Green economics: A case study of South African's willingness to pay for climate change mitigation

BY

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SUMMARY

Climate change is the greatest environmental challenge that the world is currently facing due to expanding economies, an increase in population and claims on the earth. Nevertheless, individuals are exploiting resources from the environment at a rate that is unsustainable but they are only harming themselves because certain individuals adopt the same exploitative strategy and resources are depleted.

Literature suggests that there is no clear value for the environment. Neoclassical economists argue that the way to assign a monetary value to the environment is by allocating a price to the environment. However, this poses some challenges as the environment is not a market resource. To overcome this problem, one can try to establish a monetary value for the environment by asking consumers whether and how much they are willing to pay for green initiatives such as green accommodation, organic food and wine. Literature furthermore recommends that the way to allocate a price is by asking individuals if they are willing to pay to mitigate climate change. This dissertation addresses the latter by asking day visitors at Spier, a wine farm in Stellenbosch, Western Cape, South Africa, whether or not they are willing to pay extra for certain green initiatives. Furthermore it determines how green behaviour predicts willingness to pay for green products.

Methods that are suggested by literature to determine willingness to pay are the travel cost method, hedonic pricing method and the contingent valuation method. This dissertation however concentrates on which factors influence a consumers' willingness to pay. By understanding and knowing which factors influence willingness to pay, more sustainable business practices can be identified.

Three methods are employed in the analysis of the data collected through a survey: Firstly, cross tabulations were drawn up to determine if statistically significant differences occur between the different types of environmentally friendly visitors, demographic factors and willingness to pay. Secondly, principle components are extracted from the 25 green principles which consumers apply at home to identify six types of green visitors. Lastly, these six types of green visitors and demographic variables were inserted into a logistic regression in order to determine which

variables explain a visitor's willingness to pay extra for green accommodation, organic food or wine.

The results show that demographic factors are not significant in predicting the willingness to pay for green accommodation, organic food and wine of day visitors at Spier. Willingness to pay is rather a function of existing environmental behaviour in those that actively engage in conserving the environment, through their behaviour and consumption habits, exhibiting a greater likelihood of willingness to pay than those who do little to mitigate the environmental impacts of their consumption. This supports the idea that consumers must be educated to make lifestyle changes and that environmental awareness is not a function of gender or other demographic variables.

OPSOMMING

Klimaatveranderinge is tans die omgewing se grootste uitdaging weens uitbreiding van ekonomieë, 'n toename in die bevolking en verbruikers se eise op die aarde. Ten spyte van hierdie probleem ontgin verbruikers hulpbronne uit die omgewing teen 'n koers wat onvolhoubaar is. Oor die langtermyn sal hierdie houding van die verbruiker hulself benadeel omrede elke verbruiker dieselfde uitbuitende strategie toepas en gevolglik sal dit lei tot die verderf van alle hulpbronne.

Literatuurstudies is van mening dat daar geen duidelike waarde is vir die omgewing nie, maar Neoklassieke ekonome is van opinie dat die wyse waarop 'n monetêre geldwaarde toegeken kan word aan die omgewing is deur die toekenning van 'n prys. Die probleem is egter dat die omgewing beskou word as 'n hulpbron wat nie 'n mark waarde het nie en gevolglik kan 'n prys nie daaraan toegeken word nie. Die manier om hierdie probleem te oorkom, is om vir verbruikers te vra hoeveel hulle bereid is om ekstra te betaal vir groen-inisiatiewe soos byvoorbeeld groen akkommodasie, organiese kos en wyn. Hierdie verhandeling fokus egter op watter demografiese inligting en omgewingsgedrag voorspel bereidwilligheid om te betaal vir die groen produkte wat die impak van klimaatverandering versag.

Metodes wat deur die literatuur voorgestel word om bereidwilligheid om te betaal te meet is die: reiskoste-metode, hedonies pryse-metode en die voorwaardelike waardasiemetode. Hierdie verhandeling konsentreer egter op watter faktore 'n verbruikers se bereidwilligheid om te betaal beïnvloed. Deur te verstaan watter faktore bereidwilligheid om te betaal beïnvloed, kan die kwessie van volhoubare besigheidspraktyk aangespreek kan word.

Drie metodes word in die data analise toegepas: Eerstens word daar van kruis tabulering gebruik gemaak om te bepaal of daar 'n beduidende verskil is tussen die tipe verbruiker, demografiese inligting en verbruikers se bereidwilligheid om te betaal; tweedens word die 25 groen gedrag vrae gegroepeer in ses verskillende tipes "groen" verbruikers deur middel van faktor groepering. Laastens word 'n logistiese regressie model gebruik om te bepaal watter faktore 'n beduidende effek sal hê op 'n verbruiker se bereidwilligheid om ekstra te betaal vir groen akkommodasie, organiese kos of wyn.

Die resultate van hierdie verhandeling toon aan dat demografiese faktore nie 'n belangrike voorspeller is wanneer 'n verbruiker se bereidwilligheid om te betaal vir groen akkommodasie, organiese kos en wyn van die dag besoekers by Spier gemeet word nie. Bereidwilligheid om te betaal word eerder beskou as 'n funksie van die verbruiker se bestaande omgewingsgedrag. Diegene wat aktief betrokke is by groen-gedrag het 'n groter waarskynlikheid getoon om ekstra te betaal vir groen inisiatiewe. Dit ondersteun die idee dat verbruikers moet opgevoed word oor hoe om groen-lewenstyl verandering te maak en dat omgewingsbewustheid nie 'n funksie is van geslag of ander demografiese veranderlikes nie.

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Introduction

1.1 Introduction

Over the last 50 years the world economy has expanded, population has doubled and our claims on the earth have become excessive. Climate change, also known as 'global warming', is probably the greatest environmental challenge facing the world currently (Brown, 2003). Climate change is associated with serious disruptions of the world's weather and climate patterns (South African National Climate Change Response Strategy (SANCCRS), 2004) and, according to the 2010 World Development Report, the effects are already visible through pervasive melting of ice, heat waves and the intensifying of floods, storms, droughts, and tropical cyclones (World Development Report, 2010:4).

Scientists on the Intergovernmental Panel on Climate Change (IPCC) concluded that several greenhouse gases are responsible for global warming, and humans emit them in a variety of ways, such as the combustion of fossil fuels used in cars and factories as well as the production of electricity (Metz, Davidson, Bosch, Dave and Meyer, 2007:3). The gas that is mostly to blame for global warming is carbon dioxide (CO_2) (Metz *et al.*, 2007:3). Other contributors to climate change include methane released from landfills and agriculture, nitrous oxide from fertilizers, gases used for refrigeration and other industrial processes, and the loss of forests that would otherwise store CO_2 (Metz *et al.*, 2007:3). Research shows that the degree of future temperature increases will depend on the quantity of current and future global CO_2 emissions (Metz *et al.*, 2007:3). *Table 1* summarises the effect that a two, three, or four degree Celsius increase in global temperature would have on harvests, flooding and ecosystems worldwide (Carlsson, Kataria, Krupnick, Lampi, Lofgren, Qin, Chung and Sterner, 2010:3).

Climate change is not country-specific but threatens all countries globally. Developing countries are more vulnerable to climate change due to their lack of

sufficient financial and technical capacities to manage increasing climate risk and due to their dependence on more climate-sensitive natural resources for income and well-being (World Development Report, 2010). According to the 2010 World Development Report, economists predict that developing countries would bear 75 to 80 per cent of the costs of damages caused by global warming in the near future. It is estimated that a two degree Celsius increase in temperature will result in a permanent reduction in GDP in Africa and South Asia of four to five per cent.

Table 1.1: Temperature increase and its effect on harvests, flooding and storms, and ecosystems

Temperature increases	1.1°C increase	1.67°C increase	2.2°C increase
Harvests	In countries near the equator, harvests will tend to decrease by four to six per cent while the harvests of countries in the northern hemisphere will increase by one to three per cent.	In countries near the equator, harvests will tend to decrease by ten to twelve per cent while the harvests of countries in the northern hemisphere will be unaffected	In countries near the equator, harvests will tend to decrease by fourteen to sixteen per cent while the harvests of countries in the northern hemisphere will decrease by zero to two per cent.
Increased flooding and storms	Small tropical islands and lowland countries experience increased flooding and storms.	Additional low-lying areas in the Americas, Asia and Africa experience increased flooding and storms.	Populous cities face increased flood risks from rivers and ocean storms. Existence of small island countries is threatened.
Threatened ecosystems	Sensitive ecosystems such as coral reefs and the Arctic are threatened.	Most coral reefs die. Additional sensitive ecosystems and species around the world are threatened.	Sensitive and less sensitive ecosystems and species around the world are threatened.

Source: Carlsson et al., (2010:4)

Countries across the world have responded differently to the concern of climate change. In 1988, several governments came together and formed the Intergovernmental Panel on Climate Change (IPCC) which led to the United Nations Framework Convention on Climate Change (UNFCCC). The main objective of the UNFCCC is to achieve stabilisation of greenhouse gases in the atmosphere at a level that would prevent dangerous anthropogenic[1] interference with the climate system. Efforts have been implemented by the UNFCCC such as the Kyoto Protocol which focuses mainly on the quantified limitation of emissions amongst certain countries[2] (South African National Climate Change Response Strategy, 2004). In terms of Article 3 of the Kyoto Protocol these countries, in order to sustain development, are implementing policies and measures such as:

- promoting sustainable forms of agriculture;
- research and development on the use of new and renewable forms of energy and CO_2 technologies;
- limiting and reducing the emissions of greenhouse gases; and
- limiting and reducing methane emissions through recovery and waste management.

The 2009 United Nations Climate Change Summit that was held in New York concluded that the main efforts worldwide must be to enhance action to adapt to the impact of climate change, implement emission reduction targets for industrialized countries, and implement suitable mitigation actions driven by regulation, carbon-pricing and subsidies.

In 1999, a study was done on South Africa's vulnerability to climate change and its ability to adapt (Turpie, 2002). The results of the study indicated that the economic impact of climate change in South Africa will mainly be felt in terms of changes in

[1] Anthropogenic carbon dioxide is that portion of carbon dioxide in the atmosphere that is produced directly by human activity, such as the burning of fossil fuels, rather than by processes such as respiration and decay.

[2] Australia, Austria, Belgium, Bulgaria, Canada, Croatia, Czech Republic, Denmark, Estonia, European Community, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Latvia, Liechtenstein, Lithuania, Luxembourg, Monaco, Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine, the United Kingdom as well as the United States of America.

agricultural production, which will affect the value added to the national income as well as people's livelihoods within this sector (Turpie, 2002). However, South Africa's society in general will also be affected. Areas affected include: the health sector (due to an increase in infectious diseases brought about by increasing temperatures); maize production (which accounts for 71 per cent of grain production and is expected to decrease by 10 to 20 per cent as a result of increasing temperatures); the area currently covered by biomes[3] (this is expected to decrease by 33 to 55 per cent, making plant and animal biodiversity an area of concern); and water resources (as a result of changes in the intensity and seasonality of rainfall (Department of Environmental Affairs, 2009:1)).

In an effort to limit the effects of climate change, the South African government approved the UNFCCC in August 1997 and agreed to the Kyoto Protocol in July 2002. South Africa, as a signatory to the UNFCCC, has to pursue the same policies and fulfil the same obligations as the other countries that ratified the UNFCCC (South African National Climate Change Response Strategy, 2004:4). These obligations include, amongst others:

- preparing and regularly updating a national inventory of greenhouse gas emissions;
- formulating and implementing national and regional programmes to mitigate climate change; and
- promoting and cooperating in the development and application of technologies, practices and processes that control, reduce or prevent the emissions of greenhouse gases (South African National Climate Change Response Strategy, 2004:6).

In addition to South Africa's agreement with the UNFCCC, in order to curb greenhouse gases, South Africa has proposed and implemented other policies and legislation. This includes the implementation of CO_2 emissions taxes, government initiatives such as: The Cleaner Technology and Remediation Fund, clean fuel technology and the air quality management strategy, as well as the National

[3] A major ecological community type (such as tropical rain forest, grassland, or desert)

Environmental Management Act of 1998 (South African National Climate Change Response Strategy, 2004:6).

The consequences of climate change are long-term and the effects thereof are predicted but the magnitude of the effects are as yet uncertain. The benefits gained from policies and initiatives implemented by government, the UNFCCC and the IPCC will only be seen in years to come while the costs involving climate change reduction are high, current and on going. In 1968, Hardin stated that the environment forms part of "The tragedy of the commons" theory. The premise of this theory is the degradation of all common resources. Individuals attempt to exploit a common good, but only harm themselves because everyone adopts the same strategy and resources are uniformly depleted (Feeny, Berkes, McCay and Acheson, 1990). One of the factors that influence the commons is consumer choice. Each consumer or individual utilises the environment in their own way. The level of exploitation by one individual affects the ability of another to do so, causing divergence between the utility received by individuals and the sustainability of the environment in the long run. The question that needs to be asked is not only if a country is willing to invest in the environment but if its citizens are willing to pay for this non-market resource in order to offset their consumer behaviour and safeguard the environment (Feeny *et al.*, 1990:3).

Studies of the mitigation of climate change, specifically of willingness to pay (WTP), have focused on air travellers' willingness to pay for carbon offsets (*see* Brouwer, Brander and Beukering, 2008), or tourists' willingness to contribute to a fund for the management and conservation of a particular natural resource (see Casey, Brown and Schuhmann, 2010). In all of these case studies it was found that individuals are willing to pay extra in order to offset their carbon footprint and to conserve their natural resources.

This dissertation takes the question of sustainability to a specific location, Spier Wine Estate in Stellenbosch, Western Cape, South Africa, asking day visitors there whether or not they are willing to pay for greener accommodation, food and wine. A questionnaire was compiled in order to determine whether consumers were aware of Spier's green initiatives and to establish behavioural patterns regarding environmental living and consuming.

1.2 Problem statement

The environment is the world's largest and most valuable non-market resource but consumers, firms, and governments worldwide are deriving utility from the environment at a rate that is unsustainable but are unwilling to mitigate climate change. Trees are being cut faster than they can regenerate, soil erosion exceeds new soil formation, CO_2 is being released into the atmosphere faster than nature can absorb it, and habitat destruction and climate change are destroying plant and animal species, launching mass extinctions (Brown, 2005).

There is uncertainty about the value of the environment as a non-market and scarce resource (Cleveland, 1999:89). Neoclassical economists argue that, in theory, price is the ideal measure of scarcity, but when it comes to the environment it is difficult to implement such a measure (Cleveland, 1999:89). Although it is difficult to allocate a price to the environment literature suggest that the way to allocate a value is by asking individuals whether or not they are willing to pay extra to mitigate for climate change and if so, how much.

International literature studies indicate that demographic factors influence consumers' willingness to pay. In South Africa little information is however available regarding the demographic and attitudinal characteristics of consumers that influences willingness to pay. The aim of this dissertation is to use a case study in order to examine the determinants of individuals' willingness to pay for climate change mitigation in the long run and to identify a specific type of consumers that are willing to mitigate for climate change.

1.3 Motivation

Most countries, especially developing countries, rely on the environment for their livelihoods (Glover, 2010:2). The environment is much more than just a source of recreation and consequently a price needs to be paid for the use of the environment in order to conserve this scarce common resource. Unfortunately, incomplete property rights and misguided policies can drive consumer behaviour in ways that are realistic in the short run but harmful to the environment in the long run (Glover, 2010:3).

The role of economics in decision-making is important since, by understanding and influencing consumer behaviour, necessary tools can be provided in order to compare the value of the environmental benefits with the costs involved in safeguarding them (Glover, 2010:4).

This study looks at the potential scope of climate change mitigation in South Africa by examining the predictors of whether or not the specific consumers in this case study are willing to pay for climate change mitigation.

1.4 Objectives

The primary objectives of this study are to establish whether individuals are willing to pay for green initiatives, to establish which demographic factors predict willingness to pay and which type of "green visitor" is willing to pay.

The following specific approaches relate to achieving the primary objectives:

- To provide a short theoretical overview of non-market valuation techniques with special reference to stated preference methodologies.
- To discuss examples of international studies conducted to determine the demographic and attitudinal characteristics of consumers.
- To analyse the collected data by means of cross-tabulations and factor analysis.
- To make conclusion and recommendations based on the preceding analyses.

1.5 Method

A literature review is provided on the willingness to pay for climate change mitigation which will be put into the context of the economic literature on the valuation of non-market resources.

Primary data, collected through a questionnaire distributed at Spier wine farm in the Western Cape, South Africa in February 2011, is used. Spier wine farm is well known for its green initiatives and are the reason why Spier was selected for this study. Day visitors were asked about their "green" behaviour at home and willingness to pay for green accommodation and organic food and wine.

The questionnaire consisted of two sections. Section A recorded demographic information such as year of birth, gender, language, occupation, province of origin,

and income level. Section B consisted of consumer behaviour type questions in order to investigate which type of green principles visitors at Spier apply at home. Furthermore, section B consisted of willingness to pay questions in order to establish whether a consumer is willing to pay extra for green accommodation, organic food and wine in order to mitigate climate change.

Methods that are suggested by literature to determine willingness to pay are the travel cost method, hedonic pricing method and the contingent valuation method. This dissertation however concentrates on which factors influence a consumer's willingness to pay. Three methods were employed in the analysis of the data: Firstly, cross tabulations were drawn up to determine if statistically significant differences occur between the different types of green visitors, demographic characteristics and willingness to pay. Secondly, principle components were extracted from the 25 green principles which consumers apply at home to identify six types of green visitors. Lastly, these six types of green visitors and the demographic variables were inserted into a logistic regression in order to determine which variables contribute to the likelihood of a visitor being willing to pay extra for green accommodation, organic food or wine.

1.6 Delimitation

This study only focuses on the individuals in this case study. The questionnaire answers are limited to their individual feedback. Only factors that were measurable were included in the questionnaire to establish individuals' specific attitudes toward green behaviour and purchases and their willingness to pay for climate change mitigation.

1.7 Structure

The next chapter provides a more detailed overview of international literature that evaluates individuals' willingness to pay for climate change mitigation.

Chapter 3 describes the raw data obtained from the questionnaire, *chapter 4* analyses the statistical significance of the data and predictors of willingness to pay and *chapter 5* summarises the above mentioned chapters and concludes with recommendations

2

Chapter

Literature Review

2.1 Introduction

In *Chapter 1*, an introduction was given on the motivation, objectives and method of this study. The impact that climate change has on the environment was highlighted and the important role of economic decision-making. By understanding consumer behaviour and the value consumers attach to environmental benefits, one can design interventions that can consider the cost of damage to the environment in order to safeguard it (Glover, 2010:4).

The environment has been classified as a non-market and scarce resource (Cleveland, 1999:89). Neoclassical economists argue that price is the ideal measure of scarcity, because, for economists, scarcity is reflected in relative prices, but when it comes to the environment, a non-excludable commodity, it is difficult to implement. The reason for this is that consumers think of the environment as an unlimited resource and their behaviour results in the depletion of resources (Cleveland, 1999:89 and Hall and Hall, 1984:364). Several international studies have investigated the willingness to pay for climate change mitigation and mostly focused on underlying scenarios that motivate willingness to pay. Scenarios include paying additional fees to protect corals in Mexico (Casey *et al.,* 2010), offsetting CO_2 emissions of air travel by passengers (Brouwer *et al.,* 2008), how much individuals are willing to pay for a 85 per cent, 60 per cent and 30 per cent reduction in CO_2 (Carlsson *et al.,* 2010) and willingness to pay for biomass ethanol (Solomon and Johnson, 2009).

The chapter continues by explaining the tragedy of the commons, under which the environment falls, and investigating "green" consumer behaviour. The aim of this chapter is to explain why it is difficult to determine the price of the environment and the value that individuals place on sustaining the environment and to review the methods that are typically used to determine willingness to pay. A few international

case studies are discussed that focus on willingness to pay for climate change mitigation in order to determine whether consumers are willing to pay for climate change mitigation

2.2 The environment as a common resource

The environment is arguably the world's largest and most valuable non-marketable resource. This results in consumers, firms, and governments worldwide deriving utility from the environment at a rate that is not sustainable, especially when not held financially liable for this use or the resulting externalities.

