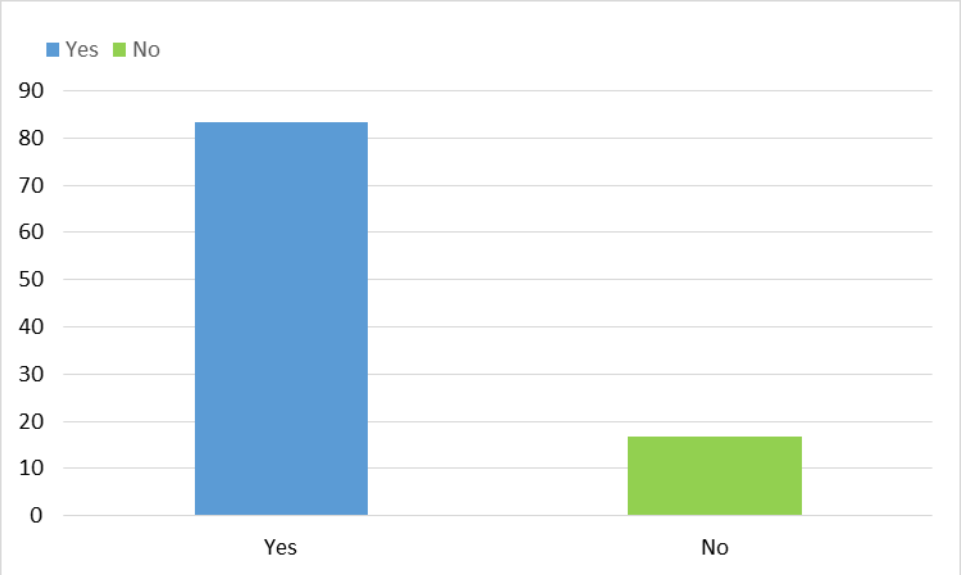


Figure 5.69: Sustainable destination

See Figure 5.70 following the 13 discussions below for a graphical depiction.

To practise environmental sustainability on a destination the size of Sun City Resort is important

Most of the participants (70%) indicated that SCR should implement sustainable measures to reduce the impact of the resort on the environment (AS: 4.68).

Participating in water-saving initiatives will not interfere with my holiday experience

More than half (55%) of the participants agreed that participating in water-saving initiatives will not interfere with their holiday experience (AS: 4.38).

Participating in energy-saving initiatives will not interfere with my holiday experience

More than half of the guests strongly agreed (53%) and agreed (30%) that participating in energy-saving initiatives will not spoil their holiday (AS: 4.31).

Participating in waste-reduction initiatives will not interfere with my holiday experience

Similar to energy and water initiatives, 54 % of respondents indicated that participating in waste-reduction initiatives will not interfere with their stay (AS: 4.38).

I always choose environmentally responsible destinations to spend my holidays at

The average score of 3.54 indicates that most people stated that they choose a green destination. Almost half of the guests (46%) were neutral in their decision.

The environmental performance status of a tourism facility has no effect on my decision when choosing a holiday destination

Most guests stated that the environmental performance of a destination does not affect their decision to travel there (AS: 3.34).

The environmental practices witnessed during my stay/visit at Sun City Resort will encourage me to practise them at my home or work

Of the participants 40% strongly agreed and 21.6% agreed that they will practise environmental practices at home or work after experiencing what SCR implemented.

I pay a lot for my room or visit and feel I do not have to save resources to save money for Sun City Resort

Most of the participants disagreed with the statement (AS: 2.03).

I am concerned about the carbon emissions generated with my travelling to Sun City Resort, it being a distance from major towns

Most of the people were undecided about the statement, with the highest percentage either choosing to be neutral or disagreeing with the statement (AS: 3.14).

Sun City Resort, being a sustainable destination, makes me more comfortable travelling here, reducing my concern of carbon emissions generated from my travelling

The feedback on this carbon emission statement was more favourable than on the previous statement. Although 62% indicated that they feel neutral to the statement, 29.7% strongly agreed (AS: 3.76).

