

ESSAYS ON THE ECONOMIC VALUE OF WILDLIFE-BASED RECREATION IN
DEVELOPING COUNTRIES

By

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ABSTRACT

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Knowledge of the economic value of wildlife species and natural habitats in developing countries is essential for development of environmental policy for efficient pricing and conservation strategies to ensure sustainable use of wildlife resources and maximum returns from investment in the eco-tourism sector. Eco-tourism has the potential to be a major contributor to GDP for many developing countries with abundant wildlife resources.

The first essay utilizes primary data obtained from the World Bank and Zambian Central Statistics Office to estimate the mean willingness to pay for entry to parks as they currently exist and entry to parks with improved amenities for four main national parks in Zambia (Mosi-oa-Tunya, South Luangwa, Lower Zambezi and Kafue) as well as tourists' perceptions of selected park attributes. An ordered probit model was used to determine the drivers of willingness to pay for park entry fees at the four prominent parks in Zambia. On average, tourists' willingness to pay for park entry fees given the status quo was estimated at 2005 USD28.42 (2012 USD33.41) and willingness to pay for park entry fees with park improvements was USD35.67 (2012 USD74.93). Both use values are well above the price that tourists paid which is an indication that park management authorities could increase park entry fees and, depending on the costs of improvement, realize positive returns on investments in the parks sector making public funding of parks worthwhile for the Zambian economy.

Determinants of willingness to pay for park entry fees included gender and age of the respondent, region of nationality, tourists' perception of wildlife diversity and congestion levels and the use and socio-economic benefits. Respondents who are retired (age 65 years and above) are less likely to be in the lowest willingness to pay category ($0 \leq \text{WTP} < 30$), and more likely to be in the highest willingness to pay category ($\text{WTP} \geq 50$) than respondents aged 18-24. Respondents from Europe and North America were found to be less likely to be in the lowest willingness to pay category as compared to those from Africa, and more likely to be in the high willingness to pay category. Respondents who perceived use and socio-economic benefits as important reasons for wildlife and natural habitat conservation are about 8 to 11 percent less likely to be in the low willingness to pay category, and are more likely to be in the high willingness to pay category by up to 10 percent, compared to those in the base category (non-use benefits).

The second essay summarizes the willingness to pay for wildlife-based recreation in Africa and uses MA to explain the source of systematic variation in willingness to pay for wildlife and natural habitats. The mean willingness to pay was estimated as 47.73 in 2012 USD. A number of methodological variables were found to influence systematic variation in willingness to pay for wildlife and natural habitats in Africa. These included the survey method, payment mode, sample size, and the respondent unit. This highlights the importance of methodological variables in MA and the need for prudence in developing and administering contingent valuation method or choice modelling surveys.

Overall, the research indicates great potential for developing countries to cash in on wildlife and natural habitats tourism or recreation, with relevant pricing strategies and investment for enhanced tourists' experienced.

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To Tony, Ty and Tia

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KEY TO ABBREVIATIONS

AME	Average Marginal Effects
CAMPFIRE	Communal Areas Management Programme for Indigenous Resources
CBNRM	Community Based Natural Resource Management
CDF	Cumulative Distribution Function
CE	Choice Experiment
CM	Choice Modelling
CS	Compensating Surplus
CVM	Contingent Valuation Method
GDP	Gross Domestic Product
GMA	Game Management Area
IUCN	International Union for Conservation of Nature
MA	Meta-Analysis
MLE	Maximum Likelihood Estimation
NGO	Non-governmental Organization
NOAA	National Oceanic and Atmospheric Administration
OLS	Ordinary Least Squares
TCM	Travel Cost Method
TEV	Total Economic Value
UNWTO	United Nations World Tourism Organization
USD	United States Dollar
VIF	Variance Inflation Factor

WTA	Willingness to Accept
WTP	Willingness to Pay
WTTC	World Travel and Tourism Council
WWF	World Wildlife Fund

CHAPTER 1: GENERAL INTRODUCTION: ESSAYS ON THE ECONOMIC VALUE OF WILDLIFE-BASED RECREATION IN DEVELOPING COUNTRIES

Developing countries worldwide have extensive wildlife resources (Myers, Mittermeier, R. A., Mittermeier, C. G., da Fonseca, & Kent, 2000). Unfortunately, many of the developing countries also have the highest levels of wildlife species extinction (IUCN, 2010) and underutilize such resources despite the great potential they offer for much needed foreign income for socio-economic development and poverty reduction.