Economists classify the environment as a common resource. When it comes to common resources such as the oceans, lakes, forests, or the atmosphere it is difficult to exclude or limit individuals' use of these resources (Ostrom, 1999:497). The difficulty of excluding beneficiaries from a common resource is a characteristic that is shared with public goods, yet the subtractability[4] of the common resource is shared with private goods (Ostrom, 1999:497). Common resources do not belong to anyone in particular (Rose, 1991:3). Because of this, individuals tend to utilise the environment for their own benefit by using and disposing of environmental goods as if the environment belonged to everyone (Rose, 1991:3). The objective of each consumer is to maximise their utility derived from these environmental goods but he or she does not take into account the cost that their behaviour has for the community. Unsustainable consumption of common resources by individuals makes these resources unavailable for other individuals (Ostrom, 1999:497).

In 1968, Hardin identified this environmental problem as "The tragedy of the commons". The premise of this theory is that communal use and ownership of common resources results in their degradation. Individuals attempt to exploit the resources of a common good, but only harm themselves because everyone adopts the same exploitative strategy and resources are uniformly depleted (Feeny *et al.,* 1990). Research on the commons prior to 1968 includes, amongst others, the work of Marcet (1819), a French environmentalist who concluded that an over-exploitation of common resources is most likely due to unrestricted access to these resources. Lloyd (1977) later concluded that a common-pool resource will be overused because

[4]Subtractability refers to how much of the good is left after consumption.

the value of the present benefit, under unrestricted use, exceeds the potential future cost (characterised by lost use), especially when each individual user bears only a fraction of those future costs, but gains the entirety of present benefits.

The "tragedy of the commons" is a crucial theory in human ecology and the study of the environment in general (Dietz, Dolsak, Ostrom and Stern, 2002:1). The typical scenario of the tragedy of the commons is simple: A number of individuals have access to a common resource, collectively they overuse the resource and this inevitably results in problems such as the collapse of fish populations, climate change and the destruction of the environment's sustainability (Dietz *et al.*, 2002:1). Each individual is faced with a decision about how much of a common resource to use. If all users restrain themselves, then the resource can be sustained. If one individual limits himself with regards to the utilization of a common resource but the next individual does not, then the pool of common resources still collapses and the former individual has lost the short-term benefits of taking his or her individual share (Hardin, 1968).

The theory of the "tragedy of the commons" can also be linked to the microeconomic problem referred to as the "prisoner's dilemma". Every participant has reason to suspect that the other participants in a common effort will not cooperate, but rather will "defect" and seek their individual benefit and each individual participant's best option then is to defect too, even though cooperating as a group will leave everyone better off (Rose, 1991:4). Thus, everyone utilises the environment to their own advantage assuming that just one individual that takes into account the degradation of the environment and acting upon it, will not make a difference. The cost of being the only compliant individual outweighs the immediate, if temporary, benefit of current consumption.

The following section expands on the impact of consumer behaviour on the environment and factors that contribute to "green" consumption.

2.3 The sustainability of consumer behaviour

Section 2.2 concluded that the essential idea of the theory of the "tragedy of the commons" concentrates on the degradation of all resources communally owned and used. Individuals attempt to exploit the resources of a common good, but only harm themselves because everyone adopts the same strategy and resources are uniformly

depleted (Feeny *et al.,* 1990). Thus, one of the factors that influence the commons is consumer choice. Every consumer chooses the level of consumption of a common resource but that decision impacts on the availability of the resource to the subsequent consumer, leading to a divergence between individuals and an unsustainable use of the environment (Feeny *et al.,* 1990:3). McGougall (1993) indicates that the role of consumers is integral to the process of a country's green revolution since an estimated 30 to 40 per cent of the degradation of the environment has been brought about by the consumption activities of private households (Chan, 2001:390).

The individual's relationship with the environment is complicated and contradictory. Individuals depend on the environment for their livelihoods and production but, also pollute, destroy and utilise the environment in a way that is not sustainable. When individuals utilise the environment in such a way, these common resources become scarce and this can lead to diminishing returns and the reduction of output. The optimal level of extraction of common resources is where the marginal cost equals the marginal returns of the extraction (Mohr and Fourie, 2010:183-197). Consumers want to maximise their extraction of the goods in order to satisfy their needs, but every consumer maximising his or her extraction will lead to the uniform depletion of these resources.

Consumer choice is one of the most important and basic economic principles (Mohr and Fourie, 2007:183-197). If consumers are not willing to take into account the social cost of their unsustainable utilisation of resources, their behaviour will inevitably contribute to high ecological costs. Resources will be depleted and result in an overall reduction of economic growth (Chan, 2001:390).

In the last half century, key questions were asked with regards to which variables influence environmentally friendly[5] (green) consumer behaviour. Various studies have addressed the characteristics of "green" consumers and the majority of these studies found that demographic variables were the best predictors of green consumer behaviour (Straughan and Roberts, 1999:559). *Table 2.1* summarises the variables with regards to whether or not the specific demographic variables of age,

[5] Environmentally friendly (also eco-friendly, nature friendly, and green) are synonyms used to refer to goods and services, laws, guidelines and policies considered to inflict minimal or no harm on the environment.

gender, income and education have a statistically significant relationship with green consumer behaviour.

Table 2.1: Demographic variables influencing green consumer behaviour.

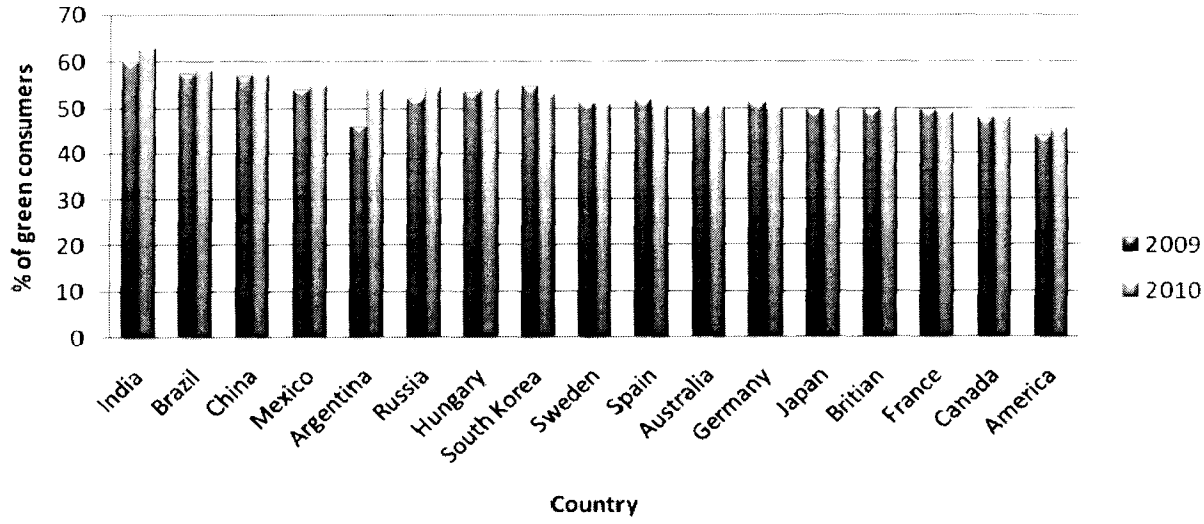
Variable	Author	Outcome
Age	Anderson *et al.*, 1974; Murphy *et al.*, 1978; Aaker and Bagozzi 1982; Roper, 1990 and Roberts, 1995.	The general outcome of age as a demographic variable is that younger individuals are likely to be more sensitive to environmental issues. A number of theories are offered in support of this belief, the most common argument being that those who have grown up in a time period in which environmental concerns were a salient issue at some level, were more likely to be sensitive to these issues.
Gender	Hounshell and Liggentt, 1973; Brooker, 1976; Arbuthhnot, 1977; Eagly,1987; MacDoanald Hara, 1994 and; Roberts, 1995.	Females are more likely to follow green behaviour. The theory is that women will, as a result of social development, more carefully consider the impact of their actions on others and the environment.
Income	Anderson et al., 1974; Antil, 1978; Kasarjian, 1971 and; Kinnear *et al.*, 1974	Income is positively related to environmental sensitivity. The theory is that individuals can, at higher income levels, bear the marginal increase in cost associated with supporting green causes and favouring green product offerings.
Education	Aaker and Bagozzi 1982; Anderson *et al.*, 1974; Kinnear et al., 1974; Murphy *et al.*, 1978 and; Newell and Green, 1997.	A definitive relationship between green behaviour and education has not yet been established. The majority of studies have found the expected positive relationship. But certain studies also found that education was negatively correlated with environmental attitudes and in some cases found no significant relationship.

Source: Straughan and Roberts (1999:599-561)

In South Africa little information is however available regarding the demographic and attitudinal characteristics of consumers that influences willingness to pay for green behaviour.

In 2010, National Geographic compiled a survey (Greendex) to determine "green" consumer behaviour for fourteen[6] countries. The survey included questions that measure consumer behaviour concentrating on different sectors including: housing, transportation and food (National Geographic, 2010:2). The findings of this study raised worldwide concern regarding the impact that consumers have on the environment (National Geographic, 2010:1). The main findings of the survey was that consumers in developed countries have a greater (negative) impact on the environment than consumers in developing countries, and that these consumers should make more sustainable choices in order to offset their carbon footprint (National Geographic, 2010:1). *Figure 2.1* summarises the overall rankings of green consumer behaviour for the 14 countries.

Figure 2.1: Overall rankings for consumer behaviour, 2009 – 2010.



Source: Greendex 2010: Consumer Choice and Environment, 2010:4

The large percentage of consumers that do not follow a green lifestyle can clearly be found in developed countries as indicated in *Figure 2.1.* America, Canada, and Britain fall under the bottom five green consumer countries while developing

[6] India, Brazil, China, Mexico, Argentina, Russia, Hungary, South Korea, Sweden, Spain, Australia, Germany, Japan, Britain, France, Canada and America.

countries such as India, Brazil and China fall under the top five green consumer countries.

With regards to the different sectors (housing, transport and food) countries performed differently.

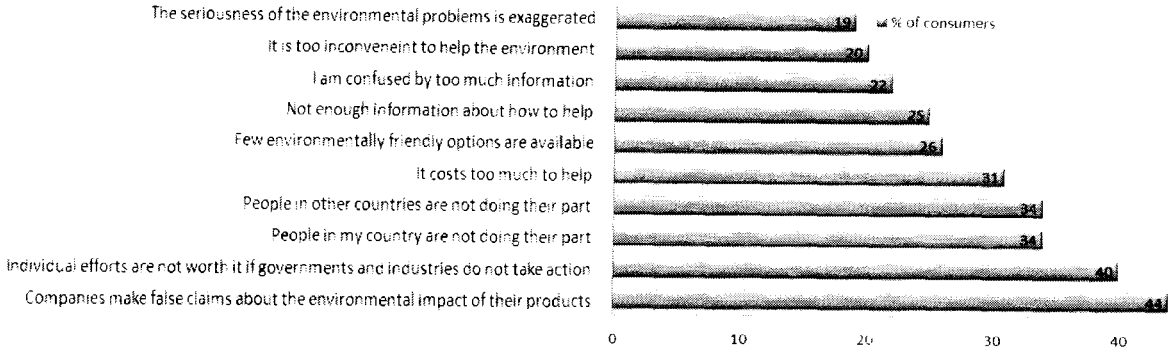
Housing: Japan and America's Greendex scores are influenced negatively due to the excessive use of air conditioners. One of the main factors that contribute to Brazil's high Greendex score is the Brazilian production of biofuel and as a result consumers tend to use more "green" energy in comparison to America and India that make use of coal and gas. In China, Brazil and America consumers showed that they prefer energy saving televisions therefore having a positive effect on the Greendex score.

Transport: Results in this survey showed that developed economies tend to make more use of cars and trucks in comparison to emerging economies. The use of cars and trucks has a negative effect on a country's Greendex score.

Food: India has a higher Greendex score because India is one of the countries that consume the least meat. Australia, India, China and Russia consume locally grown food, a positive influence on their Greendex scores. Germany is the country that consumes the most bottled water. Sixty five per cent of German consumers use bottled water every day, negatively affecting their Greendex score.

Across these fourteen countries, one of the questions asked was what discourages environmentally friendly consumer behaviour. *Figure 2.2* indicates the distribution of options consumers could indicate as to why they are discouraged. The top two reasons why consumers were discouraged from participating in green consumer behaviour were that consumers are of the opinion that companies make false claims about the environmental impact of their products and that individual efforts are not worth it if governments and industries do not take action. The factor that least discouraged green consumer behaviour was the seriousness of environmental problems. Consumers are aware of the seriousness of climate change but appear to expect that firms, government and industries should solve or mitigate the problem.

Figure 2. 2: Factors that discourage environmentally friendly consumer behaviour



Climate change involves aspects of the natural environment and economists refer to the environment as a non-market resource (Krugell and Saayman, 2011:3). Various natural resources are private goods that are competitive in a market and in some cases excludable in consumption due to certain property rights that can be invoked (Krugell and Saayman, 2011:3). However, the earth's atmosphere is being used without any direct monetary costs but its pollution during production activities, and other selfish consumer behaviour, is associated with severe negative externalities (Krugell and Saayman, 2011:3) including subsistence and health issues. These externalities are the difference between private and social costs. The market fails to account for the social costs since no individual owns their share of a sustainable environment to sell to or withhold from polluters, so no market or price exists. The result is the "tragedy of the commons" whereby the common resource pool is depleted since all individuals derive utility from the environment at a rate that is unsustainable (Krugell and Saayman, 2011:3).

Consumption and production will continue, however their externalities can be addressed by making use of more environmentally friendly methods. The effects of human activity on the environment will have to be mitigated by a combination of voluntary contributions or behavioural changes and compulsory taxes.

Research into the mitigation of climate change, as discussed in the next section, has focused on tourists' and consumers' willingness to pay for carbon offsets, and whether or not these individuals are willing to pay additional fees in order to mitigate climate change (Krugell and Saayman, 2011:3).

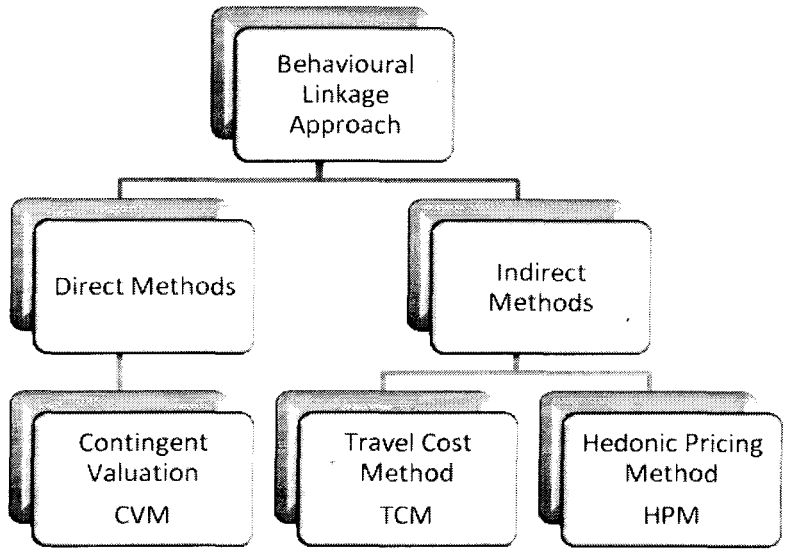
2.4 Willingness to pay for climate change mitigation

There is significant uncertainty about assigning a value to the environment as a scarce resource (Cleveland, 1999:89). Neoclassical economists argue that price is the ideal measure of scarcity, but when it comes to the environment it is difficult to implement such a measure (Cleveland, 1999:89) because it cannot be isolated, divided or traded in adherence to market principles. The reason why the environment is characterised as a non-market resource is because environmental goods (common resources) such as the oceans or atmosphere are not traded in markets. In order to establish the value of common resources, non-market valuation methods are used to determine how much consumers or individuals are willing to pay to protect these resources (King and Mazzotta, 2000). Economic value can be defined as the sum of the maximum amount that individuals are willing to pay for common resources, thereby expressing the value of the environment in monetary terms (King and Mazzotta, 2000).

Johnson and Nement, 2010, found that there are certain factors that influence willingness to pay. These factors include: income, pro-environmental lifestyles and demographic variables. It is important to firstly identify what affects willingness to pay before asking individuals whether or not they are willing to pay extra in order to mitigate climate change.

Several studies indicate that willingness to pay data can be collected through various methods (Johnson and Nement, 2010:4). *Diagram 2.1* indicates the main methods for valuing environmental benefits for non-market resources subsequent to which these methods are discussed in detail. Consumer preferences and responses to the changing environment are critical fundamentals of the behavioural linkage method which is based upon observations of behaviour in actual environmental markets or survey responses regarding hypothetical environmental markets (Thomas and Callan, 2010:155). Methods that are directly linked to environmental changes are classified as direct methods. Direct methods estimate monetary values either on the basis of prices paid in markets for the environmental assets to be valued, or using survey techniques that ask respondents what they would pay for common resources in hypothetical scenarios (Anderson, 2004:203). Direct methods include the contingent valuation method (CVM) while the indirect methods include the travel cost and hedonic pricing model (Thomas and Callan, 2010:155).

Diagram 2.1: Valuing methods for non-market resources.



Source: Thomas and Callan, (2010:154)

2.4.1 Indirect methods

The first of the methods used to estimate a measure of willingness to pay is the travel cost method (TCM) which focuses on the estimation of economic values relating to ecosystems or recreation sites. The basic principle of this method is that the value of the site or its recreational services is reflected in how much individuals are willing to pay to get there (King and Mazzotta, 2000). The travel cost method involves surveys where data is collected on respondents' place of residence, demographics, frequency of visit to a particular site, trip information etc. From the data collected through such surveys, visit costs can be calculated (Bateman et al., 2003:31). Individuals' willingness to pay to visit a recreation site can be estimated based on the number of trips that they actually make at different travel costs (King and Mazzotta, 2000). The travel cost method is mainly used in the estimation of economic costs and benefits resulting from changes in access costs and environmental quality at a recreational site and the elimination of an existing or addition of a new recreational site (King and Mazzotta, 2000). The travel cost method is valuable when researching a specific area but not so much when measuring the value of a common resource such as the whole environment or atmosphere (Krugell and Saayman, 2011:4).

An example of the travel cost method is a study conducted by Du Preez, Lee and Hosking in 2011 regarding the recreational value of beaches in the Nelson Mandela

Bay area, South Africa. The study established that although beaches are common for generating recreational value, it is important to determine the relative value of these beaches. Typically no entrance fees are imposed at beaches and therefore no data is available to construct a demand curve. To solve this problem, the non-market valuation method, the travel cost method, was introduced in order to estimate a value for blue flag status beaches. The objective was to determine the monetary value of individuals' travelling costs when visiting blue flag status beaches. It was established that individuals were willing to pay R44.73, R24.61, R37.85 and R2.68 per person, per trip for access to King's, Humewood, Hobie and Wells Estate beaches estimating the value of blue flag status beaches in the Nelson Mandela metropolitan area at R55 million per annum.