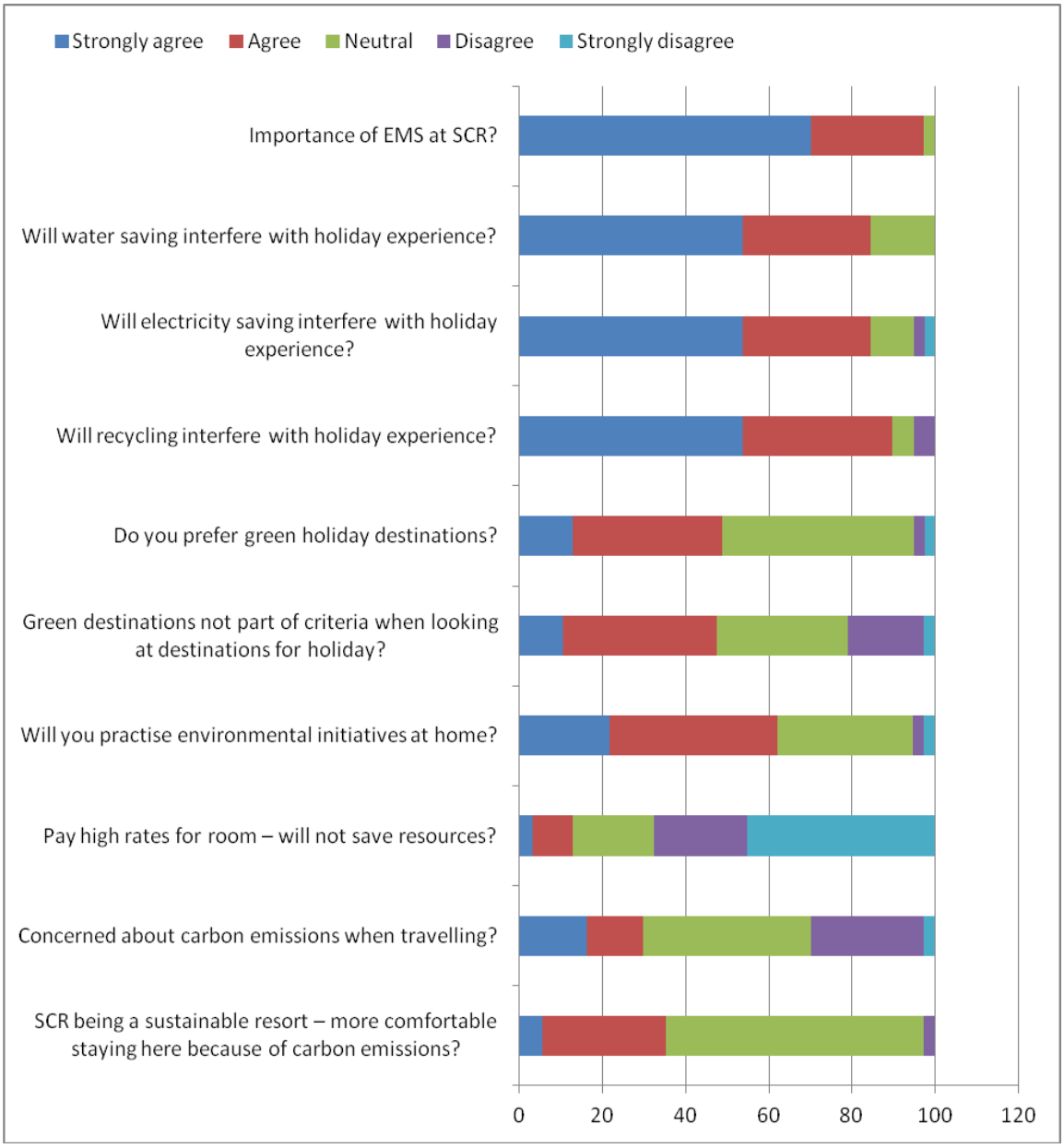


Figure 5.70: Guest perception towards sustainability

What was the single thing that made you become aware of the environmental sustainability of Sun City Resort?

The feedback shows that most participants did not notice any environmental initiatives prior to completing the questionnaire. This is an indication that the awareness creation of the sustainability programme is not effective.

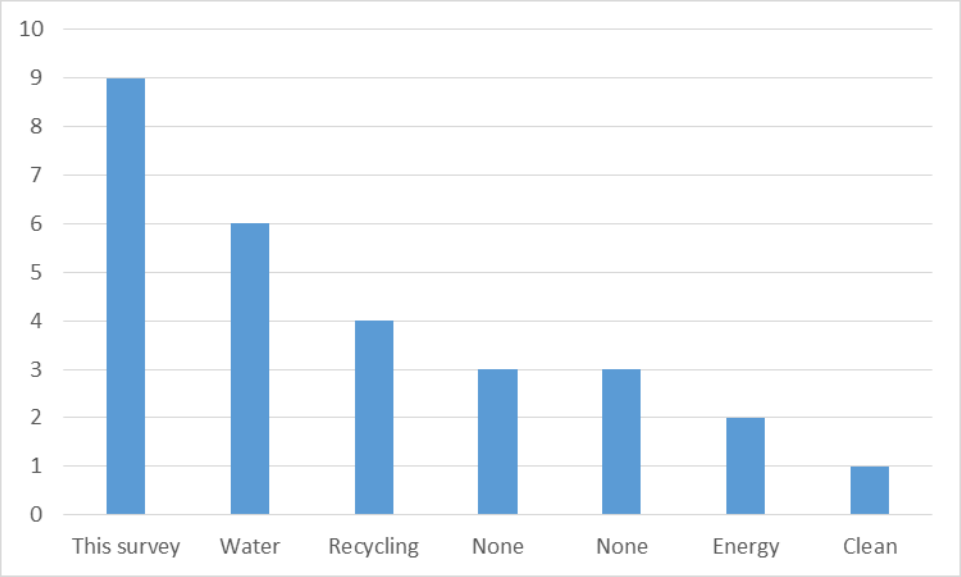


Figure 5.71: Single thing that made you aware of environmental sustainability at SCR

Will you refer Sun City Resort to friends and family as an environmentally sustainable destination?

Most of the guests indicated that they will refer SCR to their friends and family looking to visit a sustainable holiday destination.