A number of reasons have been cited for the high levels of species loss and/or the underutilization of wildlife resources for national economic gain. Lack of economic incentives for local communities to conserve wildlife species and their natural habitats (van Kooten & Bulte, 2000), coupled with minimal government investment in wildlife preservation and conservation (Hamilton & Pavy, 2010), and the lack of empirical evidence of the economic value of these wildlife resources are examples. In an effort to involve local communities in conservation efforts, developing countries seek to develop conservation policies that promote eco-tourism activities at the local level to drive economic activity in rural areas (Lepper & Goebel, 2010; Navrud & Mungatana, 1994). However, these efforts need to be complemented by empirical evidence of the economic value of these resources for appropriate pricing that would ensure sustainable use of the resources at the maximum possible returns. Empirical evidence predominantly highlights the economic importance of eco-tourism in general terms. There is growing literature on the willingness to pay for wildlife and natural habitats on the African continent but none that were specifically carried out in Zambia.

This dissertation adds to this growing literature of analytical studies documenting use and non-use values of wildlife resources in developing countries. It consists of two essays. Essay 1

(Chapter 2) uses primary data from a tourist survey to determine the economic value of wildlife species and their natural habitats in Zambia. For this research, tourists' willingness to pay entry fees for four prominent Zambian national parks is analyzed. Essay 2 (Chapter 3) documents the valuation literature for wildlife and natural habitats and uses the meta-analytic approach to estimate the economic value or willingness to pay for wildlife species and natural habitats in African countries. Knowledge of a general estimate of the economic value of wildlife species and habitats in Africa can be used to develop environmental policy for efficient pricing and conservation strategies on the continent. According to Lindhjem and Navrud (2008), MA gives more robust estimates for policy analysis compared to analysis based on individual empirical studies.

The methods commonly used to estimate economic value are Contingent Valuation Method (CVM) and Choice Modelling (CM). Both CVM and CM are stated preference, survey-based methods used to elicit values people place on wildlife and habitat (Champ, Boyle & Brown, 2003). CVM is the predominant method used to value wildlife resources, mainly because it can capture both use and non-use values, but also because substitute commodities are often not available, hence making CM less appropriate to use. Where a significant amount of valuation literature exists, MA has been employed to synthesize new findings for policy analysis. However, this has not been done for developing countries. MA is a technique used to review and summarize empirical studies and can be used to provide a statistical measure of systematic relationships between valuation estimates for an environmental good and the attributes of the study that generated the estimates (Bergstrom & Taylor, 2006).

CHAPTER 2: VISITORS' WILLINGNESS TO PAY FOR PARK ENTRY FEES: A CASE STUDY OF ZAMBIAN NATIONAL PARKS

2.1 INTRODUCTION

Tourism is one of the most important sectors in the Zambian economy, contributing about six to ten¹ percent of the Gross Domestic Product (GDP) in 2005 (World Bank, 2007). According to statistics from World Travel and Tourism Council (2012), this value has fluctuated over the years and was about five percent in 2012, an indication of the volatility of the tourism industry in Zambia. The total contribution of tourism receipts to GDP in 2011 was estimated to be 4,351.4 billion Zambian Kwacha or five percent of GDP (WTTC, 2012). Though this was a decrease of 0.5 percent from the previous year's 5.5 percent, the income generated through the tourism sector is forecast to increase by 7.2 percent to 9,344 billion Zambian Kwacha or 5.5 percent of GDP in 2022 (WTTC, 2012).