The second method used to establish willingness to pay is the hedonic pricing method (HPM) which focuses on estimating the value of environmental service that affects the prices of market goods. The hedonic pricing method is based on the assumption that individuals find the characteristics of a good, or the services it provides, more valuable than the good itself (King and Mazzotta, 2000). Therefore, prices will reflect the value of the characteristics or services of the specific good that individuals consider important when purchasing the specific good (King and Mazzotta, 2000). With the hedonic pricing method one does not ask visitors how much they are willing to pay but rather observe their spending in order to estimate a conservation premium (King and Mazzotta, 2000). The hedonic pricing method is mainly used to estimate the economic costs and benefits associated with environmental quality and environmental services (King and Mazzotta, 2000). This method is useful where individuals are already paying an entrance fee and one is interested in identifying the conservation premium associated with a protected recreational site (Krugell and Saayman, 2011:4). An example of the hedonic pricing method is a study done by Komarova in 2009 regarding the environmental impact of air pollution in Moscow. The objective was to establish the quantified effect of air pollution on house prices in Moscow. The results of the study indicated that the effect of air pollution on house prices is small but significant. Individuals are willing to pay between $5 and $46 to reduce emissions.

2.4.2 Direct method

The third method is the contingent valuation method (CVM) which is a widely applied monetary evaluation method with a consistent basis in economic theory (Bateman *et al.,* 2003:24*).* The main objective of CVM is to estimate economic values for ecosystems and environmental services by means of analysing responses to survey questions based on a hypothetical scenario (Anderson, 2004:207). CVM is a survey method where individuals are presented with information concerning environmental changes (Brouwer *et al.*, 2008:302).

CVMs have overall employed four primary question types which include: open-ended questions, dichotomous choice methods, payment cards and bidding games (Anderson, 2004:207). Open-ended questions specifically ask respondents how much they are willing to pay for common non-market resources. Dichotomous choice questions include a single value that can either be accepted or rejected by respondents. Values are printed and respondents are asked how close the values are to the maximum amount that they are willing to pay for common non-market resources when using payment cards. Bidding games can also be used in determining the value of common non-market resources where the values can be stacked in ascending or descending order until the respondent rejects or accepts the value (Anderson, 2004: 207).

Research shows that studies on the willingness to pay for climate change mitigation rely on the assessment of scenarios and therefore CVM methods are used in most cases (Johnson and Nement, 2010:4). The CVM method is the preferred method of valuation because it is characterized as flexible when it comes to valuing the type of non-market resources. It is also the most analysable method making it the most acceptable for estimating economic value (King and Mazzotta, 2000). There are, however, several drawbacks to CVM including: controversy regarding the sufficiency of the measure of individuals' willingness to pay for environmental goods; the assumption that individuals will pay the amount for a certain environmental good as stated on the questionnaire; possibly biased data since respondents may have answered a different question than the surveyor had intended; respondents may make wrong associations with regards to environmental goods that were not intended by the surveyor; respondents may not quite understand what is being asked of them; respondents may have motives to misrepresent their opinions and

respondents' answers may depend on how and which type of questions were used (King and Mazzotta, 2000). Many of these drawbacks are inherent to surveys and can be mitigated by careful wording of the questions.

One of the major drawbacks that are associated with the CVM is bias (Bateman *et al.*, 2003:23). If a respondent feels that these common non-market resources will be provided whether or not they are willing to pay for it, the respondent will most likely suggest a lower willingness to pay value with the objective of free-riding. Yet other drawbacks associated with the CVM are the overestimation of willingness to pay due to strategic overbidding, 'good respondents', upward rounding, anchoring and starting point effects as explained in Bateman *et al.*, (1995).

As previously mentioned, CVM makes use of surveys asking individuals directly how much they are willing to pay for specific environmental goods or services. Due to the fact that individuals are asked how much they are willing to pay for a specific environmental good or service it is called "contingent" valuation. Individuals are asked to state their willingness to pay, contingent on a specific hypothetical scenario and description of the environmental service (King and Mazzotta, 2000). The CVM is preferred to the travel cost and hedonic pricing methods due to the flexibility of the CVM, allowing for the assessment of a wider variety of non-market goods and services (King and Mazzotta, 2000).

2.5 Willingness to pay case studies

2.5.1 Willingness to pay to offset CO_2 emissions by air travel passengers

The study done by Brouwer *et al.* (2008) examined the demand for climate change mitigation in order to establish how much air travel passengers are willing to pay to offset their CO_2 based on the polluter pays principle. The economic valuation method used in this study was the contingent valuation method using surveys containing questions regarding individual perception of attitudes to and the willingness to pay a carbon tax to offset their carbon footprint (Brouwer *et al.*, 2008:303).

The result of the study indicated that three quarters of air travel passengers are willing to pay a carbon tax in addition to their airplane ticket (Brouwer *et al.*, 2008:309). A statistical analysis of the data indicated that 75 per cent of the approximately 400 air travel passengers that were interviewed were willing to pay on

average 25 euros per ton of CO_2 emitted (Brouwer *et al.*, 2008:310). The results also indicate that air travel passengers who are willing to pay a carbon tax are motivated to do so because they feel that they have a moral obligation and a responsibility to pay for their contribution to climate change (Brouwer *et al.,* 2008:305). The main reason why other air travel passengers are not willing to pay a carbon tax is because they are of the opinion that carbon travel tax and programs such as trees for travel will not have any significant impact on the environment (Brouwer *et al.,* 2008:305).

2.5.2 Willingness to pay to protect coral reefs in Mexico

The study done by Casey *et al.* (2010) determined whether or not tourists visiting Riviera Maya in Mexico are willing to pay an entrance fee to enhance and safeguard the coral reefs found in this area. The economic valuation method used in this study was the contingent valuation method using a survey consisting of four sections (Casey *et al.*, 2010:560). Section one of this survey covered general demographic information, section two related to scuba diving and snorkelling, section three focused on the valuation of the coral reefs and determining the willingness to pay to protect the coral reefs in the future and section four recorded the reasons for the answers that the respondents provided (Casey *et al.,* 2010:561).

The willingness to pay[7] for the protection of the coral reefs in Mexico is summarised in *Table 2.2.* The results of this study indicated that tourists visiting Riviera Maya are willing to pay an entrance fee in order to protect the coral reefs but only if they were guaranteed that the money will be used for this initiative (Casey *et al.,* 2010:570). Of the tourists that were asked if they are willing to pay additional charges for the coral reefs to preserve it, 64.39 per cent indicated that they are willing and 35.61 per cent indicated that they are not willing to pay additional charges (Casey *et al.*, 2010:570*).*

[7]Different bid levels of between $5 and $100 were introduced.

Table 2.2: Willingness to pay responses by fee amount

Amount willing to pay in $	Percentage of respondents willing to pay
$5	97.30%
$10	83.33%
$25	69.84%
$50	45.59%
$100	22.73%

Source: Casey et al., 2010:568-569.

2.5.3 Paying for mitigation: A multiple country study.

The objective of the study conducted by Carlsson *et al.* (2010) was to determine whether or not citizens from China, America and Sweden are willing to pay in order to reduce CO_2 emissions by 30, 60 and 85 per cent by the year 2050. The data for this study were obtained through a survey that was distributed in various cities of China, Sweden and America. In China, respondents were invited to complete the questionnaire and in Sweden and America the questionnaire was available online. The method used in this study was the contingent valuation method. The survey consisted of four independent sections. Section one covered general principles of climate change, section two evaluated respondents' attitudes on reducing CO_2 emissions, section three presented a choice experiment regarding rules for allocating responsibilities for CO_2 reductions and section four contained questions about the respondent's socioeconomic characteristics (Carlsson *et al.,* 2010:3). *Table 2.3* reports the resulting monthly willingness to pay for China, Sweden and America.

The results of the study as seen in *Table 2.3* indicate that respondents in Sweden had a higher willingness to pay for a 30 per cent reduction in CO_2 than those in both the United States and China. The respondents in the United States and China are willing to give up more or less the same share of their income where Swedes are more willing to give up a larger share of their income. When considering an 85 per

cent reduction in CO_2, the Swedes, Americans, and Chinese are willing to pay 1.6, 1.1 and 0.9 per cent of their income respectively in order to reduce CO_2.

Table 2.3: Monthly household WTP in dollars

	Sweden		United States		China	
	Mean	Share of Income	Mean	Share of Income	Mean	Share of Income
30% Reduction	$21.70	0.007	$17.27	0.005	$4.99	0.004
60% Reduction	$39.54	0.012	$27.95	0.008	$8.32	0.007
85% Reduction	$54.24	0.016	$36.43	0.011	$11.18	0.009

Source: Carlsson, 2010:10

2.5.4 Willingness to pay for biomass ethanol

Solomon and Johnson did a study in 2009 on the willingness to pay for biomass ethanol. The main objective of this study was to estimate the WTP for cellulosic[8] ethanol[9] as a means to assess environmental non-market values for mitigating climate change (Solomon and Johnson, 2009:2139). A CVM survey was compiled and distributed in Michigan, Minnesota and Wisconsin. The survey consisted of two sections. The first section covered questions concentrating on the awareness of climate change and section two consisted of questions relating to ethanol fuel. A total of 1500 surveys were mailed out to respondents. The response rate for the survey was 52 per cent with 745 surveys received back. *Table 2.4* illustrates the survey responses relating to some of the questions asked in section one of the survey. It indicates that, of the 667 surveys that were usable, the respondents do

[8]Cellulosic ethanol is chemically identical to first generation bioethanol (i.e. CH_3CH_2OH). However, it is produced from different raw materials via a more complex process (cellulose hydrolysis). In contrast to first generation bioethanol, which is derived from sugar or starch produced by food crops (e.g. wheat, corn, sugar beet, sugar cane, etc), cellulosic ethanol may be produced from agricultural residues (e.g. straw, corn stover), other lignocellulosic raw materials (e.g. wood chips) or energy crops (miscanthus, switchgrass, etc).

[9]Ethanol can be defined as clean, renewable fuel.

believe that climate change is happening but they do not concur on the causes of climate change.

In this study the values were averaged regarding how much consumers were willing to pay extra for cellulosic ethanol. The results of this study indicated that, on average, 83.8 per cent of respondents were not willing to pay extra for cellulosic ethanol. Approximately 50 per cent of respondents were willing to pay $0.20 extra and 40 per cent were willing to pay approximately $0.25 extra per gallon of fuel.

There are many ways for individuals to respond to climate change and how to lower emissions of CO_2 and other greenhouse gases. This study done by Solomon and Johnson (2009) indicates that, in the Midwestern part of the United States, the public willing to mitigate climate change is ready to begin the long process of converting its energy system to non-carbon sources - action that will reinforce recent federal energy policy initiatives to accelerate this transition.

Table 2.4: Survey responses to climate change.

Survey statement	Mean of the Likert[10] scale responses
Climate change is not going to happen	1.8
The ecological crisis facing humans has been greatly exaggerated	2.5
We can't stop climate change because it is not happening	1.9
Climate change is part of a natural cycle beyond human control	2.9
Rapid increases in greenhouse gases are causing climate change	3.8
Climate change is caused by burning dirty fuel	3.6

[10] 1=strongly disagree; 2=somewhat disagree; 3=neither agree nor disagree; 4=somewhat agree; 5=strongly agree.

Survey statement	Mean of the Likert scale responses
CO_2 emissions are one of the major causes of climate change	3.7
Saving energy is a way to stop climate change	3.9
I would be willing to pay 40 cents more per gallon of gasoline if the money was used to stop climate change	2.7
I can afford to pay more for gasoline and other fossil fuels if the increases are used to stop climate change	2.8
I don't support increasing gasoline prices in order to stop climate change because many people can't afford it	3.6

Source: Solomon and Johnson, 2009:2141

2.5.5 Consumers' willingness to pay for organic food

A study done by Krystallis and Chryssohoidis (2005) aimed to determine how much consumers in Greece are willing to pay for organic food products while reflecting consumers' concerns regarding the ethical behaviour of how food is produced. In order to achieve their objective, a structured questionnaire was designed to determine if consumers in Greece are aware of organic food and whether or not they are willing to pay extra for these types of foods using the contingent valuation method.

The data for this study was obtained through a questionnaire that was distributed at the end of July 2003. The questionnaire in this study consisted of two sections. Section one evaluated food purchase frequency, what factors influence consumer purchasing and trust related to certain merchants. Section two consisted of a list of 16 products where respondents had to indicate which products they buy and whether these products are organic. The last question of section two asks whether or not consumers are willing to pay extra to buy organic food.

Purchasers were approached during their food shopping in outlets of retail chains in three different areas in Athens. Of the 165 respondents, 31.7 per cent were younger than 34 years of age, 50 per cent attended university and 73.8 per cent were female. Furthermore, the results indicated that 36.9 per cent of consumers are unwilling to

pay anything above the standard price for goods and 63.1 per cent on average are willing to pay extra for organic food.

Overall, organic fruit and vegetables are perceived to be different from other foods in the food categories and consumers are therefore more willing to pay for organic products. Consumers are more willing to pay extra for organic fruit and vegetables.

2.5.6 Achieving voluntary reductions in the carbon footprint of tourism and climate change

The main objective of this study conducted by McKercher, Prideaux, Cheung and Law (2010) was to examine the attitudes of Hong Kong residents towards climate change and tourism and their willingness to pay to modify travel behaviour in order to reduce the environmental impact thereof. The secondary objectives of this study were to: 1) identify, by taking into account segments based on frequency and travel destination, a specific traveller; 2) identify the level of climate change concern felt by Hong Kong residents and 3) identifying whether or not the concern Hong Kong residents are feeling towards climate change is contributing to them changing their travel habits.

The data for this study were obtained through a randomised telephone survey using a computer-assisted telephone interview system. More than 8000 phone calls were made but after cleaning up the data only 859 of the sample cases were usable. The survey consisted of four sections: Section A established travel activity over the last twelve months. Section B tested the respondents' level of environmental awareness. Section C determined attitudes on tourism and the environment and section D collected demographic information.

Section A categorized respondents in four groups: regular international tourists, active tourists, regional Chinese tourists and infrequent tourists. It was established that 45.3 per cent of regular international tourists were willing to make a contribution to reduce the carbon impact of their holiday versus 42.3 per cent of active tourists, 37.7 per cent of regional Chinese tourists and 35.1 per cent of infrequent tourists. Regular international travellers were most aware of their environmental impact but also the least likely to change their behaviour – only 23 per cent indicated that they would travel less by plane to reduce their carbon footprint. Infrequent tourists, on the other hand, were more willing to travel less by plane (41.9 per cent) than any of the

other tourist groups. Approximately 59 per cent indicated that they would prefer to make a voluntary payment rather than pay a mandatory tax.

2.5.7 Running the green race: WTP evidence from the Two Oceans Marathon 2011.

The aim of the study done by Krugell and Saayman (2011) was to extend the scope of the current literature on willingness to pay for green products and services to sports events. The research question was whether or not runners are willing to pay more to compete in a sustainable event.

The data for this study was obtained through a structured questionnaire that was distributed at the Two Oceans Marathon in 2011. A total of 502 questionnaires were completed and used in this particular study. Of the respondents, 63 per cent were male and 35 per cent female. The average age was 38 years and 57 per cent of athletes were English-speaking. Of the 502 respondents, 11 per cent did not complete the question on willingness to pay, 27 per cent clearly indicated that they are not willing to pay extra and 62 per cent indicated that they are willing to pay extra for a sustainable event.

Furthermore, it was established that 22 per cent of the respondents were willing to pay an additional R10, 12 per cent R30 and 19 per cent were willing to pay R50 over and above the registration fee of the race. Besides the bid amounts that were given, a question was asked regarding the maximum amount that athletes are willing to pay for a sustainable event. Sixty per cent of respondents completed this question and their average maximum premium for a "green" event was R83 in addition to the entrance fee.

2.5.8 Willingness to pay for climate policy: a review of the estimates

The objective of the study done by Johnson and Nement (2010) was to survey estimates of the willingness to pay for climate policy in order to determine the validity of this explanation, to compare different methods and to explain factors that might influence willingness to pay. This study evaluated previous studies on willingness to pay, including: Wiser (2007), Yoo and Kwak (2009), MacKerron et al. (2009), Solino *et al.* (2009), Zografakis *et al.* (2009), Bergmann *et al.* (2006) Tseng and Chen (2008) Li *et al.* (2009), Berk and Fovell (1999), Berrens and Bohara (2004), Hoyos and Longo (2009) Solomon and Johnson (2009), Viscusi and Zeckhuiser (2006),

Normura and Akai (2004) Carlsson *et al.* (2010), Longo *et al.* (2008), Layton and Brown (2000), and Cameron (2002).

Johnson and Nement (2010) found that the mean amount that respondents were willing to pay for climate policy was $167 with a minimum amount of $22 and a maximum amount of $437.

2.6 Summary

This chapter aimed to highlight the theory behind the tragedy of the commons and the findings of main international literature regarding individuals' willingness to pay to safeguard the environment.

The tragedy of the commons as explained by Hardin (1968) has become a metaphor for the problems of overuse and degradation of common resources caused by individuals (Bateman *et al.*, 2003:19). Individuals tend to utilise the environment in their own way by using and disposing of environmental goods as if the environment belonged to everyone and was in unlimited supply (Rose, 1991:3). Unsustainable consumption of common resources by individuals makes these resources unavailable for other individuals in the future (Ostrom, 1999:497).

In order to determine the value of a common non-market resource, two basic principles need to be kept in mind. The first is that the costs and benefits of a common non-market resource need to be determined and secondly, the value of these common non-market resources needs to be expressed in monetary terms (Bateman *et al.,* 2003:15). These basic principles can be achieved by making use of valuation methods which mostly rely upon individual behaviour and preferences (Bateman *et al.,* 2003:15). Three types of valuation methods are used in order to value environmental goods. These include: the travel cost method, the contingent valuation method and the hedonic pricing method (Bateman *et al.,* 2003:17). International studies done by Casey *et al.* (2010), Brouwer *et al.* (2008), Carlsson *et al.* (2010), Solomon and Johnson (2009) and Krystallis and Chryssohoidis (2005) on the willingness to pay for green consumer behaviour all used the contingent valuation method in order to apply a monetary value to common non-market resources. The CVM is preferred to the hedonic pricing and travel cost methods due to its flexibility and ease of analyses. *Table 2.5* summarises the outcomes of these international studies.

Table 2.5: Willingness to pay case studies summarised

Author (Year)	Objective	Method	Results
Casey *et al* (2010)	The objective of this study was to determine whether or not tourists visiting Riviera Maya in Mexico are willing to pay an entrance fee to enhance and safeguard the coral reefs found in this area.	CVM	The results of this study indicated that tourists visiting Riviera Maya are willing to pay an entrance fee in order to protect the coral reefs but only if they were guaranteed that the money will be used for this initiative. 97.30 per cent of the respondents were willing to pay $5 to protect the coral reefs while 83.33, 69.84, 45.59 and 22.73 per cent of the respondents were willing to pay $10, $25, $50 and $100 respectively to protect the coral reefs.
Brouwer *et al* (2008)	The objective of this study was to examine the demand for climate change mitigation in order to establish how much air travel passengers are willing to pay to offset their CO_2 based on the polluter pays principle.	CVM	Three quarters of air travel passengers are willing to pay a carbon tax in addition to their airplane ticket. 75 per cent of air travel passengers are willing to pay on average 25 euros per ton of CO_2 emitted
Carlsson *et al* (2010)	The objective of this study was to determine whether or not citizens from China, America and Sweden are willing to pay in order to reduce CO_2 emissions by 30, 60 and 85 per cent by the year 2050.	CVM	Sweden has a higher willingness to pay for a 30 per cent reduction in CO_2 than the United States and China. The United States and China are willing to give up more or less the same share of their income where Swedes are more willing to give up a larger share of their income. Thus, Swedes, Americans, and Chinese are willing to pay 1.6, 1.1 and 0.9 per cent respectively of their income in order to reduce CO_2.