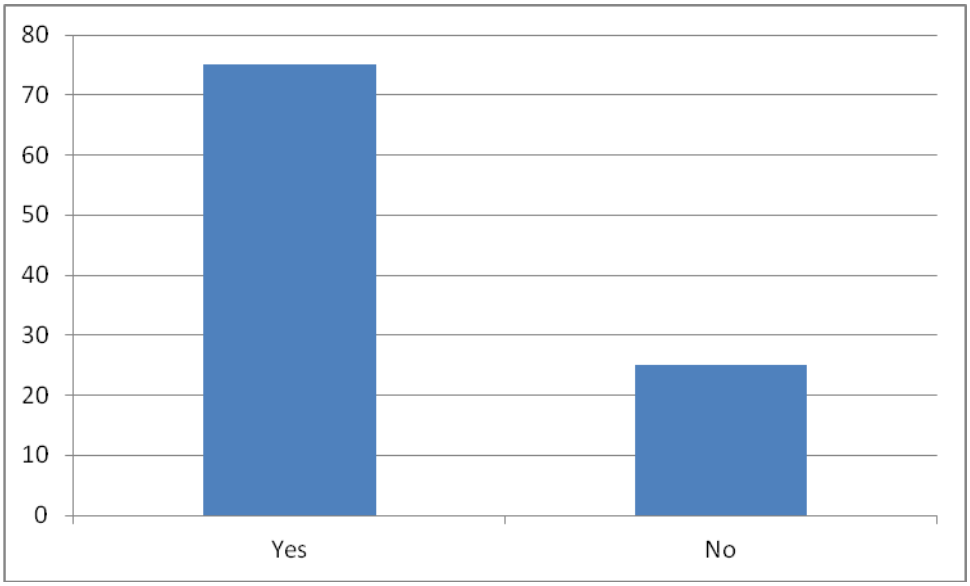


Figure 5.72: Refer to SCR as an environmentally friendly destination

5.4.5.4 Conclusion for guest questionnaires

This section summarise the guest questionnaire data.

5.4.5.4.1 Awareness

Just over half of the guests indicated that they noticed environmental signage at SCR. This is an area where the resort can improve.

5.4.5.4.2 Participation

When asked whether they have participated in energy, water and waste reduction, the feedback was negative. 55% of the respondents said they have not participated in energy or water reduction and 50% said they did not participate in recycling processes

5.4.5.4.3 Perception

The majority of the guests felt that SCR is a sustainable destination. Guests stated that they feel more comfortable knowing their impacts are managed during their stay and that participating in energy-, water- and waste-management initiatives will not interfere with their stay. This also means that SCR would be able to do more initiatives that are guests facing because it will not affect their experience. Whether the destination is green or not does not affect their choice of holiday destination.

Most people stated that they will participate in environmental initiatives if they are seeing it in the operations at SCR. Although they pay high rates for their rooms, they do not feel that this is an excuse to waste resources. Most participants (71%) were either neutral or disagreed when asked if they are concerned about carbon emissions when traveling far distances, but it is beneficial if the destination is environmentally friendly and it gives them some comfort knowing they reduce some impacts. The survey was the first thing that made people aware of the sustainability programme at SCR and they agreed that SCR is a sustainable destination.

5.4.6 To make recommendations for the improvement of the environmental performance of SCR in terms of energy, water and waste management

There is usually room for improvement in any organisation. Objective 6 was to make recommendations to SCR to enhance its environmental performance.

5.4.6.1 Energy

5.4.6.1.1 Electricity

The key card energy-management systems in Sun City Hotel and the Vacation Club are believed to be the major reason for the noticeable drop in consumption. It is therefore recommended that similar units are installed in The Palace, Cascades Hotel and The Cabanas during future refurbishments. It is important to stay relevant

to technology and the units should replace compact fluorescent bulbs with more efficient LED lights where possible. Solar geysers or heat pumps should be installed at The Cabanas and a feasibility study should be conducted on the installation of a solar voltaic farm on the Entertainment Centre roof during the planned 2016 refurbishment. Solar electricity installations should be added to various loose-standing buildings. A central solar farms can be built to power some of the hotels, if sufficient vacant land is available. The resort should consider converting the pathway between the Entertainment Centre and Sun City Hotel and Casino, nicknamed whiskey walkway, into an electricity-generating walkway. Walkways are built with special tiles that move slightly when stepped on. With each step the tiles harvest the kinetic energy from footsteps and converts it into electricity.

5.4.6.1.2 LPG

The use of gas is preferred when cooking. This operation should be maintained, and annual audits should be conducted on the hazardous installation to ensure integrity and prevent losses. The current proactive measures include daily readings at the units and percentages monitored and displayed on the BMS system in the central control room.

5.4.6.1.3 Fuel

SCR should investigate the use of solar- and electricity-powered transport options for guests and staff. Guests and staff should be encouraged to walk when on SCR, instead of using vehicles to transport them over short distances.

5.4.6.1.4 Coal

Kwena Gardens must decommission the coal-fired geysers when the farming section closed down

5.4.6.2 Water

SCR should continue to detect and repair leaks, especially in swimming pool infrastructure. Pipes should be replaced where many historical leaks occurred. Water should be installed from air water stations around the conference centre. The machine takes moisture from the air, runs it through a filter and sterilises with UV to produce fresh water.

Awareness campaigns and collateral should be implemented for guests to reduce their use of water during holidays. Staff must be encouraged to save water at work and at home. Only indigenous trees must be planted relevant to this area and climate. Alien invasive plants eradication programmes are in place and must be maintained to keep the area free from foreign unusable plants that threaten the endemic flora. Indigenous trees are less reliant on water than invasive plants, thereby reducing irrigation. Mulch and organic compost should be added to all garden beds to reduce evaporation and lower irrigation requirements. Organic compost will assist growth.