Historically, Zambia's economy relied heavily on the copper industry, with the tourism sector categorized as merely a social sector. But with the contribution of the mining sector to GDP declining and up to 80 percent of the people living below the poverty level, the government has been looking to the tourism industry to boost economic development and poverty reduction (International Monetary Fund [IMF], 2007). With tourism becoming increasingly important to the Zambian economy, it was reclassified from a social to an economic sector in 1996 (Hamilton & Pavy, 2010). Unfortunately, even with acknowledgement of its economic importance, the

¹ Other important sectors for economic development are agriculture, mining and manufacturing, which contributed 8.6%, 6.5% and 10.6% respectively, to GDP in 2005 (World Bank, 2007)

government has contributed very little in financial support to promote nature tourism², relative to other countries in the region (Morris, 2010), as the sector has been considered to have high financial leakages. Hence, the majority of tourism development was relegated to the private sector. In fact, public support for tourism development has been at most 0.5 percent of the total government expenditure (Ministry of Finance and National Planning, 2009). This study will provide an estimate of the potential value of wildlife and natural sites tourism in Zambia, which could enable government to better assess the potential value of increasing public support of tourism development.

The tourism sector in Zambia is strongly oriented towards nature-based tourism. The main tourism assets for the country are the wildlife, mainly found in national parks, but also in Game Management Areas (GMAs) and private game ranches and the natural sites of the Victoria Falls and Lake Tanganyika. The sector has been identified as important, not only for economic development, but also for poverty reduction and sustainable management of wildlife resources (Morris, 2010). The development of the tourism sector in Zambia is guided by the Tourism Policy of 1999 and the Poverty Reduction Strategy of 2002. The Tourism Policy stresses the importance of tourism development as a means of reducing poverty with special focus on rural areas. The goal of the Policy is to facilitate the development of a diversified, sustainable and regionally competitive tourism industry and to ensure a quality environment and sustainable utilization of heritage and natural resources (World Bank, 2007).

² In 2004, the Zambian government invested only US\$1.5 million into tourism promotion compared other countries in the region: Botswana (US\$7 million); Namibia (US\$6 million); South Africa (US\$180 million).

For the tourism industry in Zambia to be sustainable and regionally competitive, there is need understand tourists' perceptions and satisfaction with their tourism experience in Zambia. The tourism industry in developing countries has been found to be influenced by tourists' perception about a tourist destination (Kaltenborn, Nyahongo & Kideghesho, 2011; Philemon, 2015). International tourists' perceptions and expectations ultimately influence their willingness to pay for entry to the wildlife and natural sites, as well as their decision to revisit and encourage others to visit, and it is crucial to understand expectations and how they influence willingness to pay.