Author (Year)	Objective	Method	Results
Solomon and Johnson (2009)	The main objective of this study was to estimate the WTP for cellulosic ethanol as a means to assess environmental non-market values for mitigating climate change.	CVM	83.8 per cent of respondents were not willing to pay extra for cellulosic ethanol in order to mitigate climate change. 50 per cent of respondents were willing to pay $0.20 extra and 40 per cent were willing to pay approximately $0.25 extra.
Krystallis and Chryssohoidis (2005)	The objective was to determine if Greek consumers are willing to pay extra for organic food products while reflecting consumers' concerns regarding the ethical behaviour on how food is produced.	CVM	31.7 per cent of respondents were unwilling to pay extra for organic food while 63.1 per cent of the respondents were willing to pay extra for organic food. Respondents were also more willing to pay extra for organic fruit and vegetables in comparison with other food categories.
McKercher, Prideaux, Cheung, Law (2010)	The main objective of this study was to examine the attitudes of Hong Kong residents towards climate change and tourism and their willingness to pay to modify travel behaviour in order to reduce the environmental impact thereof.	Cluster analysis & CVM	45.3 per cent of regular international tourists were willing to make a contribution to reduce the carbon impact of their holiday versus 42.3 per cent of active tourists, 37.7 per cent of regional China tourists and 35.1 per cent of least travel active tourists. Approximately 59 per cent indicated that they would prefer to make a voluntary payment rather than pay a mandatory tax.
Kruger, Saayman (2011)	The objective of this study was to extend the scope of the current literature on willingness to pay for green products and services to sports events.	CVM	27 per cent indicated that they are not willing to pay extra and 62 per cent indicated that they are willing to pay extra for a sustainable event.

Author (Year)	Objective	Method	Results
Johnson, Nement (2010)	The aim of this study was to survey estimates of the willingness to pay for climate policy in order to determine the validity of this explanation, to compare different methods and to explain factors that might influence willingness to pay.	Various	After taking into account the results of the different studies they found that the mean amount that respondents were willing to pay for climate policy was $167 with a minimum amount of $22 and a maximum amount of $437.

In the last 50 years, key questions have been asked with regards to which variables determine environmentally friendly (green) consumer behaviour. It was found that demographic variables have the largest impact on green consumer behaviour. These variables include age, gender, income and education. It was found that individuals who are either younger, female or have a higher income are more likely to be "green" consumers. There have been mixed findings on education and whether or not it is positively or negatively related to green consumer behaviour. To conclude, literature studies found that several demographic variables influence green behaviour and in all studies the majority of consumers are willing to pay extra in order to mitigate climate change. *Chapter 3* will establish how "green" day visitors who visited Spier in 2011 are and whether or not they are willing to pay extra to mitigate climate change.

Chapter 3

Data Description

3.1 Introduction

Chapter two provided an overview of the international and South African literature regarding consumers' willingness to pay for climate change mitigation and green products and services.

In the last half century, key questions have been raised with regards to which variables influence environmentally friendly (green) consumer behaviour and various studies have addressed these questions. It was found that demographic variables are significant predictors of green consumer behaviour. These include age, gender, income and education. Literature suggests that the method most commonly used to determine a consumer's willingness to pay is the contingent valuation method. Taking into account the different case studies, it was found that most consumers are willing to pay extra in order to mitigate climate change, consume green products and services, although some consumers are more willing to pay than others.

This chapter explains the rationale behind the questions in this study and describes the raw data.

3.2 The questionnaire

A basic structured questionnaire was designed to gather primary data regarding the green behaviour of day visitors at Spier. Spier is a wine farm located in the Western Cape situated in the heart of the Cape winelands which produces award-winning wines. All the facilities at Spier, including the conference facilities, four star hotel, restaurants and the cheetah and eagle conservation outreach centre strive towards sustaining the environment. The reason Spier wine farm was selected for this study is due to its commitment to several green initiatives.

The questionnaire was designed for Spier by the Institute of Tourism and Leisure Studies at the North-West University where a report was compiled on a basic profile

of day visitors at Spier. The survey was conducted from 19 to 26 February 2011. Prior to the distribution of surveys fieldworkers are trained on how to approach respondents and are provided with background regarding the study in order to avoid interview bias. Fieldworks approach respondents randomly on a first-to-pass basis where the objective of the survey and the questionnaire are explained to them.

The questionnaire consisted of two sections (see appendix A). Section A gathered demographic data such as gender, birth year, home language, occupation and province of residence. Section B asked questions regarding the respondents' awareness of green management principles at Spier, the respondents green behaviour at home, the respondents choice of wine farm, and whether they are willing to pay for green accommodation, organic food and organic wine and if so, how much. Overall 20 questions were asked, however, only certain questions were used in this analysis. The questions that were mainly used were the demographic questions and those related to green behaviour.

A total of 160 completed questionnaires (N=160) were used for the purposes of this study. *Table 3.1* provides a layout of the questions with explanations as to why these questions were asked.

Table 3.1: Explanation of questions

Demographic information		
Question		**Explanation**
1	Gender	Demographic information was required to establish a basic profile of a day visitor visiting Spier. The answers also enabled the researcher to differentiate between gender and other factors that predict green behaviour. Province, language, occupation and birth year are interesting factors to consider in determining whether or not visitors from different provinces, age groups, occupation and home language are willing to pay more for green accommodation and/or organic food and wine.
2	Birth year	
3	Resident of Stellenbosch	
4	Province	
5	Home language	
6	Occupation	

"Green" behaviour		
Question		**Explanation**
6	Awareness of "green" management principles at Spier	A day visitor's attitude towards green behaviour at home and whether or not they are aware of Spier's green principles will most likely have a positive impact on whether or not they are willing to pay extra for green accommodation, green food and organic wine. The objective of these questions was to determine if day visitors at Spier practise a green lifestyle and whether or not they are willing to pay extra for green accommodation, food and wine.
7	"Green" behaviour at home	
8	Wine farm choice behaviour	
9	Willingness to pay for "green" accommodation, organic food in restaurants, and organic wine.	
10	Amount visitors are willing to pay extra for "green" accommodation, organic food in restaurants and organic wine.	

3.3 Data description

3.3.1 Demographic information

Key questions in the literature review were related to environmentally friendly (green) consumer behaviour. Studies have examined the characteristics of "green" consumers and the majority of these studies found, when looking at the impact of demographic variables, that demographic variables are the best predictors of green consumer behaviour (Straughan and Roberts, 1999:559).

The raw data obtained from the questionnaire are presented in *Figures 3.1 to 3.6*. *Figures 3.2, 3.4, 3.5* and *3.6* indicate the frequency of each answer per question for day visitors at Spier while *Figure 3.1* and *3.3* indicate the percentage of each answer per question. *Chapter four* will analyse these variables in order to determine if these demographic variables are significant predictors of a consumer's willingness to pay.

The male:female ratio is illustrated in *Figure 3.1* where 59.6 per cent of the respondents are female and 39.8 per cent are male. When looking at the year of birth in *Figure 3.2* it seems that the majority of respondents were born between 1970 and

1986, meaning that they are now between the ages of 25 and 41. The mean year of birth is indicated as 1973, thus the average age for a day visitor at Spier is 38 years.

Figure 3.1: Male:female ratio

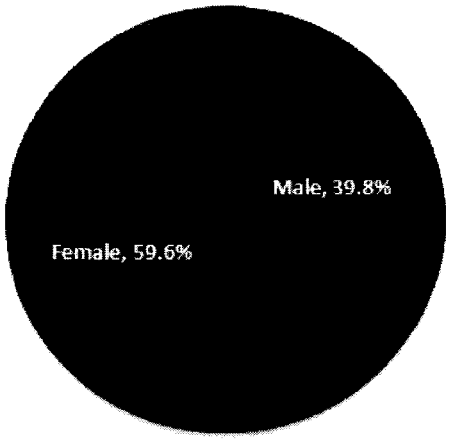


Figure 3.2: Age distribution of respondents

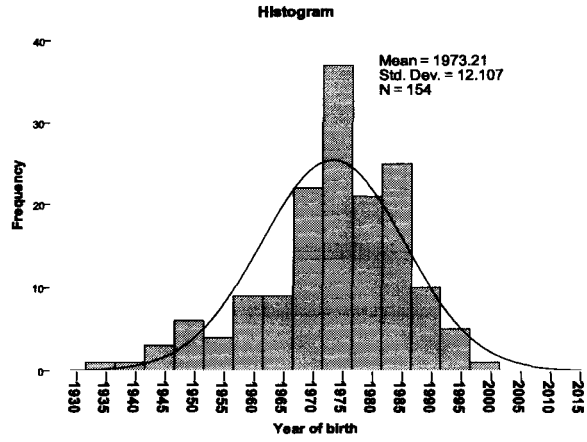


Figure 3.3: Stellenbosch residence

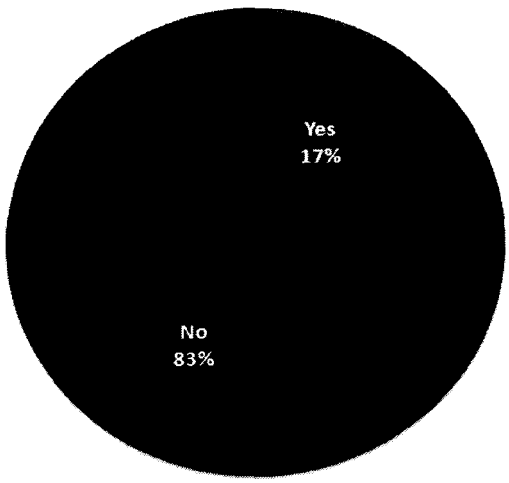


Figure 3.3 indicates that 83 per cent of the respondents are not from Stellenbosch but when looking at the distribution of respondents over provinces (*Figure 3.4*) it is clear that the majority of respondents reside in the Western Cape (57.6 per cent). Approximately seven per cent of respondents reside in Gauteng, four per cent in the Eastern Cape, one per cent in the Northern Cape, three per cent in KwaZulu Natal and one per cent in the Free State. It needs to be noted that there were no respondents from the Limpopo, Mpumalanga or North West provinces in this sample. Approximately 26.70 per cent of respondents were foreigners residing outside South Africa in countries such as the United Kingdom, the United States of America, Belgium and Germany. At the time when the questionnaire was distributed it was off-season and therefore not during the school holidays. During the school holidays there would possibly be more visitors from other South African provinces as these residents come to the Cape for their vacation. *Figure 3.5* indicates home language. Of all the respondents, 62 per cent

were English speaking, while 31 per cent were Afrikaans speaking. Only seven per cent of the respondents spoke other languages including German, Dutch, Danish, Flemish, Polish and Sepedi.

Figure 3.4: Province of origin

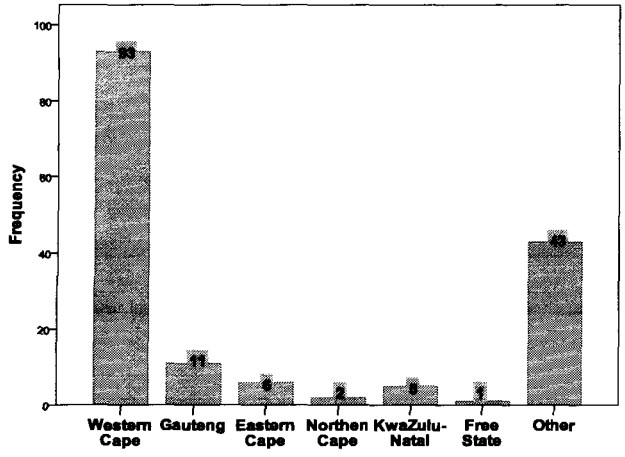


Figure 3.5: Home language

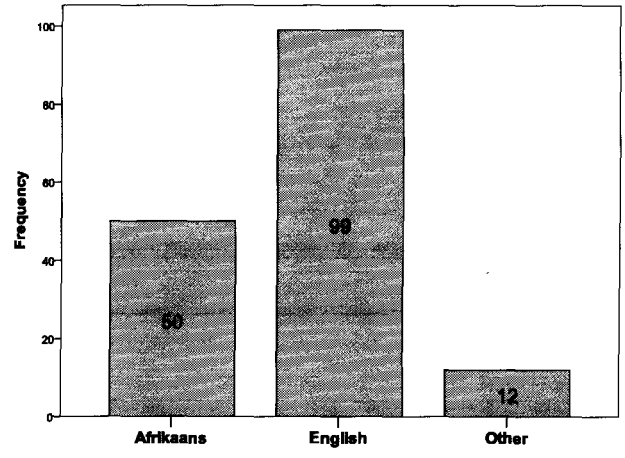
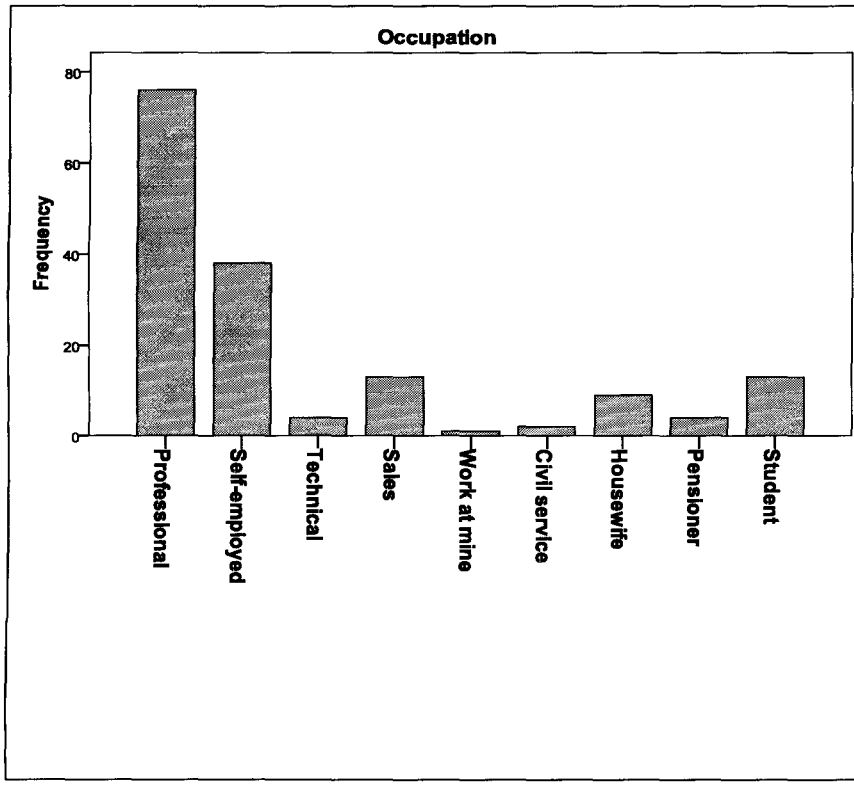


Figure 3.6: Occupation



Professional	47%
Self-employed	23%
Technical	3%
Sales	8%
Mining	1%
Civil service	1%
Housewife	6%
Pensioner	3%
Student	8%

Figure 3.6 indicates the different occupation groups of the respondents. The majority were professionals (47 per cent) and self-employed (23 per cent). Professionals can be defined as individuals who specialise in a specific field such as medical doctors, lawyers and engineers.

To conclude, from the demographic information it seems that the profile of an average day visitor at Spier is a professional English-speaking female residing in the Western Cape.

3.3.2 "Green" behaviour

The Greendex survey carried out by National Geographic was discussed in *chapter two* and indicated that consumers in developed countries such as America, Canada, and Britain do not follow a green lifestyle. Factors that negatively impacted on the Greendex score of these countries, were the excessive use of air conditioners, energy production using gas and coal, the use of cars and trucks and the use of bottled water. Factors that were positively related to a country's Greendex score included consumption of biofuel, energy-saving televisions and locally grown food. The question is, how green is the average day visitor at Spier?

In the tables that follow, the respondents are grouped according to whether they are positively (chose the options agree or totally agree) inclined towards the question or negatively inclined (chose the options disagree or totally disagree) with the majority opinion being reported. These groupings can then be used to compare the responses of those with dissenting opinions and ignore the responses of those who stated they felt neutral about the statement or question. Where the dissenting opinions carry similar weight, both negative and positive groups are reported.

The raw data obtained from the questionnaire is presented in *Tables 3.1* to *3.6*. *Tables 3.1* and *3.5* present the result of the likert scale questions regarding applying green principles at home and whether consumers will visit environmentally friendly wine farms. *Tables 3.2, 3.3, 3.4* and *3.6* present the results indicating which green principles consumers agree and disagree with. *Chapter 4* analyses the behaviour of these respondents.

Spier wine farm has developed a distinctive approach to business which strives to balance prosperity with social and environmental aims and is a front-runner in sustaining green business practice. Spier recycles 100 per cent of its waste-water,

which is then used to irrigate their gardens, and makes use of biodynamic farming practices recycling 80 per cent of their solid waste. The first question asked was whether the day visitor at Spier was aware of their green initiatives and whether it is a deciding factor in choosing to visit Spier?

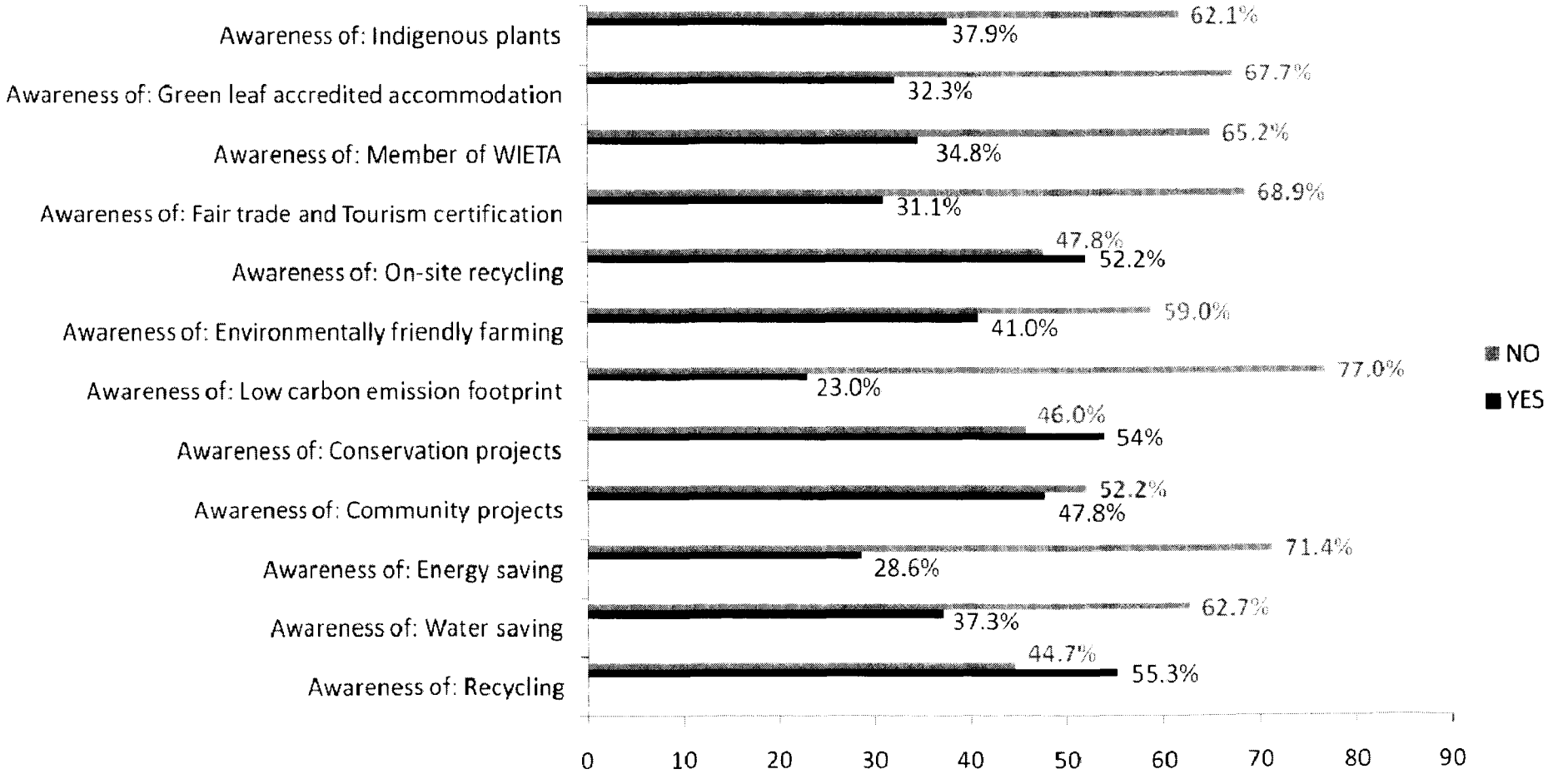
Figure 3.7 indicates the awareness of "green" behaviour at Spier. Overall it seems that day visitors are not aware of Spier's green initiatives. On average, 39.6 per cent of respondents answered "yes" and 60.4 per cent answered "no" to the twelve green awareness questions that were asked. Of all the respondents, 55 per cent are aware of their recycling efforts, 54 per cent of their conservation projects, and 52 per cent of their on-site recycling messages. Only the awareness questions on recycling, on-site recycling messages and conservation projects received more yes than no responses. Over 60 per cent of respondents were not aware of Spier's water and energy-saving methods, their low carbon emission footprint, Fair Trade and Tourism certification, accredited membership of WIETA[11], Green Leaf[12] standards and the majority of indigenous plants in their gardens. When looking at the overall Green awareness of Spier it seems that "greenness" is not a factor influencing the choice of the day visitor when visiting a wine farm such as Spier.