Sprinklers must be regularly reset to ensure that they are aimed at the target area and not at the adjacent pavement. Waterless washing should be implemented at the transport wash bay.

5.4.6.3 Waste

Luxury hotels' requirements and guests' satisfaction versus environmentally friendly requirements mean that unnecessary packaging and waste are generated. Daily new products are developed that are greener, with recycled packaging or products that are derived from eco-friendly sources.

A food waste composting system should be implemented and small amounts of soiled waste should be disposed of at the landfill. Alternatively, a waste-to-energy plant should be implemented, which can take any waste with an ability to burn (calorific energy value), thereby achieving zero waste-to-landfill. The landfill can then be closed.

Waste water recovery must be increased to 100%. Swimming pool backwash should be directed into the sewer system and not into storm water. The WWTW is on half its capacity, so it should be able to handle the increase in water comfortably.
Awareness training should be introduced for guests and staff to improve the recycling of waste. A public recycling station should be made available to guests at the Sky train station, Valley of Waves and hotel entrances.

5.4.6.4 Staff perception, participation and awareness

More staff should receive environmental awareness training to educate them on environmental best practices. The Green Team members are clearly more educated than the other staff members. The training will also bridge this gap if staff are not part of the Green Teams.

5.4.6.5 Guests' perception, participation and awareness

Feedback by guest on signage was low, and they stated that it was either not visible enough or people did not pay attention. It is recommended that SCR improves its guests' awareness. SCR can update the in-room directory with more environmental information. Implement fact posters in high density guest areas. Utilize the street pole advertising boards to display environmental achievements. Use the room televisions to display environmental facts.

The data from this study should be used for awareness material on the resort to educate guests and staff.

5.5 Conclusion

The chapter contained in-depth discussions of the energy and water management, waste generation and reduction strategies, and finally the perceptions of internal and external customers of their understanding and view of the EMS of SCR. The quantitative and qualitative data have brought together information over a period to draw a conclusion on how well SCR has performed when it comes to managing its impacts on the environment. This conclusion on the resort's performance is delivered in the final chapter to follow.

Chapter 6
Synthesis, recommendations and conclusions

The strongest arguments prove nothing so long as the conclusions are not verified by experience. Experimental science is the queen of sciences and the goal of all speculation. – Roger Bacon

6.1 Introduction

This chapter summarises the outcome of the results and analysis in Chapter 5, where each objective was discussed in detail. It also discusses some of the limiting factors that affected the study and provides recommendations for future research, which should be incorporated to improve the outcome of the study. The conclusion brings together the purpose, objectives and outcome of the study.

6.2 Synthesis

6.2.1 Research problem

The research problem was formulated in Chapter 1 as “Establish how well is SCR performing with regard to environmental management”. The problem is that there is a lack of publications on environmental management for mass tourism destinations in South Africa. By determining the performance of SCR, it can be compared to international benchmarks to indicate its level of performance.

There were sufficient data available to adequately answer the research question. The researcher made use of quantitative and qualitative data from SCR operations and questionnaires respectively.

6.2.2 Research question

The research question was: What is the environmental performance of SCR in relation to energy, water and waste management?

6.2.3 Research aim

The study aimed to determine the environmental performance of SCR by utilising UNWTO sustainable tourism core indicators in terms of energy, water and waste. The UNWTO indicators guided the researcher as to what information is required to determine the environmental performance of the resort. Four indicators were selected to answer the questions on energy, water, solid waste and waste water performance. The questionnaires gave insight into the staff and guest perceptions with regard to the resort's performance. A number of objectives were set to analyse the information.

6.2.4 Objectives

There were six objectives identified in the study. Each objective has subcategories that had to be explored and discussed in order to achieve the primary objectives. The six objectives were about energy, water and waste management at SCR and how staff and guests perceive this being managed with and without their participation. The consumption rates do not only include the actual room or personal consumption, but all the energy and water uses of all facilities and staff that make the hotel experience possible. The same is true for waste-management generation and recycling.

Objective 1: To determine and analyse the energy consumption of the five accommodation areas and SCR as a whole

UNWTO indicator: Energy sources per capita

Five energy sources were identified, namely electricity, LPG, diesel, petrol and coal. Electricity information was available for the resort and all the hotels, but LPG, fuel and coal information was available only on resort level. Electricity use was calculated per room and per person per hotel and resort-wide. LPG, fuel and coal use were calculated per room and per person resort-wide.

Although benchmarks for five-star hotels for megajoule per-person rates were not found, the resort and hotels at SCR compared very well to international benchmarks. The conservative rate as identified by Gossling (2004) of 130 MJ per person was not achieved by any of the three hotels with five-star ratings. The Cascades Hotel was

closest with 172 MJ. A five-star hotel in Oman used in excess of 3 700 MJ per night, which is 11 times as much as the highest user at SCR, The Palace. The Cabanas and Vacation Club were far below the world average of 130 MJ, using around 50 MJ per night. The Palace was the only hotel that showed an increase in electricity due to the pump station that was added in 2011. The resort used 12.3% or 11 156 046-kWh less in 2013 compared to 2010. This is equivalent to three times the overall consumption of The Cabanas per year.

LPG use increased in 2011, but reduced. The Palace towers and replacement of the Entertainment Centre's LPG infrastructure were largely responsible for the saving. Fuel consumption increased. Diesel increases were assigned to the new bus fleet, meaning more vehicles operating to provide a better services to guests. The resort implemented more petrol minibuses as well to add to the guest experience. It is a balancing act between sustainability and guest experience. Coal consumption increased initially because of poor data, but reduced in 2013. The 2010 data were unusable and were left out of the equation.

Objective 2: To determine and analyse the water consumption of the five accommodation areas and SCR as a whole

UNWTO indicator: Per capita consumption of water from all sources

The resort only has one water source, which is the municipal supply. The water use increased in 2012, but remarkable demand reductions were shown in 2013. The resort has managed to reduce its water use by 183 million litres (6.5%) over the study period. The Palace reduced its consumption, but also had less guests, which meant the per-person rate stayed relatively the same. The Palace use is very high compared to that of the other hotels, but it must be noted that the hotel supplies water to the golf course, the Lost City Country Clubhouse, large gardens and water features. It makes it difficult to compare its use to that of any other hotel. The Cascades Hotel was excluded due to poor records. Only one of the two water supply lines were measured until a meter was installed in October 2012.

Sun City Hotel, The Cabanas and Vacation Club increased consumption despite the resort saving. Sun City Hotel increased suddenly in 2011 and evened out over the

remaining two years. The Cabanas had three months of data missing in 2010, which set a low baseline. When the missing data were replaced with annual averages, there was still an increase in water use similar to 2011, but then more guests were accommodated. In 2012 the water demand continued to increase, but with lower occupancies. It could be due to a leak or general higher use per room/person. The Vacation Club's increase in use is due to potable water irrigation in Phase 2. Both per-room and per-person rates increased despite lower occupancies.

The resort and all the hotels, except The Palace, fall within the 100- to 2 000-litres world average consumption per person per night. The total resort use per person is perceived to be high, but it includes a fair amount of support services and facilities uncommon in other resorts around the world. The resort is one of a kind and facilities such as the Valley of Waves and freshwater lakes all lose water from evaporation, which must be filled up. The consumption of the Entertainment Centre and various restaurants was also incorporated into the calculation.

Objective 3: To determine and analyse the solid waste and waste water generation and recycling rates of SCR

UNWTO indicator: Waste produced by the destination and recycled per capita

Only resort waste data were available and none for each of the hotels or 54 waste-collection areas. The same occupancy data were used as for energy and water resort calculations. After the initial drop in waste-generation data due to density change, the waste data stabilised. The density change was only applicable to the first year of this study data, after which the truck was weighed before disposal. The rear-end loader was weighed from January 2011, so accurate data were only available then, without relying on estimates on densities. The resort's waste generation has decreased since 2010 and the recycling rate has increased over the four-year study period. The waste generation and recycling rate per person is well comparable with that in Europe, Germany and North America.

UNWTO indicator: Treatment and recycling of waste water per capita

All waste water on the resort, besides backwash water, is treated and re-used. The water from all the hotels enter the WWTW where it is treated, and the disinfected and clean effluent water is then used for irrigation on the golf courses. The waste water received has fluctuated each year, ranging between 800 and 1 000 megalitres, but the recovery rate has increased each year up to 2013, when 84% was recovered from raw waste water.

Objective 4: To investigate the perception of staff of SCR's energy and water consumption and waste generation and recycling

The responses from the staff were highly positive in the awareness, participation and perception sections, as the majority were Green Team members who are educated in the EMS on the resort. The employees that are not Green Team members are informed via email campaigns and awareness events. It is a reflection that an environmentally aware culture exists at the resort.

Objective 5: To investigate the perception of guests of SCR's energy and water consumption and waste generation and recycling

Guests stated they did not notice awareness material around the resort. Only 50% saw any material. They said they did not participate in any resource-saving initiatives, but they will if they see the resort implementing them. They do not specifically choose green destinations, but said it would be a benefit if the destination is green because they are not aware of the impacts when travelling to the destination. They also considered it as not an excuse to over-utilise resources just because of the high tariffs paid for the accommodation. The guests also stated that they feel that SCR is a sustainable tourism destination.

Objective 6: To make recommendations for the improvement of the environmental performance of SCR in terms of energy, water and waste management

Recommendations were made under each of the energy sources, water and waste sectors. During the investigations into each hotel and the resort as a whole, gaps and efficiencies were identified that could be addressed and used to improve the system. Recommendations were made to fill the gaps and improve the system.

Guests and staff were asked various questions pertaining to environmental awareness-creation initiatives and these were identified as an improvement that must be implemented.

6.3 Limitations

- A major limitation was the omissions in the data. Only one meter was installed on the Cascades Hotel water supply lines, so the water consumption was not correctly recorded, which meant that 19 months of data were missing and that the Cascades Hotel was removed from the final water section of the study. Coal was only recorded from 2011 on the resort resource management system. The Palace had a faulty meter in January 2012 and The Cabanas had three months of data missing in 2010 and June 2011. The density calculations of wet waste that took place in 2010 also made the waste-generation graph questionable. The researcher had to ensure uniformity of data availability. All hotels had to have the same type and quality of data available.

- Access to guests during the study was problematic. Due to ethical reasons it is not easy to approach guests during their holiday time to bother them with a questionnaire. The researcher therefore decided to make the questionnaire completion a voluntary process. This also contributed to the low yield in completed questionnaires.

- There are many different people responsible for gathering data on the resort and it was at times challenging to get information or explanations pertaining to certain data sets.