The individual's relationship with the environment is complicated and contradictory. On the one side, individuals depend on the environment for their livelihoods and production but on the other side individuals pollute, destroy and utilise the environment in a way that is not sustainable. Consumer choice is one of the most important and basic economic principles (Mohr and Fourie, 2007). If consumers are not willing to take into account what the social cost of their unsustainable utilisation of resources is on the environment, consumer behaviour will inevitably contribute to high ecological costs. It is therefore important to look at the behaviour of consumers to see if they are environmentally friendly and thereby contributing to a sustainable environment. *Table 3.1* indicates the practice of "green" principles at home for day visitors at Spier.

[11] WIETA: Wine Industry Ethical Trade Association.

[12] Green leaf accredited: The Green Leaf Environmental Standard is an international standard that measures *green accommodation, green business, green products, green conferencing and green events.*

Figure 3.7: Day visitor awareness of green initiatives at Spier



Overall, when looking at *Table 3.2*, it seems that the majority of respondents do engage in green behaviour since an average of 46.3 per cent agreed or totally agreed with all the statements versus 20.8 per cent who disagreed or totally disagreed.

Table 3.2: Do day visitors at Spier apply green principles at home?

	Not Important	Totally disagree	Disagree	Neutral	Agree	Totally agree
At home, I recycle waste products such as cans, bottles and papers.	9.8%	9.3%	8.1%	13.7%	19.3%	39.8%
At home, I use recycled paper products.	11.2%	7.5%	8.1%	19.9%	26.6%	26.7%
At home, I use energy-saving light bulbs.	10.6%	4.3%	3.7%	10.6%	27.3%	43.5%
At home, I maximise the use of natural light and open windows to reduce the use of energy.	11.8%	3.1%	5.0%	12.4%	24.8%	42.9%
At home, I make use of a solar panel geyser to reduce the use of electricity.	13.6%	44.1%	10.6%	17.4%	8.1%	6.2%
At home, I make use of low-flow showerheads and toilets.	15%	25.5%	6.8%	16.1%	20.5%	16.1%
At home, I switch off and unplug unused electronic equipment and appliances.	12.5%	4.3%	5.0%	13.0%	26.7%	38.5%
I plant indigenous plants in my garden.	14.%3	14.9%	7.5%	24.2%	12.4%	26.7%
I have proper insulation and reflective roof coverings.	16.1%	12.4%	8.1%	16.8%	21.1%	25.5%

	Not Important	Totally disagree	Disagree	Neutral	Agree	Totally agree
I wash my laundry in cold water instead of hot water.	14.2%	9.9%	7.5%	16.8%	12.4%	39.1%
To save energy, I lower the temperature of my hot water geyser.	13.6%	7.5%	5.6%	17.4%	19.9%	35.4%
To reduce water use, I prefer to take showers.	14.9%	7.5%	3.1%	8.1%	17.4%	50.3%
When at home, I switch off the lights in rooms when unoccupied.	14.9%	1.9%	0.6%	4.3%	19.3%	59.0%
At home, I recycle food waste products to create compost for gardening or other purposes.	14.9%	23.0%	10.6%	20.5%	9.3%	21.7%
At home, I collect rain water that forms part of recycling.	13.5%	31.1%	13.7%	23.0%	7.5%	11.2%
When at home, I tend to buy bulk products to reduce packaging.	15.6%	16.1%	9.3%	29.2%	13.7%	16.1%
At home, I prefer to use eco-friendly cleaning products.	14.1%	11.2%	10.6%	29.8%	19.3%	14.9%
I prefer low carbon emission vehicles or green vehicles.	16.8%	11.8%	15.5%	24.8%	11.8%	19.3%
I support conservation efforts, for example owning a Nedbank Green Affinity credit card.	17.5%	22.4%	9.9%	21.7%	13.0%	15.5%
I use ozone-friendly aerosols, for example hair spray, deodorants, air fresheners, etc.	16.2%	6.2%	6.2%	21.1%	18.6%	31.7%

	Not Important	Totally disagree	Disagree	Neutral	Agree	Totally agree
I use environmentally friendly washing powders, dishwashing soaps, etc.	14.2%	8.1%	9.3%	28.6%	19.9%	19.9%
I switch off my geyser during the day, to save energy.	17.5%	21.7%	12.4%	18.6%	4.3%	25.5%
At home, I encourage my kids/wife/husband/partner to be more eco-friendly and save energy.	13%	5.6%	5.0%	21.1%	23.6%	31.7%
I take bags from home when I go shopping.	12.5%	12.4%	6.2%	18.6%	14.9%	35.4%
I consider myself environmentally friendly.	11.8%	1.9%	6.8%	25.5%	27.3%	26.7%

Summarised in *Table 3.3* are the green principles respondents agreed and totally agreed with when it came to applying these principles at home. For eleven of the principles, over 60 per cent of respondents agreed or totally agreed that they apply the following at home: maximise the use of natural light; switch off unused electronic equipment and appliances; prefer showers; use energy-saving light bulbs; switch off lights in unoccupied rooms; recycle; wash laundry with cold water instead of hot; use ozone-friendly aerosols and encourage loved ones to be environmentally friendly. 61.3 per cent of respondents feel that they are environmentally friendly.

Summarised in *Table 3.4* are the green principles respondents disagreed or totally disagreed with when it came to applying green principles at home. 54.7 per cent of respondents do not have a solar panel geyser. The reason for this may be that solar panel geysers in South Africa are still relatively expensive and cost between R4000 and R18 000. Furthermore, the results indicated that respondents do not collect rain water (44.8 per cent), a factor that is unexplainable because it is not cost sensitive.

Table 3.3: Green principles applied at home: agree or totally agree

At home, I recycle waste products such as cans, bottles and papers.	59.1%
At home, I use recycled paper products.	53.3%
At home, I use energy-saving light bulbs.	70.8%
At home, I maximise the use of natural light and open windows to reduce the use of energy.	67.7%
At home, I switch off and unplug unused electronic equipment and appliances.	65.2%
I plant indigenous plants in my garden.	39.1%
I have proper insulation and reflective roof coverings.	46.6%
I wash my laundry in cold water instead of hot water.	51.5%
To save energy, I lower the temperature of my hot water geyser.	55.3%
To reduce water use, I prefer to take showers.	67.7%
When at home, I switch off the lights in rooms when unoccupied.	78.3%
At home, I prefer to use eco-friendly cleaning products.	34.2%
I use ozone-friendly aerosols, for example hair spray, deodorants, air fresheners, etc.	50.3%
I use environmentally-friendly washing powders, dishwashing soaps, etc.	39.8%
At home, I encourage my kids/wife/husband/partner to be more eco-friendly and save energy.	55.3%
I take bags from home when I go shopping.	50.3%
I consider myself environmentally friendly.	54.0%

Table 3.4: Green principles applied at home: disagree or totally disagree

At home, I make use of a solar panel geyser to reduce the use of electricity.	54.7%
At home, I collect rain water that forms part of recycling.	44.8%

Table 3.5 contains the green principles that showed less than five per cent difference between the respondents who agreed or totally agreed and the respondents who disagreed or totally disagreed when it came to applying these principles at home. The distribution of answers by respondents who agreed and totally agreed and the respondents who disagreed and totally disagreed are similar with regards to the use of low-flow shower heads and toilets, the recycling of food waste, buying bulk in order to reduce packaging, preferring green vehicles, supporting green initiatives and switching off of the geyser during the day in order to save energy.

Table 3.5: Green principles indicating under 5 % difference between agree or totally agree and disagree or totally disagree

	Disagree or totally disagree	Agree or totally agree
At home, I make use of low-flow showerheads and toilets.	37.9%	43.1%
At home, I recycle food waste products to create compost for gardening or other purposes.	39.4%	36.4%
When at home, I tend to buy bulk products to reduce packaging.	30.1%	35.3%
I prefer low carbon emission vehicles or green vehicles.	32.9%	37.3%
I support conservation efforts, for example owning a Nedbank Green Affinity credit card.	39.2%	34.6%
I switch off my geyser during the day, to save energy.	41.3%	36.1%

Tables 3.2 to *3.5* indicate consumers' green principles which they apply at home. *Table 3.6* on the other hand indicates whether or not consumers are willing to buy

wine or visit wine farms that are environmentally friendly. This includes taking into account factors such as recycling, eco-friendly encouragement, energy-saving technology and supporting green initiatives.

Table 3.6: Green wine farm choice behaviour.

	Not important	Totally disagree	Disagree	Neutral	Agree	Totally agree
If available, I would choose a wine farm with recycling programmes.	18.6%	6.2%	1.9%	24.2%	25.5%	23.6%
If available, I would choose a wine farm that uses recycled paper products.	19.8%	7.5%	2.5%	21.7%	26.1%	22.4%
If available, I would choose a wine farm when they support an environmental NGO, for example WWF (World Wildlife Foundation).	19.3%	5.6%	3.1%	20.5%	24.8%	26.7%
If available, I would choose a wine farm that uses energy-saving light bulbs.	19.9%	6.8%	3.1%	27.3%	19.3%	23.6%
If available, I would choose a wine farm if guests are encouraged to be eco-friendly.	19.9%	3.7%	4.3%	24.2%	19.9%	28.0%
If available, I would choose a wine farm that makes use of energy-efficient appliances.%	20.5%	5.0%	4.3%	24.2%	23.0%	23.0%
If available, I would consider a green wine farm in terms of convenience (e.g. easily accessible, well known).	20.5	5.0%	4.3%	21.1%	28.0%	21.1%
If available, I would consider a green wine farm that would enable me to protect the environment when travelling.	20.5	4.3%	3.1%	27.3%	25.5%	19.3%
If available, I would consider a wine farm that offers organic, fresh and healthy foods to their guests.	21.2	4.3%	2.5%	16.8%	24.8%	30.4%
If available, I would choose a wine farm that uses ecological arguments in its marketing campaign.	21.1	5.6%	2.5%	27.3%	22.4%	21.1%
If available, I would choose a wine farm that organises or sponsors environmental protection activities.	21.8	5.6%	2.5%	24.2%	21.1%	24.8%

	Not Important	Totally disagree	Disagree	Neutral	Agree	Totally agree
If available, I would choose a wine farm that has a low carbon emission footprint.	20.5	6.2%	3.1%	21.1%	26.1%	23.0%
If available, I would choose a wine farm that recycles water and implements it in irrigation.	21.7	5.0%	4.3%	16.8%	23.0%	29.2%
If available, I would choose wine farms that use recycled glass as crockery in restaurants and wine tasting events.	21.7	5.6%	3.1%	26.1%	19.9%	24.2%
If available, I would choose wine farms that sell organic wine which is less harmful to the environment.	21.1%	8.1%	3.1%	24.2%	18.6%	24.8%
If available, I would choose wine farms that encourage their staff to be environmentally friendly.	21.2%	4.3%	4.3%	19.9%	20.5%	29.8%
If available, I would choose wine farms that implement environmentally friendly farming practices.	22.3%	5.0%	3.7%	16.8%	21.1%	31.1%

Table 3.7 summarises the results in *Table 3.6* of green wine farm choice behaviour and indicates the results of the respondents who agreed or totally agreed and the respondents who disagreed or totally disagreed regarding whether or not consumers are willing to buy wine or visit wine farms that are environmentally friendly. The majority of respondents indicated that they agree or totally agree with the statements that were given. Overall it seems that consumers will visit wine farms that recycle, encourage eco-friendly behaviour, make use of energy-saving technology and support green initiatives.

In *Chapter 2* the environment as a common non-market resource was discussed and the literature suggested that price is the ideal measure of scarcity. A monetary value is allocated by means of asking individuals whether or not they are willing to pay for green policy, and green goods and services.

Table 3.7: Green principles applied at home: Agree to totally agree and disagree to totally disagree

	Disagree to totally disagree	Agree to totally agree
If available, I would choose a wine farm with recycling programmes.	8.1%	49.1%
If available, I would choose a wine farm that uses recycled paper products.	10.0%	48.5%
If available, I would choose a wine farm when they support an environmental NGO, for example WWF (World Wildlife Foundation).	8.7%	51.5%
If available, I would choose a wine farm that uses energy-saving light bulbs.	9.9%	42.9%
If available, I would choose a wine farm if guests are encouraged to be eco-friendly.	8.0%	47.9%
If available, I would choose a wine farm that makes use of energy-efficient appliances.	9.3%	46.0%
If available, I would consider a green wine farm in terms of convenience (e.g. easily accessible, well known).	9.3%	49.1%
If available, I would consider a green wine farm that would enable me to protect the environment when travelling.	7.4%	44.8%
If available, I would consider a wine farm that offers organic, fresh and healthy foods to their guests.	6.8%	55.2%
If available, I would choose a wine farm that uses ecological arguments in its marketing campaign.	8.1%	43.5%
If available, I would choose a wine farm that organises or sponsors environmental protection activities.	8.1%	45.9%
If available, I would choose a wine farm that has a low carbon emission footprint.	9.3%	49.1%
If available, I would choose a wine farm that recycles water and implements it in irrigation.	9.3%	52.2%

	Disagree to totally disagree	Agree to totally agree
If available, I would choose wine farms that use recycled glass as crockery in restaurants and wine tasting events.	8.7%	44.1%
If available, I would choose a wine farm that sells organic wine which is less harmful to the environment.	11.2%	43.4%
If available, I would choose wine farms that encourage their staff to be environmentally friendly.	8.6%	50.3%
If available, I would choose wine farms that implement environmentally friendly farming practices.	8.7%	52.2%

Day visitors at Spier were asked whether or not they are willing to pay extra for organic food in restaurants, green accommodation and organic wine. *Table 3.8* presents the results of the respondent's willingness to pay.

Table 3.8: Willingness to pay

	Yes	No
Would you pay extra for organic food	72.30%	27.70%
Would you pay extra for green accommodation	59.40%	40.60%
Would you pay extra for organic wine	59.70%	40.30%

Overall, 63.3 per cent of respondents are willing to pay extra for organic food, green accommodation and organic wine and 36.20 per cent of respondents are not willing to pay extra. It seems that day visitors will more likely be willing to pay extra for organic food (72.30 per cent) than for green accommodation (59.4 per cent) and wine (59.7 per cent).

The next question that needs to be asked is, if these respondents are willing to pay extra for organic food, wine and green accommodation, how much extra are they willing to pay? The results of how much extra these respondents are willing to pay are presented in *Table 3.9.*

Table 3.9: Willingness to pay (in Rand)

	Mean	Min	Max	WTP
Would you pay extra for organic food	116.22	0.00	2,000.00	27.00
Would you pay extra for green accommodation	297.33	0.00	1,500.00	118.00
Would you pay extra for organic wine	39.86	0.00	100.00	16.00

For the respondents who answered this question regarding willingness to pay for organic restaurant food, organic wine and green accommodation, it seems that on average they are willing to pay R27 extra for organic food, R118 for green accommodation and R16 for organic wine. With regards to paying extra for organic food in restaurants, 30.6 per cent of respondents were willing to pay R50 extra, 12.2 per cent R20 extra and 12.2 per cent were willing to pay R100 extra. With regards to organic wine, 24.3 per cent of respondents were willing to pay R10 extra, 13.5 per cent were willing to pay R20 extra and 16.2 per cent were willing to pay up to R50 extra for a bottle of organic wine. With regards to green accommodation, 33.3 per cent of respondents were willing to pay R100 extra, 11.1 per cent R200 extra and 15.6 per cent were willing to pay R500 extra. Overall, it does seem that most day visitors at Spier are willing to pay extra for green accommodation, organic food and organic wine.

3.4 Summary

This chapter explained the rationale behind the questions in the questionnaire and presented a description of the raw data.

With regards to the demographic information of a day visitor at Spier, it seems that they are mainly female, English-speaking and reside in the Western Cape. The majority of the visitors are professionals and are on average 38 years old.

Green behaviour results indicated that visitors are not aware of how green Spier is but overall these visitors live a green lifestyle. Most visitors switch off lights in unoccupied rooms, use energy-saving light bulbs, prefer showers in order to save water, maximise the use of natural light, switch off and unplug unused electronic equipment and appliances, recycle waste products, lower the temperature of their

geysers, encourage loved ones to be environmentally friendly, use ozone-friendly aerosols and use cold water instead of hot water to wash laundry. The majority of visitors will also rather visit a wine farm that recycles, encourages eco-friendly behaviour, makes use of energy-saving technology and supports green initiatives.

When asking the visitors whether or not they are willing to pay extra for green accommodation, organic food and organic wine, on average 63.3 per cent of respondents indicated that they are willing to pay extra but 36.2 per cent of the respondents indicated that they are not willing to pay extra. On average for the respondents who answered the question on how much extra they are willing to pay, the results show that, on average, visitors are willing to pay R118 extra for accommodation, R27 extra for food and R16 extra for wine.

The next chapter analyses the raw data in order to determine which demographic factors influence a visitor's willingness to pay and whether or not statistically significant differences occur between the willingness to pay of residents, genders, occupation groups and age groups.

4

Chapter
Methodology and Empirical Results

4.1 Introduction

The previous chapter explained the rationale behind the questions that were asked in the questionnaire and described the raw data. The demographic profile of an average day visitor at Spier indicates that they are mainly female, English-speaking and reside in the Western Cape. The majority of the visitors are professionals and are, on average, 38 years old.

Green behaviour results indicated that visitors are not aware of the green projects and initiatives of Spier but overall these visitors live a green lifestyle by applying certain green principles at home.

When asking the visitors whether or not they are willing to pay extra for green accommodation, organic food and organic wine, on average 63.3 per cent of respondents indicated that they are willing to pay extra, but 36.2 per cent of respondents indicated that they are not willing to pay extra. On average for the respondents who answered the question on how much extra they are willing to pay, the results show that visitors are willing to pay R118 extra for accommodation, R27 extra for food and R16 extra for wine.

The aim of this chapter is to predict characteristics that influence willingness to pay. This will be achieved by analysing the raw data by making use of cross tabulations, principle component analysis and logistic regressions. The raw data will be analysed in order to determine which demographic factors influence a visitor's willingness to pay and whether or not statistically significant differences exist between the willingness to pay of local and international residents, genders and occupation groups.

4.2 Method

Cross tabulations are used to indicate whether there is a statistical relationship between a set of questions (Field, 2005). Cross tabulations will be used on the data to determine whether or not statistically significant differences occur between day visitors' willingness to pay for green accommodation, organic food or wine with regards to the demographic variables (gender, occupation, home language, and province). The willingness to pay variable was determined was by means of a yes-no[13] format that predicated on whether the respondent was willing to pay for green accommodation, organic food and organic wine.