6.4 Recommendations for further study

The following recommendations are made for possible future studies relevant to the topic of the current study:

- Potentially develop new site-specific indicators and benchmarks to verify the performance of the resort in future. The site is evolving and implementing newer technologies as and when refurbishments take place. The site is

unique and the metering of facilities has improved. It would give future researchers the ability to exclude areas from the total consumption.

- The hotel electricity and water meter readings should exclude the water used for irrigation, water features and golf courses.
- The Palace Hotel which is a Leading hotel of the World needs to request an amendment to the standard to allow energy efficient practices in rooms and continue to maintain the LHW standard and certification.
- The questionnaires used in this study were too long. Future studies should have short questionnaires, especially for the guests. Employees usually have more time to complete them.
- During the study many new data streams were excluded, which were only initiated during or after the four-year data window used in this study. In future studies researchers would be able to include more data types to enhance the quality of the outcomes.
- The eco-efficiency of SCR in terms of transportation, accommodation and activities can be investigated.
- The thermal impact of the climate on energy use can be included in future studies. High temperatures are often responsible for higher electricity use for cooling guest areas.

6.5 Researcher's view of the study

During the research there was not a lot of information found on mass tourism destinations' resource use and waste generation. This study is therefore gives a new dimension of luxury mass tourism quantified data on how much energy and water are used per room and per person during their visit. The hotels on the resort not only have the normal hotel facilities but include dams, large extended forests, golf courses, artificial beach which is different from the normal amenities found in a city hotel. The researcher hopes that the data will be useful to other researchers who want to compare their data to determine the environmental performance of the case studies they investigate.

6.6 Conclusion

SCR is truly equivalent to a small town. It has a substation and electrical distribution network to supply all its facilities and accommodation units with electricity. A proper LPG system is in place for efficient cooking of meals and it even has its own fuel station to supply the over 100-strong fleet of vehicles, scooters, plant and machines with diesel and petrol.. Water and waste water infrastructure is well designed and effective. A waste-recycling facility and landfill site take care of the waste-management requirements.

The resort management is dedicated to ensure that the impact of the business on the environment is managed effectively to achieve sustainability. Many environmental initiatives also have a financial saving, which is a good motivator for capital investment. However, sometimes the environment has to give a little to balance economic, environmental and social aspects to ensure sustainability. Without the resort being operational, both the environment and the people working there will be unable to survive. It is all about balance. The Palace and its immediate surroundings are heavy on resources, but a large part of the resort is built around the Lost City theme, which must be maintained at all costs.

SCR has shown reductions in the use of all energy sources across the resort, except fuel, which increased due to service requirements. All hotels except The Palace have shown a reduced demand. Water use was drastically reduced on resort level, but Sun City Hotel, The Cabanas and Vacation Club showed an increase in water use, which in most cases could be justified.

The waste-management process was realigned in 2010 and from there has improved by reducing waste volumes and increasing recyclables. There is more to be done to make guests and staff aware of their impacts on the environment and to reduce their demand on resources and waste generation.

The resort as a whole has achieved energy and water savings and has reduced waste generation and increased recycling rates. As a result of these findings, it can be confirmed that SCR has performed well to achieve resource consumption savings and reduce waste to land. When it comes to international energy-, water- and waste-management standards, SCR is also performing well when compared to a number of international hotels. This view is also shared by guests and employees.

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Appendices

Appendix 1: SCR monthly resource tracking sheet list (Sun City EMS, 2014)

Department/Entity	Type of information		Unit
Electrical Department	Electricity	Maximum demand	kVA
		Energy usage	kWh
Infrastructure	Water	Fresh water	Litres
		Grey water	
	Hazardous waste skip + disposal certificate	Bins swop weight	Kg
Resort	Gas (consumption)		Kg
Maintenance	Power generation	Diesel Consumption	Litres
		Running time	Hrs
Maintenance	Refrigeration gas	R22	Kg
		R134a	
		R404a	
		R407a	
		R410a	
		R507	
Transport	Transport fuel	Diesel	Litres
		Petrol	Litres
		Kilometres	Km
	Hazardous waste skip + disposal certificate	Bins swop weight	Kg

Events, entertainment and conferences department	Resort occupancy (rooms and individuals)		Sold per night
Vacation Club	VC occupancy (rooms and individuals)		Sold per night
Landscaping contractor	Pesticides and fuel	Pesticides	Ml
		Diesel/Petrol	Litres
		Bakkies	Km
		Machines	Hours
	Composting yard	Compost loads	Kg
		Mulch loads	
Waste contractor	Waste recycled	Paper	Kg
		Glass	
		Cans	
		Cardboard	
		Plastic	
		Metal	
		E-waste	
	Waste-to-landfill		
Finance	LPG bulk invoices		Rand
	Electrical invoice		Rand

	Water invoice	Rand
	Refrigeration gas invoice	Rand
	Diesel invoice	Rand
	Petrol invoice	Rand
	Diesel (generators)	Rand
	Vacation Club recharges (electrical and water)	Rand
	Business partner and concessionaires recharges (water and electricity)	Rand
	Total revenue	Rand
	Foot count stats	Qty
	Head count	Qty
Medical contractor	Medical waste disposal + certificate	Kg
Sanitary and pest control contractor	Sanitary waste disposal + certificate	Kg

Appendix 2: Guest questionnaire

Date: _____ Time: _____

Hotel: _____

Dear Guest,

I am Danie Boshoff, a master's student in Environmental Management at the University of South Africa. I am utilising sustainable tourism indicators to determine the environmental performance of Sun City Resort.

The United Nations World Tourism Organization describes sustainable tourism as follows:

"Sustainable tourism development meets the needs of present tourists and host regions while protecting and enhancing opportunities for the future. It is envisaged as leading to management of all resources in such a way that economic, social and aesthetic needs can be fulfilled while maintaining cultural integrity, essential ecological processes, and biological diversity and life support systems."

The sustainability of a resort includes the triple bottom line: 1) economic, 2) environmental and 3) socio-cultural segments. Only the environmental segment will be focussed on in this research study

The environmental performance of the resort will mostly include the consumption of natural resources, which will be covered by the quantitative (numerical) data being collected on a monthly basis. To gather information on how people perceive the environmental performance of Sun City Resort, a qualitative (non-numerical/words) section must be included. This questionnaire will cover this section.

Take note of the following when you complete the questionnaire:

- The questionnaire is completely anonymous.
- Please complete all questions in the two sections of the questionnaire.
- The questionnaire should only be completed by people older than 16 years of age.
- Answer swiftly and do so truthfully.
- Place the questionnaire in the provided receptacle.

Thank you for your friendly assistance

_____

Danie Boshoff

Questionnaire

The questionnaire is divided into 2 sections:

1. Demographics of the guest
2. Environmental awareness

Section 1: Demographics and general information

Mark the applicable box with a " X "

1. What is your age?	
18–24	
25–34	
35–44	
45–54	
55–64	
65+	

2. What is your gender?	
Male	Female

3. Marital status	
Single	
Married	
Divorced	
Widowed	
Separated	

5. Country of origin	
Country	
If RSA, specify province	

4. Race	
White	
Black	
Coloured	
Asian	
Hispanic	
State other	

6. Choose one language (first language / mother tongue)			
English		Dutch	
Afrikaans		French	
Setswana		German	
IsiZulu		Spanish	
IsiXhosa		Chinese/Mandarin	
Sesotho		Portuguese	
Sepedi		Hindi	
Other:			

7. What is the highest degree or level of school you have completed?					
No schooling		Diploma or 1–2 years at university or technicon		Master's degree	
Schooling but less than Grade 10		Bachelor's degree		Doctorate degree	
Schooling Grade 10–12		Honours degree		Other	

8. Employment status			
Unable to work		Student	
Permanently employed		Retired	
Casual worker		Homemaker	
Self-employed		Unemployed	

9. Annual income			
R0 – R50 000		R300 001 – R500 000	
R50 001 – R100 000		R500 001 – R700 000	
R100 001 – R200 000		R700 001 – R900 000	
R200 001 – R300 000		R900 001 +	

Section 2: Environmental awareness

10. Are you a staying guest or a day visitor?

Guest	Day visitor

If you are a day visitor, skip question 11–12, 16–17 and 29. Tick box provided.

11. Where are you staying? Day visitor

The Palace of the Lost City	
Cascades Hotel	
Sun City Hotel	
The Cabanas	
Vacation Club	
Kwena Gardens Chalets	

12. Length of stay? Day visitor

1 night	
2 nights	
3 nights	
4 nights	
5 nights	
6 nights and more	

13. Repeater rate

1st time at Sun City Resort	
2 visits	
3 visits	
4 visits	
5 and more visits	

14. Have you noticed any environmental signage during your stay/visit?

Yes	No

15. Please elaborate in your answer in Question 14.

_____

_____

16. Which of the following have you noticed in the **front-of-house area of the hotel?** Day visitor

Guest of Nature booklet		Environmental newsletter	
Awareness posters (environmental calendar events)		Environmental snippets	
Sustainability policy		Other (specify)	

17. Which of the following have you noticed in the **rooms**? Day visitor

Water-saving tent cards		In-room information file	
Energy-saving tent cards		Primate notices	
Enviro pages on the VDA system (TV)		Key card energy-management system	
Low-flow showerheads		Dual flush toilets	

18. Did you participate in our **water-**saving initiatives during your stay/visit on Sun City Resort?	Yes	No	How?
19. Did you participate in our **electricity-**saving initiatives during your stay/visit on Sun City Resort?	Yes	No	How?

20. Have you made use of a recycling station?	Yes	No	How?
21. In your opinion, would you say Sun City Resort is a sustainable tourism destination?	Yes	No	What influenced your decision in the above question?

To what extent to you agree or disagree with the following statements?

22. To practise environmental sustainability on a destination the size of Sun City Resort is important	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
23. Participating in **water-saving** initiatives will not interfere with my holiday experience	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
24. Participating in **energy-saving** initiatives will not interfere with my holiday experience	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
25. Participating in **waste-reduction** initiatives will not interfere with my holiday experience	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
26. I always choose environmentally responsible destinations to spend my holidays at.	Strongly disagree	Disagree	Neutral	Agree	Strongly agree

27. The environmental performance status of a tourism facility has **no effect** on my decision when choosing a holiday destination	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
28. The environmental practices witnessed during my stay/visit at Sun City Resort will encourage me to practise them at my home or work	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
29. I pay a lot for my room or visit and feel I do not have to save resources to save money for Sun City Resort	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
30. I am concerned about the carbon emissions generated with my travelling to Sun City Resort, it being a distance from major towns	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
31. Sun City Resort, being a sustainable destination, makes me more comfortable travelling here, reducing my concern of carbon emissions generated from my travelling	Strongly disagree	Disagree	Neutral	Agree	Strongly agree

32. What was the single thing that made you become aware of the environmental sustainability of Sun City Resort?

_____

_____

33. Will you refer Sun City Resort to friends and family as an environmentally sustainable destination?

_____

_____

Any other comments

_____

Appendix 3 – Staff questionnaire

Date: _____ Time: _____

Department: _____

Dear Staff member,

I am Danie Boshoff, a master's student in Environmental Management at the University of South Africa. I am utilising sustainable tourism indicators to determine the environmental performance of Sun City Resort.