Secondly, by using the green principle variables, principle component analyses are used to convert seemingly correlated green principle variables into factors that are correlated. The objective of compiling a principle component analysis is to reduce the number of variables and to detect structure in the data (Field, 2005). The aim is to group these factors into categories of "greenness" amongst visitors which can then be included in a logistic regression to determine which visitor is more likely to pay extra for green accommodation, organic food or wine. A logistic regression is a multiple regression but with a dependent variable that is a predictor of independent variables (Field, 2005).

4.3 Empirical results

4.3.1 Cross tabulation results for demographic variables

Cross tabulation was used on the data to determine whether or not statistically significant differences occur between day visitors who are willing to pay extra for green accommodation, organic food or organic wine with regards to the demographic variables of gender, occupation, home language, and province of residence. The results of the cross tabulations are presented in *Tables 4.1 to 4.4*

Table 4.1 indicates the results of the cross tabulations between genders and willingness to pay for green accommodation, organic food or wine. The objective is

[13] If a respondent indicated that he/she was not willing to pay (R0) for green accommodation, organic food or organic wine the "no" or not willing represent a legitimate zero and not protest bids.

to determine whether a statistically significant difference exists between genders and their willingness to pay.

When looking at the percentage within gender with regard to males it indicates that the distribution of males willing to pay for green accommodation and organic wine are similar. Respectively, 56 per cent and 55 per cent of males indicated that they are willing to pay extra for green accommodation and wine, and 43 per cent and 44.64 per cent of males indicated that they are not willing to pay extra for green accommodation and wine However, when looking at whether males are willing to pay extra for organic food it can be seen that the majority of males are willing to do so (64.29 per cent) When looking at the percentage within gender with regards to females it indicates that the majority of females are willing to pay for green accommodation (61.50 per cent), organic food (77.78 per cent) and wine (62.82 per cent).

Within the group that indicated that they are willing to pay more for green accommodation, it is clear that the majority of the visitors are females: approximately 60 per cent compared to 39 per cent for males. Similar proportions are in evidence for organic food and organic wine. The Pearson Chi-Square test results indicated, given the sample, that gender differences have no statistically significant effect on a day visitor's willingness to pay for green accommodation (χ^2= 0.550), organic food (χ^2= 0.083) and organic wine (χ^2= 0.385).

Table 4.2 indicates the results of the cross tabulations between home language and willingness to pay for green accommodation, organic food and wine. The objective is to determine whether a statistically significant difference exists between home language and willingness to pay. When one considers only those who are willing to pay more, the English-speaking visitors dominate the results, but that is the result of the sample. One should examine willingness to pay within each of the language groups.

When looking at the percentage within home language with regard to Afrikaans as the home language, it can be seen that the majority of Afrikaans-speaking day visitors are willing to pay extra for green accommodation (69.05 per cent) organic food (76.19 per cent) and organic wine (60.98 per cent).

With regards to English as the home language, it can be seen that the distribution of English-speaking day visitors willing to pay for green accommodation is similar. 54.22 per cent of English-speaking day visitors indicated that they are willing to pay extra for green accommodation, while 45.78 per cent of English-speaking day visitors indicated that they are not willing to pay extra for green accommodation. When looking at whether English-speaking day visitors are willing to pay for organic food and wine, it is clear that the majority of these visitors are willing to pay extra, 70.11 per cent and 60.00 per cent respectively.

When looking at the percentage within home language with regards to "other languages" as the home language, it is evident that the majority of these day visitors are willing to pay extra for green accommodation (62.50 per cent of visitors) and organic food (75.00 per cent). The distribution of visitors speaking languages other than Afrikaans and English with regards to willingness to pay for organic wine was exactly the same at 50 per cent.

Overall, when looking at these home languages it seems that Afrikaans-speaking day visitors are more likely to be willing to pay for green accommodation (69.05 per cent), organic food (76.19 per cent) and wine (60.68 per cent). The Pearson Chi-Square test results indicated, given the sample, that differences between day visitors' home languages have no statistically significant effect on the willingness to pay for green accommodation (χ^2= 0.276), organic food (χ^2= 0.758) and wine (χ^2= 0.842).

Table 4.3 indicates the results of the cross tabulations between occupation and willingness to pay for green accommodation, organic food or wine. The objective is to determine whether a statistically significant difference exists between different occupations and willingness to pay.

When looking at the percentage within occupation with regards to professionals, it can be seen that the distributions of professionals willing to pay extra for green accommodation and organic wine are similar. With regards to green accommodation, 59.70 per cent of professionals indicated that they are willing to pay extra, while 40.3 per cent of professionals indicated that they are not willing to pay extra. Professionals were also more willing to pay extra for organic wine, 59.09 per cent indicated that they are willing to pay extra while 40.19 per cent indicated that they are not willing to pay extra for organic wine. However, when looking at whether

professionals are willing to pay extra for organic food it is clear that the majority of professionals are willing to pay extra (76.45 per cent).

With regards to visitors who are self-employed, *Table 4.3* indicates that the majority of these visitors are willing to pay extra for green accommodation (60.00 per cent of self-employed), organic food (76.67 per cent) and wine (68.97 per cent).

It seems that visitors in a technical occupation indicated that they are willing to pay extra for green accommodation (75 per cent of these respondents) but their distribution between willingness to pay for organic food and wine are similar. 50 per cent indicated yes, they are willing to pay and 50 per cent indicated no, they are not willing to pay. 70 per cent and 80 per cent of visitors in sales were willing to pay extra for green accommodation and food. Day visitors working in the civil service, and housewives, were willing to pay extra for green accommodation, organic food and wine. Pensioners were not at all willing to pay extra for green accommodation, organic food and wine. Students were also not willing to pay extra for green accommodation, while the distribution between students who were willing to pay extra and those who were not willing to pay extra for organic food and wine were similar. The reason why students and pensioners are most likely not willing to pay extra is because of their limited disposable income. They may not have sufficient income left at the end of each month to pay extra for green accommodation.

Overall, the Pearson Chi-Square test results indicated, given the sample, that the occupation groups have no significant effect on a day visitor's willingness to pay for green accommodation (χ^2= 0.114), and wine (χ^2= 0.288). There was, however, a statistically significant effect when it came to organic food (χ^2= 0.013)

Table 4.4 indicates the results of the cross tabulations between provinces and willingness to pay for green accommodation, organic food or wine. The objective is to determine whether a statistically significant difference exists between the province a visitor resides in and their willingness to pay.

The majority of day visitors reside in the Western Cape and outside RSA borders. With regard to the Western Cape, it seems that the majority of respondents are willing to pay extra for organic food (76.25 per cent of these respondents) and wine (61.54 per cent). 63.64 per cent of visitors who reside outside RSA borders were willing to pay extra for organic food.

Overall the Pearson Chi-Square test results indicated, given the sample, that provinces of residence do not have a statistically significant effect on a day visitor's willingness to pay extra for green accommodation (χ^2= 0.705), organic food (χ^2= 0.676) and wine (χ^2= 0.833).

Table 4.1: Cross tabulation between WTP and genders

Gender		Would you pay extra for green accommodation (A)			Would you pay extra for organic food (F)			Would you pay extra for organic wine (W)		
		Yes	No	Total	Yes	No	Total	Yes	No	Total
Male	Count	31	24	55	36	20	56	31	25	56
	% within Gender	56.40%	43.60%	100.00%	64.29%	35.71%	100.00%	55.36%	44.64%	100.00%
	% within WTP: A, F, W	39.20%	44.40%	41.40%	36.36%	52.63%	40.88%	38.75%	46.30%	41.79%
	% of Total	23.30%	18.00%	41.40%	26.28%	14.60%	40.88%	23.13%	18.66%	41.79%
Female	Count	48	30	78	63	18	81	49	29	78
	% within Gender	61.50%	38.50%	100.00%	77.78%	22.22%	100.00%	62.82%	37.18%	100.00%
	% within WTP: A, F, W	60.80%	55.60%	58.60%	63.64%	47.37%	59.12%	61.25%	53.70%	58.21%
	% of Total	36.10%	22.60%	58.60%	45.99%	13.14%	59.12%	36.57%	21.64%	58.21%
Total	Count	79	54	133	99	38	137	80	54	134
	% within Gender	59.40%	40.60%	100.00%	72.26%	27.74%	100.00%	59.70%	40.30%	100.00%
	% within WTP: A, F, W	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
	% of Total	59.40%	40.60%	100.00%	72.26%	27.74%	100.00%	59.70%	40.30%	100.00%

Table 4.2: Cross tabulation between WTP and home language

Home Language		Would you pay extra for green accommodation (A)			Would you pay extra for organic food (F)			Would you pay extra for organic wine (W)		
		Yes	No	Total	Yes	No	Total	Yes	No	Total
Afrikaans	Count	29	13	42	32	10	42	25	16	41
	% within Home language	69.05%	30.95%	100.00%	76.19%	23.81%	100.00%	60.98%	39.02%	100.00%
	% within WTP: A, F, W	36.71%	24.07%	31.58%	32.32%	26.32%	30.66%	31.25%	29.63%	30.60%
	% of Total	21.80%	9.77%	31.58%	23.36%	7.30%	30.66%	18.66%	11.94%	30.60%
English	Count	45	38	83	61	26	87	51	34	85
	% within Home language	54.22%	45.78%	100.00%	70.11%	29.89%	100.00%	60.00%	40.00%	100.00%
	% within WTP: A, F, W	56.96%	70.37%	62.41%	61.62%	68.42%	63.50%	63.75%	62.96%	63.43%
	% of Total	33.83%	28.57%	62.41%	44.53%	18.98%	63.50%	38.06%	25.37%	63.43%
Other	Count	5	3	8	6	2	8	4	4	8
	% within Home language	62.50%	37.50%	100.00%	75.00%	25.00%	100.00%	50.00%	50.00%	100.00%
	% within WTP: A, F, W	6.33%	5.56%	6.02%	6.06%	5.26%	5.84%	5.00%	7.41%	5.97%
	% of Total	3.76%	2.26%	6.02%	4.38%	1.46%	5.84%	2.99%	2.99%	5.97%
Total	Count	79	54	133	99	38	137	80	54	134
	% within Home language	59.40%	40.60%	100.00%	72.26%	27.74%	100.00%	59.70%	40.30%	100.00%
	% within WTP: A, F, W	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
	% of Total	59.40%	40.60%	100.00%	72.26%	27.74%	100.00%	59.70%	40.30%	100.00%

Table 4.3: Cross tabulation between WTP and occupation

			Would you pay extra for green accommodation			Would you pay extra for organic food			Would you pay extra for organic wine		
			Yes	No	Total	Yes	No	Total	Yes	No	Total
Occupation	Professional	Count	40	27	67	52	16	68	39	27	66
		% within Occupation	59.70%	40.30%	100.00%	76.47%	23.53%	100.00%	59.09%	40.91%	100.00%
		% within Would you pay extra for green accommodation	51.28%	50.00%	50.76%	53.06%	42.11%	50.00%	49.37%	50.00%	49.62%
		% of Total	30.30%	20.45%	50.76%	38.24%	11.76%	50.00%	29.32%	20.30%	49.62%
	Self-employed	Count	18	12	30	23	7	30	20	9	29
		% within Occupation	60.00%	40.00%	100.00%	76.67%	23.33%	100.00%	68.97%	31.03%	100.00%
		% within Would you pay extra for green accommodation	23.08%	22.22%	22.73%	23.47%	18.42%	22.06%	25.32%	16.67%	21.80%
		% of Total	13.64%	9.09%	22.73%	16.91%	5.15%	22.06%	15.04%	6.77%	21.80%
	Technical	Count	3	1	4	2	2	4	2	2	4
		% within Occupation	75.00%	25.00%	100.00%	50.00%	50.00%	100.00%	50.00%	50.00%	100.00%
		% within Would you pay extra for green accommodation	3.85%	1.85%	3.03%	2.04%	5.26%	2.94%	2.53%	3.70%	3.01%
		% of Total	2.27%	0.76%	3.03%	1.47%	1.47%	2.94%	1.50%	1.50%	3.01%
	Sales	Count	7	3	10	8	2	10	5	5	10
		% within Occupation	70.00%	30.00%	100.00%	80.00%	20.00%	100.00%	50.00%	50.00%	100.00%
		% within Would you pay extra for green accommodation	8.97%	5.56%	7.58%	8.16%	5.26%	7.35%	6.33%	9.26%	7.52%
		% of Total	5.30%	2.27%	7.58%	5.88%	1.47%	7.35%	3.76%	3.76%	7.52%
	Civil service	Count	2	0	2	2	0	2	2	0	2
		% within Occupation	100.00%	0.00%	100.00%	100.00%	0.00%	100.00%	100.00%	0.00%	100.00%
		% within Would you pay extra for green accommodation	2.56%	0.00%	1.52%	2.04%	0.00%	1.47%	2.53%	0.00%	1.50%
		% of Total	1.52%	0.00%	1.52%	1.47%	0.00%	1.47%	1.50%	0.00%	1.50%
	Housewife	Count	5	1	6	6	1	7	5	2	7
		% within Occupation	83.33%	16.67%	100.00%	85.71%	14.29%	100.00%	71.43%	28.57%	100.00%
		% within Would you pay extra for green accommodation	6.41%	1.85%	4.55%	6.12%	2.63%	5.15%	6.33%	3.70%	5.26%
		% of Total	3.79%	0.76%	4.55%	4.41%	0.74%	5.15%	3.76%	1.50%	5.26%
	Pensioner	Count	0	3	3	0	4	4	0	4	4
		% within Occupation	0.00%	100.00%	100.00%	0.00%	100.00%	100.00%	0.00%	100.00%	100.00%
		% within Would you pay extra for green accommodation	0.00%	5.56%	2.27%	0.00%	10.53%	2.94%	0.00%	7.41%	3.01%
		% of Total	0.00%	2.27%	2.27%	0.00%	2.94%	2.94%	0.00%	3.01%	3.01%
	Student	Count	3	7	10	5	6	11	6	5	11
		% within Occupation	30.00%	70.00%	100.00%	45.45%	54.55%	100.00%	54.55%	45.45%	100.00%
		% within Would you pay extra for green accommodation	3.85%	12.96%	7.58%	5.10%	15.79%	8.09%	7.59%	9.26%	8.27%
		% of Total	2.27%	5.30%	7.58%	3.68%	4.41%	8.09%	4.51%	3.76%	8.27%

Table 4.4: Cross tabulation between WTP and province

Province of origin		Would you pay extra for green accommodation (A)			Would you pay extra for organic food (F)			Would you pay extra for organic wine (W)		
		Yes	No	Total	Yes	No	Total	Yes	No	Total
Western Cape	*Count*	45	32	77	61	19	80	48	30	78
	% within Province of origin	58.44%	41.56%	100.00%	76.25%	23.75%	100.00%	61.54%	38.46%	100.00%
	% within WTP: A, F, W	56.96%	59.26%	57.89%	61.62%	50.00%	58.39%	60.00%	55.56%	58.21%
	% of Total	33.83%	24.06%	57.89%	44.53%	13.87%	58.39%	35.82%	22.39%	58.21%
Gauteng	*Count*	6	4	10	6	4	10	5	5	10
	% within Province of origin	60.00%	40.00%	100.00%	60.00%	40.00%	100.00%	50.00%	50.00%	100.00%
	% within WTP: A, F, W	7.59%	7.41%	7.52%	6.06%	10.53%	7.30%	6.25%	9.26%	7.46%
	% of Total	4.51%	3.01%	7.52%	4.38%	2.92%	7.30%	3.73%	3.73%	7.46%
Eastern Cape	*Count*	3	3	6	5	1	6	4	2	6
	% within Province of origin	50.00%	50.00%	100.00%	83.33%	16.67%	100.00%	66.67%	33.33%	100.00%
	% within WTP: A, F, W	3.80%	5.56%	4.51%	5.05%	2.63%	4.38%	5.00%	3.70%	4.48%
	% of Total	2.26%	2.26%	4.51%	3.65%	0.73%	4.38%	2.99%	1.49%	4.48%
Northern Cape	*Count*	1	1	2	1	1	2	1	1	2
	% within Province of origin	50.00%	50.00%	100.00%	50.00%	50.00%	100.00%	50.00%	50.00%	100.00%
	% within WTP: A, F, W	1.27%	1.85%	1.50%	1.01%	2.63%	1.46%	1.25%	1.85%	1.49%
	% of Total	0.75%	0.75%	1.50%	0.73%	0.73%	1.46%	0.75%	0.75%	1.49%
KwaZulu-Natal	*Count*	4	0	4	4	1	5	4	1	5
	% within Province of origin	100.00%	0.00%	100.00%	80.00%	20.00%	100.00%	80.00%	20.00%	100.00%
	% within WTP: A, F, W	5.06%	0.00%	3.01%	4.04%	2.63%	3.65%	5.00%	1.85%	3.73%
	% of Total	3.01%	0.00%	3.01%	2.92%	0.73%	3.65%	2.99%	0.75%	3.73%
Free State	*Count*	1	0	1	1	0	1	1	0	1
	% within Province of origin	100.00%	0.00%	100.00%	100.00%	0.00%	100.00%	100.00%	0.00%	100.00%
	% within WTP: A, F, W	1.27%	0.00%	0.75%	1.01%	0.00%	0.73%	1.25%	0.00%	0.75%
	% of Total	0.75%	0.00%	0.75%	0.73%	0.00%	0.73%	0.75%	0.00%	0.75%
Other	*Count*	19	14	33	21	12	33	17	15	32
	% within Province of origin	57.58%	42.42%	100.00%	63.64%	36.36%	100.00%	53.13%	46.88%	100.00%
	% within WTP: A, F, W	24.05%	25.93%	24.81%	21.21%	31.58%	24.09%	21.25%	27.78%	23.88%
	% of Total	14.29%	10.53%	24.81%	15.33%	8.76%	24.09%	12.69%	11.19%	23.88%
Total	Count	79	54	133	99	38	137	80	54	134
	% within Province of origin	59.40%	40.60%	100.00%	72.26%	27.74%	100.00%	59.70%	40.30%	100.00%
	% within WTP: A, F, W	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
	% of Total	59.40%	40.60%	100.00%	72.26%	27.74%	100.00%	59.70%	40.30%	100.00%

4.3.2 Exploratory factor analysis

The green principle variables are used in this section in order to undertake a principle component analysis. The principle component analysis is used to convert green principle variables that are correlated into factors that are uncorrelated. The aim is to use these uncorrelated factors and interpret them as indicators of the "greenness" of visitors which can then be included in a logistic regression to determine which type of visitor is more likely to pay extra for green accommodation, organic food and wine.

Field, 2005, suggests that the first step in estimating principle components is to determine whether factor analysis is possible by testing the data with the Kaiser-Meyer-Olkin (KMO) and Bartlett's test. The KMO measures the sampling adequacy which should be greater than 0.5 for a satisfactory factor analysis to proceed. The Bartlett's measure tests the null hypothesis that the original correlation matrix is an identity matrix. For factor analysis to be successful some relationship between variables would be ideal otherwise all the correlation coefficients would be zero. Therefore, the Bartlett's significance value should be less than 0.05 rejecting the null hypothesis of an identity matrix. *Table 4.5* presents the KMO and Bartlett's test results.

Table 4.5: KMO and Bartlett's test results

Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO).		.830
Bartlett's Test of Sphericity	Approx. Chi-Square	1237.633
	df	300
	Sig.	.000

The results presented in *Table 4.5* indicate that factor analysis is indeed possible with the data. The KMO value is 0.830 which is greater than 0.5 and therefore satisfactory. The Bartlett's null hypothesis of a linear matrix can be rejected because the probability is smaller than 0.05. The next step is to look at the eigenvalues of the model to determine the number of factors in the analysis.

Table 4.6 present the variables that are explained by the model and report the [14]eigenvalues associated with each linear component (green principles) before extraction. Before extraction, 25 linear components were identified. The eigenvalues associated with each factor represent the variance explained by that particular linear component and also presents the eigenvalues in terms of the percentage of variance explained. In this case, 31.53 per cent of the variance is explained by component one, 9.30 per cent by component two, 7.08 per cent by component three, 6.02 per cent by component four, 4.87 per cent by component five, 4.26 per cent by component six and 4.06 per cent by component 7 (initial eigenvalues column). These seven components all have eigenvalues greater than one where the remainder of the components have eigenvalues less than one. The extraction sums of the squared loadings column present the eigenvalues that are greater than one. Column three, which presents the rotation sums of squared loadings, rotated the data in order to ensure eigenvalues and variances that are a better fit to the model. Only eigenvalues that are greater than one will be considered as a factor. These seven components that have eigenvalues greater than one are therefore the components that are seen in *Table 4.6.*

In *Appendix A*, the component matrix before rotation can be found. This matrix contains the loadings of each variable onto each of the seven factors that were identified in *Table 4.6.* Before rotation, most variables load highly onto the first factor which makes sense, because this was the component that explained most of the variance prior to extraction of 31.53 per cent. Seven factors were extracted meaning that seven types of green visitors were identified.

Table 4.7 presents the component matrix after rotation. This matrix contains the same information as the component matrix in *Appendix A,* except the matrix in *Table 4.7* is calculated after rotation. A rotation matrix is used to minimise variables overloading on the factor with the most variance. Overloading onto one factor makes interpretation difficult and rotation takes care of this problem. The

[14]The **eigenvectors** of a square matrix are the non-zero vectors that, after being multiplied by the matrix, either remain proportional to the original vector (i.e., change only in magnitude, not in direction) or become zero. For each eigenvector, the corresponding eigenvalue is the factor by which the eigenvector changes when multiplied by the matrix.

objective of rotation is to maximise the loading onto factors instead of overloading it (Field, 2005).

Table 4.6: Total variance explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cum. %	Total	% of Variance	Cum. %	Total	% of Variance	Cum. %
1	7.884	31.536	31.536	7.884	31.536	31.536	**3.65**	**14.599**	**14.599**
2	2.327	9.309	40.846	2.327	9.309	40.846	**3.315**	**13.26**	**27.859**
3	1.771	7.085	47.931	1.771	7.085	47.931	**2.703**	**10.811**	**38.669**
4	1.507	6.029	53.96	1.507	6.029	53.96	**2.408**	**9.633**	**48.303**
5	1.219	4.876	58.836	1.219	4.876	58.836	**1.75**	**7**	**55.303**
6	1.066	4.265	63.101	1.066	4.265	63.101	**1.573**	**6.293**	**61.596**
7	1.016	4.063	67.164	1.016	4.063	67.164	**1.392**	**5.568**	**67.164**
8	0.909	3.634	70.799						
9	0.827	3.31	74.108						
10	0.766	3.062	77.171						
11	0.686	2.744	79.915						
12	0.638	2.551	82.466						
13	0.52	2.078	84.544						
14	0.514	2.056	86.6						
15	0.47	1.881	88.481						
16	0.462	1.846	90.328						
17	0.41	1.64	91.968						
18	0.343	1.372	93.34						
19	0.313	1.25	94.59						
20	0.291	1.163	95.754						
21	0.266	1.066	96.819						
22	0.24	0.961	97.78						
23	0.214	0.855	98.635						
24	0.199	0.798	99.433						
25	0.142	0.567	100						

Table 4.7: Rotated Component Matrix

	Factors					
	2	3	4	5	6	7
		0.476				
I switch lights off in unoccupied rooms	0.773					
I take showers to reduce water use	0.739					
I switch off and unplug equipment	0.66					
I lower the temperature of the geyser	0.634				0.439	
I switch the geyser off during the day	0.487					
I do laundry with cold water	0.416					0.62
I use a solar panel geyser		0.788				
I collect rain water as part of recycling		0.734				
I use low-flow shower heads		0.592		0.426		
I recycle waste products			0.853			
I use recycled paper products			0.724			
I recycle food waste products for compost		0.478	0.543			
I take bags from home when I go shopping			0.445		0.401	
I plant indigenous plants			0.403		0.459	0.43
I use energy-saving light bulbs				0.805		
I use natural light to reduce energy use	0.471			0.61		
I support conservation efforts - green affinity					0.71	
I have insulated roof covering						0.588

Seven factors where correlations exist amongst the measures have been identified. The first factor contains the green principles: I use environmentally friendly washing powder; I use ozone-friendly aerosols; I use eco-friendly cleaning products; I'm eco-friendly; I encourage the family to save energy; I buy bulk products to reduce packaging and prefer low carbon emission vehicles. These principles were grouped under factor one and for the purpose of this study renamed as: *Green shoppers*.

The second factor contains the green principles: I switch lights off in unoccupied rooms; I take showers to reduce water use; I switch off and unplug equipment; I lower the temperature of the geyser; I switch the geyser off during the day; and I do laundry with cold water. These principles were grouped as factor two and are renamed as: *Green miser*. Green misers are day visitors who do a bit more than the bare minimum when it comes to applying these green principles at home.

The third factor contains the green principles: I use a solar panel geyser, I collect rain water as part of recycling and I use low-flow shower heads. These principles which were grouped as factor three are renamed as: *Green infrastructure*. Green infrastructure day visitors are day visitors who are willing to spend money on durable green products such as solar panel geysers and put more effort into their green behaviour such as recycling their waste by creating compost and collecting rainwater.

The fourth factor contains the green principles: I recycle waste products, I use recycled paper products, I recycle food waste, I take bags from home when I go shopping and I plant indigenous plants. These principles which were grouped as factor four are renamed as: *Green gardener*. Green gardeners fit the classic profile of an environmentally aware consumer. Their actions speak of forethought and long term dedication. They are actively involved in reducing their carbon footprint.

The fifth factor contains the green principles: I use energy-saving light bulbs and I use natural light to reduce energy use. These principles which were grouped as factor five are renamed as: *Light supporter*. Day visitors who are categorised as light supporters do the bare minimum when it comes to applying green principles at home.

It needs to be noted that the variables in the factors are not mutually exclusive but rather that certain variables in the factors showed stronger correlations which resulted in the groupings (factors). Thus, for example, the green shopper factor might have variables overlapping in the light supporter factor because visitors who do more than the bare minimum are also likely to use, for instance, energy-saving light bulbs as indicated by the light supporter factors.

The sixth and seventh factors contain green principles that are scattered amongst the other factors, and will therefore be combined and serve as the reference category when the logistic regressions are estimated. Factors six and seven were combined and renamed as: *Other*. The use of natural light under the light supporters overlaps with the green miser. The day visitors that are likely to do a bit more than the bare minimum will most likely use natural light to reduce energy use as well. Recycling food waste products for compost overlaps with green infrastructure. Day visitors who are categorised under green infrastructure are likely to recycle food waste products as well as buy in bulk.

The seven factors that have been identified will be used to estimate a logistic regression in order to determine which type of day visitor (green shopper, green miser, green infrastructure, green gardener and light supporter compared to other) are willing to pay extra for accommodation, food or wine in order to mitigate climate change. The demographic variables will also be included in the model to determine whether or not willingness to pay is gender-, occupation-, language- or province-specific.

The independent variables in the logistic regression in models one, two and three are the the "green" type of day visitor identified through the principle component analysis and the demographic characteristics, while the willingness to pay for green accommodation (model one), organic food (model two) and organic wine (model 3) is the dependent dichotomous variable as indicated in *equations*[15] *4.1, 4.2 and 4.3*:

$$Y_{WTP\_accommodation} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \varepsilon \quad (4.1)$$

[15] β_0: Constant X_1: Green shopper, X_2: Green miser, X_3: Green infrastructure, X_4: Green gardener, X_5: Light supporter, X_6: Gender, X_7: Home language, X_8: Occupation and X_9 Province.

As stated above, factors 6 and 7 were combined and therefore serves as the reference category (other) for the types of day visitors. For the categorical variables, one variable is dropped each time to serve as the reference category. The reference category for gender is female, language is Afrikaans, occupation is professional and province is the Western Cape. *Table 4.8* presents the results from the logistic regression for model one.

In the logistic regression, the coefficient, Wald and exponentiation beta coefficients will be interpreted. The Wald significance value is interpreted in order to establish the individual contribution of the predictors. The null hypothesis is that the beta coefficient for the specific predictor is not significantly different from zero. If the predictor is significantly different from zero ($p < 0.05$) it indicates that the variable is a significant predictor of the dependent variable (Y).

The Exp(B) measures the difference in odds resulting from a unit change in the predictor. If the Exp(B) value is greater (less) than one this means that as the predictor increases, the odds of the outcome occurring increases (decreases). The coefficient is interpreted by referring to the reference group.

The Wald sig. values in *Table 4.8* for green shoppers, green misers[16] and green gardeners are significant, meaning that these types of visitors will be more willing to pay for green accommodation in comparison to the other day visitors. Although all the types of day visitors are more willing to pay extra for green accommodation, specific attention needs to be paid to green shoppers. Green shopper's Exp(B) value is not only greater than one, as for the other types of day visitors, but also the largest Exp(B) value of all the types of visitors indicating that green shoppers are the most likely to be willing to pay extra for green accommodation. In addition to the green shoppers, green misers and green gardeners, the green infrastructure and light supporter visitors are also likely to be more willing to pay extra for green accommodation than the other visitors but the differences between the groups are not significant.

From the demographic variables, it is clear that females are more willing to pay extra for green accommodation than males, but the difference is not significant.

[16] Significant at the 10 per cent level.

With regards to language, the results indicate that English-speaking visitors (language 1) are more likely to be willing to pay for green accommodation than visitors speaking Afrikaans (language 2). Visitors speaking languages other than English and Afrikaans are more likely to be willing to pay for green accommodation than English-speaking visitors. All the occupation groups were more likely to be willing to pay extra for green accommodation than students, apart from pensioners (occupation 7) who were not willing to pay extra for green accommodation.

Table 4.8 : Factors determining day visitors' WTP for green accommodation

	B	S.E.	Wald	Sig.	Exp(B)
Green_Shopper	1.333	.550	5.874	.015	3.793
Green_Miser	1.081	.590	3.356	.067	2.949
Green_Infrastructure	.714	.550	1.689	.194	2.043
Green_Gardener	1.280	.557	5.281	.022	3.597
Light_Supporter	.499	.564	.783	.376	1.647
Gender(1)	-.259	.605	.184	.668	.772
Language			4.953	.084	
Language(1)	1.355	1.358	.996	.318	3.879
Language(2)	-.093	1.268	.005	.942	.912
Province			2.441	.785	
Province(1)	-.724	.765	.895	.344	.485
Province(2)	.262	1.079	.059	.808	1.299
Province(3)	-.018	1.706	.000	.992	.982
Province(4)	-2.398	2.050	1.369	.242	.091
Province(5)	21.323	22160.57	.000	.999	1821961618.43
Constant	-3.199	1.709	3.504	.061	.041
Occupation			3.431	.843	
Occupation(1)	1.457	1.035	1.984	.159	4.294
Occupation(2)	.798	1.106	.521	.470	2.222
Occupation(3)	2.964	2.066	2.059	.151	19.374
Occupation(4)	.603	1.349	.200	.655	1.828
Occupation(5)	22.937	26571.23	.000	.999	9154066364.4
Occupation(6)	.638	1.601	.159	.690	1.892
Occupation(7)	-20.764	28420.72	.000	.999	.000

Visitors from Gauteng (province 1), the Northern Cape (province 3) and KwaZulu-Natal (province 4) are more likely to be willing to pay for green accommodation than visitors who reside in the Western Cape. Visitors who reside in the Western Cape are more likely to pay extra for green accommodation than visitors who reside in the Eastern Cape (province 2) and outside the RSA borders (province 5). The results obtained from the logistic regression regarding the demographic variables are similar to the results obtained from the cross tabulations at the beginning of this chapter. As with the cross tabulations, the demographic variables were insignificant and therefore do not contribute to the explanation of a day visitors' willingness to pay for green accommodation. The classification of day visitors: green shoppers, green misers and green gardeners on the other hand provide a significant explanation of a visitor's willingness to pay for green accommodation.

Table 4.9 presents the results from the logistic regression (model two) with regards to day visitors' willingness to pay for organic food. The type of day visitors and demographic information are the independent variables while the willingness to pay for organic food is the dependent variable as indicated in *equation 4.2*:

$$Y_{WTP\_food} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \varepsilon \qquad (4.2)$$

The results from *Table 4.9* indicate that green shoppers, green misers, green infrastructure and green gardeners are more likely to be willing to pay extra for organic food than other visitors, but other visitors are more likely to be willing to pay extra for organic food than the light supporter. Regardless, the type of day visitor does not play a significant role in a visitor's willingness to pay for organic food.

From the demographic variables, it is evident that females are more likely to be willing to pay extra for organic food than males. With regards to language, it can be seen that visitors speaking Afrikaans are more likely to be willing to pay extra for organic food than visitors who speak English (language 1) and other languages (language 2).

Table 4.9: Factors determining day visitors' WTP for organic food

	B	S.E.	Wald	Sig.	Exp(B)
Green_Shopper	.563	.527	1.143	.285	1.757
Green_Miser	.342	.577	.350	.554	1.407
Green_Infrastructure	.625	.539	1.347	.246	1.869
Green_Gardener	.676	.547	1.529	.216	1.966
Light_Supporter	-.235	.560	.176	.675	.791
Gender(1)	-.839	.587	2.043	.153	.432
Language			.528	.768	
Language(2)	-.921	1.384	.442	.506	.398
Occupation			5.882	.554	
Occupation(1)	2.108	.894	5.564	.018	8.229
Occupation(2)	1.881	.968	3.774	.052	6.557
Occupation(3)	2.434	1.632	2.225	.136	11.408
Occupation(4)	2.231	1.338	2.780	.095	9.313
Occupation(5)	22.987	28327.914	.000	.999	9622759350.88
Occupation(6)	1.202	1.529	.618	.432	3.327
Occupation(7)	-19.773	22425.851	.000	.999	.000
Province			2.994	.701	
Province(1)	.769	.737	1.090	.297	2.158
Province(2)	.717	1.054	.462	.497	2.047
Province(3)	1.757	1.510	1.353	.245	5.793
Province(4)	-.630	1.806	.122	.727	.533
Province(5)	1.504	1.445	1.084	.298	4.499
Constant	-1.314	1.705	.594	.441	.269

The Wald sig. value in *Table 4.9* for self-employed (occupation 1), technical (occupation 2) and the civil service (occupation 4) are statistically significant[17], meaning that these types of visitors will more likely be willing to pay for organic food than the other day visitors compared to the reference group. Although all the types of occupation groups, except for pensioners (occupation 6), are more likely to be willing to pay extra for organic food, specific attention needs to be drawn to civil service. Civil service's (occupation 4) Exp(B) value is not only greater than one but also the largest Exp(B) value of all the types of visitors, indicating that civil

[17] Significant at the 10% level

service visitors are the most willing to pay extra for organic food. In addition to the self-employed (occupation 1), technical (occupation 2) and civil service (occupation 4), the visitors in sales and housewives more likely, and students and pensioners less likely, to be willing to pay extra for organic food than the other visitors, but the differences between these occupation groups are not significant. Visitors from Gauteng (province 1), the Eastern Cape (province 2), the Northern Cape (province 3) and visitors outside the borders of the RSA (province 5) are more likely to be willing to pay for organic food than visitors who reside in the Western Cape. Visitors who reside in KwaZulu-Natal (province 4) are less likely to pay extra for green accommodation than visitors who reside in the Western Cape.

None of the results obtained in the regression regarding gender, language or province were significant concurring with the results from the cross tabulations at the beginning of this chapter. The results obtained for this logistic regression with regards to the demographic variables are similar to the previous regression. All the variables indicated insignificant results, with the exception of occupation. When looking at the willingness to pay for organic food the type of green visitor does not seem to be a significant predictor, but rather a day visitors' occupation. This can be linked to disposable income. Visitors with higher earnings are more likely to be willing to pay extra for organic food than visitors with low incomes such as students and pensioners.

Table 4.10 presents the results from the logistic regression with regards to day visitors' willingness to pay for organic food. The type of day visitors and demographic information are the independent variables while the willingness to pay for organic wine is the dependent variable as indicated in *equation 4.3*:

$$Y_{WTP\_wine} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \varepsilon \qquad (4.3)$$

The Wald sig. value in *Table 4.10* for green shoppers and green gardeners are significant[18], meaning that these types of visitors are more willing to pay extra for organic wine than the other visitors. The other day visitors are more likely to be willing to pay extra for organic wine than the green miser and light supporter, while the green infrastructure visitor is more willing to pay extra for organic wine than the

[18] Significant at the 10% level.

other visitors. Although the Exp(B) value for green infrastructure and green gardener is greater than one, specific attention needs to be drawn to green shoppers. Green shopper's Exp(B) value is not only greater than one, but also the largest Exp(B) value of all the types of visitors, indicating that green shoppers are the most willing to pay extra for organic wine.

Table 4.10: Factors determining day visitors' WTP for organic wine

	B	S.E.	Wald	Sig.	Exp(B)
Green_Shopper	1.046	.501	4.364	.037	2.847
Green_Miser	-.063	.524	.015	.904	.939
Green_Infrastructure	.753	.507	2.206	.137	2.123
Green_Gardener	.898	.513	3.061	.080	2.455
Province			1.218	.943	
Province(1)	.494	.711	.484	.487	1.640
Province(2)	.759	1.094	.482	.488	2.137
Province(3)	.058	1.265	.002	.963	1.060
Province(4)	.213	1.762	.015	.904	1.237
Province(5)	1.167	1.336	.763	.383	3.211
Constant	-2.449	1.596	2.354	.125	.086
Light_Supporter	-.693	.516	1.800	.180	.500
Gender(1)	-.436	.550	.628	.428	.647
Language			1.143	.565	
Language(1)	1.508	1.473	1.049	.306	4.519
Language(2)	1.116	1.382	.652	.419	3.052
Occupation			2.781	.905	
Occupation(1)	.231	.805	.082	.774	1.260
Occupation(2)	.475	.927	.263	.608	1.609
Occupation(3)	1.652	1.623	1.037	.309	5.218
Occupation(4)	1.270	1.272	.997	.318	3.561
Occupation(5)	22.186	28412.416	.000	.999	4315762928.07
Occupation(6)	-.815	1.396	.341	.560	.443

From the demographic variables, it is evident that females are more likely to be willing to pay extra for organic wine than males, but the Wald sig. value is not significant. With regards to language, it can be seen that visitors speaking English (language 1) and other languages (language 2) are more likely to be willing to pay for organic wine than Afrikaans-speaking visitors. All the occupation groups were more likely to be willing to pay extra for organic food than professionals apart from pensioners (occupation 6) and students (occupation 7) who were less likely to be willing to pay extra for organic wine. Visitors who reside in the Western Cape were less likely to be willing to pay extra for green wine in comparison to visitors from all the other provinces and international visitors. The results obtained for this logistic regression with regards to the demographic variables are similar to the previous two logistic regressions. All the variables indicated insignificant results. When looking at the willingness to pay for organic wine overall, it seems that the type of day visitor will influence willingness to pay for organic wine, specifically green misers and green gardeners and not demographic factors.

4.3.3 Cross tabulations for the types of visitors

Cross tabulation was used on the data to determine whether or not statistically significant differences occur between day visitors who are willing to pay extra for green accommodation, organic food or organic wine and the type of day visitor who was identified through the principle components in the previous section. The results of the cross tabulations are presented in *Tables 4.11 to 4.15*

Table 4.11 shows the results of the cross tabulations between green shoppers and willingness to pay for green accommodation, organic food or wine. The objective is to determine whether a statistically significant difference exists between green shoppers and their willingness to pay.

When looking at the percentage within willingness to pay it is clear that if a visitor is categorised as a green shopper he or she will be more willing to pay extra for green accommodation, organic food and wine. 61 per cent of green shoppers indicated that they are willing to pay extra for green accommodation, 52.8 per cent indicated that they are willing to pay for organic food and 59.6 per cent indicated that they are willing to pay extra for organic wine.