The United Nations World Tourism Organization describes sustainable tourism as follows:

"Sustainable tourism development meets the needs of present tourists and host regions while protecting and enhancing opportunities for the future. It is envisaged as leading to management of all resources in such a way that economic, social and aesthetic needs can be fulfilled while maintaining cultural integrity, essential ecological processes, and biological diversity and life support systems."

The sustainability of a resort includes the triple bottom line: 1) economic, 2) environmental and 3) socio-cultural segments. Only the environmental segment will be focussed on in this research study.

The environmental performance of the resort will mostly include the consumption of natural resources, which will be covered by the quantitative (numerical) data being collected on a monthly basis. To gather information on how people perceive the environmental performance of the Sun City Resort, a qualitative (non-numerical/words) section must be included. This questionnaire will cover this section

Take note of the following when you complete the questionnaire:

- The questionnaire is completely anonymous.
- Please complete all questions in the two sections of the questionnaire.
- The questionnaire should only be completed by people older than 16 years of age.
- Answer swiftly and do so truthfully.
- Place the questionnaire in the provided receptacle.

Thank you for your friendly assistance

_____

Danie Boshoff

Questionnaire

The questionnaire is divided into 2 sections:

1. Demographics of staff
2. Environmental awareness

Section 1: Demographics and general information

Mark the applicable box with a " X "

1. What is your age?	
18-24	
25-34	
35-44	
45-54	
55-64	
65+	

2. What is your gender?	
Male	Female

3. Marital status	
Single	
Married	
Divorced	
Widowed	
Separated	

5. Country of Origin	
Country	
If RSA, specify province	

4. Race	
White	
Black	
Coloured	
Asian	
Hispanic	
State other	

6. Choose one language (First language/ Mother tongue)			
English		Dutch	
Afrikaans		French	
Setswana		German	
IsiZulu		Spanish	
IsiXhosa		Chinese/Mandarin	
Sesotho		Portuguese	
Sepedi		Hindi	
Other:			

7. What is the highest degree or level of school you have completed?					
No Schooling		Diploma or 1-2 years on University or Technicon		Masters degree	
Schooling but less than grade 10		Bachelors degree		Doctorate degree	
Schooling Grade 10-12		Honours degree		Other	

8. Employment Status			
Permanently employed – Sun International		Casual worker	
Permanently employed – Business partner		Contract worker	
Permanently employed – Concessionaire			

9. Annual income			
R0-R50 000		R300 001 – R500 000	
R50 001 – R100 000		R500 001 – R700 000	
R100 001 – R200 000		R700 001 – R900 000	
R200 001 – R300 000		R900 001 +	

Section 2: Environmental awareness

10. Have you noticed any environmental signage in the workplace?

Yes	No

11. Which of the following have you noticed in the **workplace?**

Guest of Nature booklet		Environmental Newsletter	
Awareness posters (Environmental calendar events)		Environmental Snippets	
Sustainability Policy		Other (specify)	

12. Are you a **Green Team member?**	**Yes**	**No**
13. Do you participate in **water-**saving initiatives on Sun City Resort?	**Yes**	**No**
14. Do you participate in **electricity-**saving initiatives on Sun City Resort?	**Yes**	**No**
15. Have you made use of a **recycling station**?	**Yes**	**No**
16. In your opinion, would you say Sun City Resort is a **sustainable tourism destination?**	**Yes**	**No**

To what extent to you agree or disagree with the following statements?

17. To practise environmental sustainability on a destination the size of Sun City Resort is important	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
18. If you would go on holiday, will you take the environmental status of the destination into consideration when making a decision?	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
19. The environmental practices witnessed at Sun City Resort will encourage me to practise them at my home	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
20. I am proud to work at Sun City Resort being a sustainable tourism destination	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
21. I am aware of the environmental programme on the Resort	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
22. I support the environmental programme on Sun City Resort	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
23. Have you completed the environmental awareness training?	Yes		No		I am enrolled

24. What was the single thing that made you become aware of the environmental sustainability of Sun City Resort?

_____

_____

_____

25. Will you refer Sun City Resort to friends and family as an environmentally sustainable destination?

_____

_____

_____

Any other comments

_____

_____

_____

_____

Appendix 4 – Questionnaire approval

Sun City Resort Questionnaire approval

As stated by the Managing Executive of Sun City Resort, all additional documents used on the Resort to gather information from guests or staff must be approved by him.

This document will serve as proof that the Managing Executive, Mr Mike van Vuuren has approved the Guest questionnaire and Staff questionnaires for my studies.

Danie Boshoff

Student

Approved

Mr Mike van Vuuren

Managing Executive