Table 4.11: Cross tabulation between WTP and green shoppers

Green shopper (GS)		WTP Green Accommodation		WTP Organic Food		WTP Organic Wine	
		NO	YES	NO	YES	NO	YES
No	Count	30	23	19	34	28	23
	% within GS	56.6%	43.4%	35.8%	64.2%	54.9%	45.1%
	% within WTP	66.7%	39.0%	57.6%	47.2%	60.9%	40.4%
	% of Total	28.8%	22.1%	18.1%	32.4%	27.2%	22.3%
Yes	Count	15	36	14	38	18	34
	% within GS	29.4%	70.6%	26.9%	73.1%	34.6%	65.4%
	% within WTP	33.3%	61.0%	42.4%	52.8%	39.1%	59.6%
	% of Total	14.4%	34.6%	13.3%	36.2%	17.5%	33.0%
Total	Count	45	59	33	72	46	57
	% within GS	43.3%	56.7%	31.4%	68.6%	44.7%	55.3%
	% within WTP	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	43.3%	56.7%	31.4%	68.6%	44.7%	55.3%

Overall the Pearson Chi-Square test results indicated, given the sample, that the type of green visitor (green shopper) does have a statistically significant effect on the willingness to pay for green accommodation (X^2 = 0.005), and organic wine (X^2 = 0.038). Being a green shopper however had no significant impact on the willingness to pay for organic food (X^2 = 0.325). This can be seen in the percentage within willingness to pay in the cross tabulation since, although 52.8 per cent of green shoppers were willing to pay extra, 42.4 per cent were not willing to pay extra. This is a rather small difference between visitors who are willing to pay extra and those who are not willing to pay extra.

Table 4.12 indicates the results of the cross tabulations between green misers and willingness to pay for green accommodation, organic food or wine.

It seems from *Table 4.12*, when looking at the percentage within willingness to pay, that green misers are more willing to pay for green accommodation than visitors who are not categorised as green misers. 66.1 per cent of green misers indicated that they are willing to pay extra for green accommodation, while 56.5 per cent of visitors who were not categorised as green misers are not willing to pay

extra for green accommodation. The distribution between visitor's willingness to pay for organic food and organic wine on the other hand are similar, which resulted in no statistically significant differences with Pearson Chi-Square values of X^2 = 0.510 and X^2 = 0.399 respectively. On the other hand, the Pearson Chi-Square value for green accommodation was X^2 = 0.020 indicating that green misers do have a significant difference effect on willingness to pay for green accommodation.

Table 4.12: Cross tabulation between WTP and green misers

Green miser (GM)		WTP Green Accommodation		WTP Organic Food		WTP Organic Wine	
		NO	YES	NO	YES	NO	YES
No	Count	26	20	16	29	22	22
	% within GM	56.5%	43.5%	35.6%	64.4%	50.0%	50.0%
	% within WTP	56.5%	33.9%	47.1%	40.3%	46.8%	38.6%
	% of Total	24.8%	19.0%	15.1%	27.4%	21.2%	21.2%
Yes	Count	20	39	18	43	25	35
	% within GM	33.9%	66.1%	29.5%	70.5%	41.7%	58.3%
	% within WTP	43.5%	66.1%	52.9%	59.7%	53.2%	61.4%
	% of Total	19.0%	37.1%	17.0%	40.6%	24.0%	33.7%
Total	Count	46	59	34	72	47	57
	% within GM	43.8%	56.2%	32.1%	67.9%	45.2%	54.8%
	% within WTP	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	43.8%	56.2%	32.1%	67.9%	45.2%	54.8%

Table 4.13 indicates the results of the cross tabulations between green infrastructure and willingness to pay for green accommodation, organic food or wine.

The results in *Table 4.13* indicate similar results for all three categories of willingness to pay (accommodation, food and wine). The distribution between visitors who are and who are not categorised in green infrastructure for willingness to pay extra and willingness not to pay extra for green accommodation, organic food and organic wine are similar. This correlates with the results from the Pearson Chi-Square test indicating that the type of visitor, green infrastructure

visitor, has no statistically significant effect on willingness to pay for green accommodation ($X^2 = 0.403$), organic food ($X^2 = 0.183$) and wine ($X^2 = 0.183$) and visitors who are or who are not categorised in green infrastructure.

Table 4.13: Cross tabulation between WTP and green infrastructure

Green infrastructure (GI)		WTP Green Accommodation		WTP Organic Food		WTP Organic Wine	
		NO	YES	NO	YES	NO	YES
No	Count	26	28	21	34	28	26
	% within GI	48.1%	51.9%	38.2%	61.8%	51.9%	48.1%
	% within WTP	56.5%	48.3%	61.8%	47.9%	59.6%	46.4%
	% of Total	25.0%	26.9%	20.0%	32.4%	27.2%	25.2%
Yes	Count	20	30	13	37	19	30
	% within GI	40.0%	60.0%	26.0%	74.0%	38.8%	61.2%
	% within WTP	43.5%	51.7%	38.2%	52.1%	40.4%	53.6%
	% of Total	19.2%	28.8%	12.4%	35.2%	18.4%	29.1%
Total	Count	46	58	34	71	47	56
	% within GI	44.2%	55.8%	32.4%	67.6%	45.6%	54.4%
	% within WTP	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	44.2%	55.8%	32.4%	67.6%	45.6%	54.4%

Table 4.14 indicates the results of the cross tabulations between green gardeners and willingness to pay for green accommodation, organic food or wine.

The results from *Table 4.14* indicate that visitors who are not categorised as green gardeners are less willing to pay for green accommodation (60.9 per cent) than visitors who are categorised as green gardeners categorised (39.1 per cent).

Furthermore, the distribution between willingness to pay extra and not willing to pay extra for organic food and wine for visitors who are categorised as green gardeners and those who are not are similar. Thus, the Pearson Chi-Square value indicated statistically significant ($X^2 = 0.040$) results between the type of day visitor, green gardener, and their willingness to pay for green accommodation. The Pearson Chi-Square values indicate that the type of green visitor, green

gardeners, will have a statistically significant effect on willingness to pay for green accommodation (X^2 = 0.040) and a statistically insignificant effect on organic food (X^2 = 0.494) and wine (X^2 = 0.260).

Table 4.14: Cross tabulation between WTP and green gardener

Green gardener (GG)		WTP Green Accommodation		WTP Organic Food		WTP Organic Wine	
		NO	YES	NO	YES	NO	YES
No	Count	28	24	18	33	25	24
	% within GG	53.8%	46.2%	35.3%	64.7%	51.0%	49.0%
	% within WTP	60.9%	40.7%	52.9%	45.8%	53.2%	42.1%
	% of Total	26.7%	22.9%	17.0%	31.1%	24.0%	23.1%
Yes	Count	18	35	16	39	22	33
	% within GG	34.0%	66.0%	29.1%	70.9%	40.0%	60.0%
	% within WTP	39.1%	59.3%	47.1%	54.2%	46.8%	57.9%
	% of Total	17.1%	33.3%	15.1%	36.8%	21.2%	31.7%
Total	Count	46	59	34	72	47	57
	% within GG	43.8%	56.2%	32.1%	67.9%	45.2%	54.8%
	% within WTP	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	43.8%	56.2%	32.1%	67.9%	45.2%	54.8%

Table 4.15 indicates the results of the cross tabulations between light supporters and willingness to pay for green accommodation, organic food or wine.

The results in *Table 4.15* indicate similar results for all three categories of willingness to pay (accommodation, food and wine). The distribution between visitors who are and who are not categorised in light supporters for willingness to pay extra and not willing to pay extra for green accommodation, organic food and organic wine are similar. This correlates with the results from the Pearson Chi-Square test indicating that the day visitor, green infrastructure, has no statistically significant effect on willingness to pay for green accommodation (X^2 = 0.380), organic food (X^2 = 0.555) and wine (X^2 = 0.252).

Table 4.15: Cross tabulation between WTP and light supporters

Light Supporter (LS)		WTP Green Accommodation		WTP Organic Food		WTP Organic Wine	
		NO	YES	NO	YES	NO	YES
No	Count	23	24	14	35	19	30
	% within LS	48.9%	51.1%	28.6%	71.4%	38.8%	61.2%
	% within WTP	50.0%	41.4%	42.4%	48.6%	41.3%	52.6%
	% of Total	22.1%	23.1%	13.3%	33.3%	18.4%	29.1%
Yes	Count	23	34	19	37	27	27
	% within LS	40.4%	59.6%	33.9%	66.1%	50.0%	50.0%
	% within WTP	50.0%	58.6%	57.6%	51.4%	58.7%	47.4%
	% of Total	22.1%	32.7%	18.1%	35.2%	26.2%	26.2%
Total	Count	46	58	33	72	46	57
	% within LS	44.2%	55.8%	31.4%	68.6%	44.7%	55.3%
	% within WTP	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	44.2%	55.8%	31.4%	68.6%	44.7%	55.3%

4.4 Summary

Summarising the outcomes of cross tabulations and the three logistic regressions it seems that demographic variables do not offer a significant explanation of a day visitor's decision regarding whether or not he or she is willing to pay extra for green accommodation and wine. With regards to whether or not a visitor is willing to pay extra for green accommodation and organic wine seems to be visitor-specific. It was found that green shoppers, green misers and green gardeners were more likely to be the type of visitors that will be willing to pay extra for green accommodation, and green shoppers and green gardeners are willing to pay extra for organic wine. With regards to willingness to pay extra for organic food, it was found that occupation plays a significant factor in a visitor's willingness to pay. Self-employed day visitors and day visitors involved in the technical and civil service categories was more likely to be willing to pay extra for organic food, which may be due to higher disposable income.

Therefore, rather than identifying a specific profile of a visitor by looking at the demographic variables, the specific types of green visitors should be considered.

Visitors who are environmentally aware and practice green principles at home are more willing to pay extra for certain initiatives in order to mitigate climate change.

Table 4.16: Summary of cross tabulation and logistic results

	WTP for green accommodation		WTP for organic food		WTP for organic wine	
Variable	Cross Tabs	Logistic	Cross Tabs	Logistic	Cross Tabs	Logistic
Green shopper	✓	✓	×	×	✓	✓
Green miser	✓	✓	×	×	×	×
Green infrastructure	×	×	×	×	×	×
Green gardener	✓	✓	×	×	×	✓
Light supporter	×	×	×	×	×	×
Other factors		R		R		R
Male	×	×	×	×	×	×
Female	×	R	×	R	×	R
Professional	×	R	✓	R	×	R
Self-employed	×	×	✓	✓	×	×
Technical	×	×	✓	✓	×	×
Sales	×	×	✓	×	×	×
Civil service	×	×	✓	✓	×	×
Housewife	×	×	✓	×	×	×
Pensioner	×	×	✓	×	×	×
Student	×	×	✓	×	×	×
Western Cape	×	R	×	R	×	R
Gauteng	×	×	×	×	×	×
Eastern Cape	×	×	×	×	×	×
Northern Cape	×	×	×	×	×	×
KwaZulu-Natal	×	×	×	×	×	×
International	×	×	×	×	×	×
Afrikaans	×	R	×	R	×	R
English	×	×	×	×	×	×
Other	×	×	×	×	×	×

The final outcomes of the cross tabulations and logistic regressions are summarised in *Table 4.16.* The (×) indicates that the variable has no significant impact on visitors' willingness to pay (from the logistic regression) and that there is no significant difference between willingness to pay and the variable (from the cross tabulation). The (✓) indicates: that the variable has a statistically significant impact on visitors' willingness to pay (logistic) and that there is a statistically significant difference between willingness to pay and the variable (cross tabulation). The (R) indicates the reference group.

The next chapter summarises the findings of chapter 1 through 4 of this dissertation followed by a conclusion and recommendations for future studies.

5

Chapter
Conclusion and Recommendations

5.1 Introduction

Individuals are deriving utility from the environment at a rate that is unsustainable, but in the long run they are only harming themselves because everyone adopts the same strategy and resources are uniformly depleted. Climate change is having severe impacts on the production of food. Floods and droughts are severely impacting world food production and affecting countries, especially developing countries that depend on their agricultural sector for food and economic growth. It is therefore evident that climate change is currently the greatest environmental challenge that the world is facing.

The environment, however is a free good and this subjects it to the tragedy of the commons where it is consumed for current rather than sustainable benefit. Neoclassical economists, argue that the way to assign a monetary value to the environment is by allocating a price to the environment. Literature suggests that there is no clear value for the environment. Literature furthermore recommends that the way to allocate a price is by asking individuals if they are willing to pay to mitigate climate change.

The primary objective of this study was to establish if day visitors at Spier are willing to pay for green initiatives and to establish which demographic factors and which type of green visitor influence their willingness to pay. The secondary objective is to place the issue of climate change mitigation in the economic context of non-market valuation. The specific objectives related to achieving the primary and secondary objectives are the analyses of the demographic characteristics of day visitors and how these predict on their willingness to pay for green accommodation, organic food and wine and the analyses of environmental

behaviour of day visitors and how specific types of green visitors (estimation via principle component analysis) are willing to pay for green accommodation, organic food or wine.

This chapter provides a brief overview of this dissertation describing how the objectives were addressed and summarising the research findings. It also provides some insight on how future studies of this nature should be addressed.

5.2 Conclusion

Chapter 1 introduced the problem statement of how to determine a value to the environment as a non-market resource. It was said that the way to allocate a value to the environment is by asking consumers if they are willing to pay to mitigate climate change and if so, how much. Therefore, the aim of this dissertation was to use a case study in order to examine the determinants of individuals' willingness to pay for climate change mitigation in the long run and to identify a specific type of consumers that are willing to mitigate for climate change. Furthermore, the chapter continued by providing a brief overview of what is climate change, how the world is responding to climate change, how South Africa is affected by climate change and South Africa's response strategies towards climate change.

Chapter 2 provided an overview of the literature on issues of the environment as a common resource and willingness to pay methods. Firstly, the secondary objective was addressed by discussing the environment as a common resource, the tragedy of the commons and the value of the environment as a non-market resource. Secondly, the sustainability of consumer behaviour was discussed by summarising which factors influence green consumer behaviour and establishing the level of "greenness" of developing and developed countries by looking at their Greendex scores. Literature suggested that demographic characteristics such as age, gender, income and education will affect an individual's willingness to pay for green initiatives (Straughan and Robersts, 1999:599): Younger individuals are likely to be more sensitive to environmental issues, due to social development is females more likely to follow green behaviour and individuals can at higher income levels bear the marginal increase in the cost associated with supporting green causes and favouring green products.

The chapter continued by discussing the different methods of willingness to pay for climate change mitigation where different case studies of willingness to pay were discussed.

From the raw data that was discussed in *Chapter 3* it was found that a typical day visitor at Spier is female, speaks English and resides in the Western Cape. The majority of visitors are professionals and are, on average, 38 years old. Green behaviour results indicated that visitors are not aware of how green Spier is but overall these visitors live a green lifestyle when looking at some of the green principles that they apply at home. When asking the visitors whether or not they are willing to pay extra for green accommodation, organic food or organic wine, the majority of respondents indicated that they are willing to pay extra therefore achieving the first part of the primary objective and concurs with the literature findings of: Casey *et al* (2010), Brower *et al* (2008), Carlsson *et al* (2010), Solomon and Johnson (2009), Krystallis and Chryssohoidis (2005), McKercher *et al* (2010), Krugell and Saayman (2011) and Johnson and Nement (2010).

The results from *Chapter 4* show that demographic factors are not significant in predicting day visitors at Spier's willingness to pay for green accommodation, organic food and organic wine. Therefore, this outcome contradicts the literature findings of Straughan and Roberts (1999) that demographic factors are predictors for willingness to pay. Willingness to pay is rather a function of existing environmental behaviour, with those that actively engage in conserving the environment through their behaviour and consumption habits, exhibiting higher willingness to pay than those who do little to mitigate their consumption. The results for the cross tabulations indicated that there is no significant relationship between visitors' willingness to pay and demographic factors (gender, occupation, province and home language) but in certain aspects significant differences did occur amongst certain types of day visitors (green shopper, green miser and green gardener). Logistic regressions confirm that demographic factors do not play a significant role in day visitors' willingness to pay for green accommodation or wine. Occupation, however, was the only significant demographic factor when it came to willingness to pay for organic food and could be linked to the availability of disposable income. With regards to willingness to pay for green accommodation

and organic wine it seems to be visitor-specific. It was found that green shoppers, green misers and green gardeners will more likely be the type of day visitors that will be willing to pay extra for green accommodation and green shoppers and green gardeners will be more willing to pay extra for organic wine.

It therefore seems that consumers who are already practising green principles at home are more willing to pay extra for products that mitigate climate change than consumers who are not applying green principles at home.

5.4 Recommendations

The questionnaire used in this study was designed for and by the Institute for Tourism and Leisure Studies at the North-West University and was not primarily initiated for this study. The exclusion of certain questions prevented a CVM analysis of the data and limited the conclusions that could be drawn. An open ended willingness to pay format was used in the survey but this may be subjected to biases. The first recommendation therefore is to design a questionnaire with the prime objective of conducting a study on willingness to pay and to assure that the NOAA guidelines is used. This will enable questions related to the existing knowledge of and attitude towards climate change to be asked and compared to estimated values of willingness to pay.

Rather than asking for a specific amount that a consumer is willing to pay extra, which is a highly relative measure, it may be better to rather ask what percentage they are willing to pay extra for greener products. Alternatively, to assist in a CVM study, respondents could be given a menu of options from which they could indicate their preferences. These could incorporate greener and less green options to more subtly measure their willingness to pay rather than confronting them with direct choices that could be influenced by a perception of the 'right' answer. As this study found that people who are already practising eco-friendly behaviour are those who are more willing to pay, it would be valuable to establish why they behave in an environmentally friendly way. Thus, when looking at factors influencing willingness to pay, more attention needs to be given towards the green attitude and green awareness of the consumer instead of the simple demographic profile of a typical green consumer.

A recommendation for further research in this regard is an experimental study. Fieldworks need to be distributed to a specific event or venue where a program is used to determine individuals' carbon footprint given their behaviour over a certain time period. After their carbon footprint is calculated, individuals are then asked if they are willing to make a contribution to a specific green initiative (such as Trees for Africa) in order to offset their carbon footprint. This type of study would reveal which individual are immediately willing to pay to offset their carbon footprint, what is the average carbon footprint before individuals are willing to pay to offset it and more important, how much they are truly willing to contribute to the initiative.

Addendum A

Component Matrix before Rotation:

	Factor						
	1	2	3	4	5	6	7
I'm eco-friendly	.730						
I encourage the family to save energy	.702						
I use eco-friendly cleaning products	.679						
I use environmentally friendly washing powder	.674			-.517			
I buy bulk products to reduce packaging	.659						
I prefer low carbon emission vehicles	.642						
I use natural light to reduce energy use	.633						
I use low-flow showerheads	.628					-.459	
I plant indigenous plants	.622						
I switch off and unplug equipment	.614						
I lower the temperature of the geyser	.594	-.410					
I switch the geyser off during the day	.560						
I take showers to reduce water use	.539	-.432		.402			
I use ozone-friendly aerosols	.532			-.529			
I collect rain water as part of recycling	.525	.403					
I have insulated roof covering	.510				.442		
I use recycled paper products	.480	.462					
I recycle food waste products for compost	.409	.589					

	Factor						
	1	2	3	4	5	6	7
I switch lights off in unoccupied rooms	.456	-.568					
I recycle waste products	.423	.447	.425				
I use a solar panel geyser	.442		-.498				
I take bags from home when I go shopping	.412				-.564		
I do laundry with cold water		-.440			.446		
I use energy-saving light bulbs	.454		.422			-.504	
I support conservation efforts - green affinity	.508						-.526

Addendum B

(Questionnaire)

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