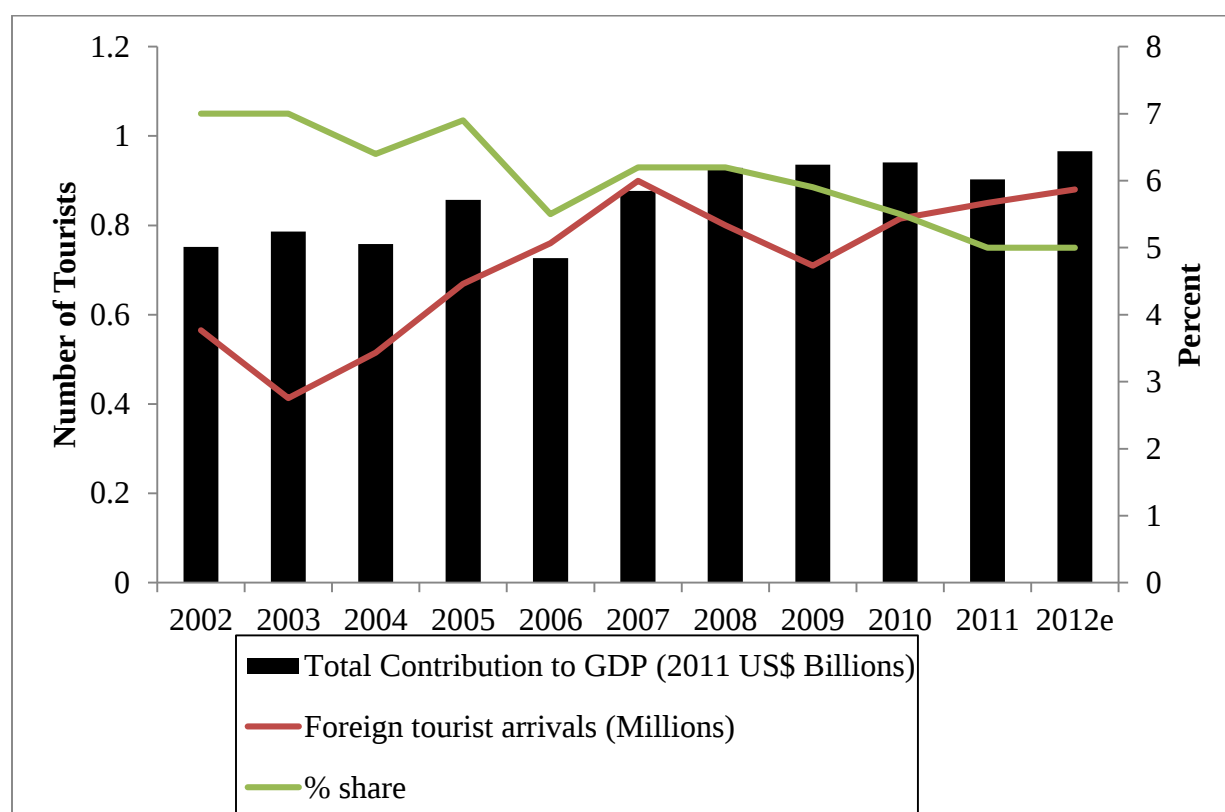
Zambia has a total of 19 national parks with four emerging as tourism favorites: Kafue National Park, the second largest in Africa; South Luangwa National Park, which has a high animal density and diversity; the Victoria Falls, a World Heritage Site and one of the seven natural wonders of the world and the adjacent Mosi-oa-Tunya or Livingstone National Park; and Lower Zambezi National Park. Though the Victoria Falls are in both Zimbabwe and Zambia, Zambia receives a large percentage of the region's arrivals due to Zambia's access to Victoria Falls and the political and economic instability in neighboring Zimbabwe. Victoria Falls is the main tourist destination in Southern Africa, as are many other world heritage sites for the region where they are located. According to the country's international arrivals statistics, the Mosi-oa-Tunya National Park, though relatively small, attracts the largest number of tourists as it is adjacent to the spectacular Victoria Falls. Other natural sites that boost the tourism industry, though less popular with tourists, include spectacular landscapes such Lake Kariba, the largest man-made lake in the world; Lake Tanganyika; and the Zambezi River which runs across south-central Africa.

Compared to other countries in southern Africa, Zambia's nature-based tourism sector is relatively small with immense potential for further development. The low number of tourists may

be because the tourism industry in Zambia developed with limited government support, mainly through privatization of key tourist assets. In 2002, Zambia's stake in the industry in the region was still a relatively insignificant 4.38 percent, with South Africa dominating the tourism industry with the largest number of tourist arrivals at 8.34 million (UNWTO, 2012).

Figure 1 below shows the international tourist arrivals in Zambia over the last decade, as well as the total contribution of tourism receipts to GDP, and the accompanying percentage share of GDP.

Figure 1: Trends in Tourist Arrivals in Zambia and Total Contribution to GDP



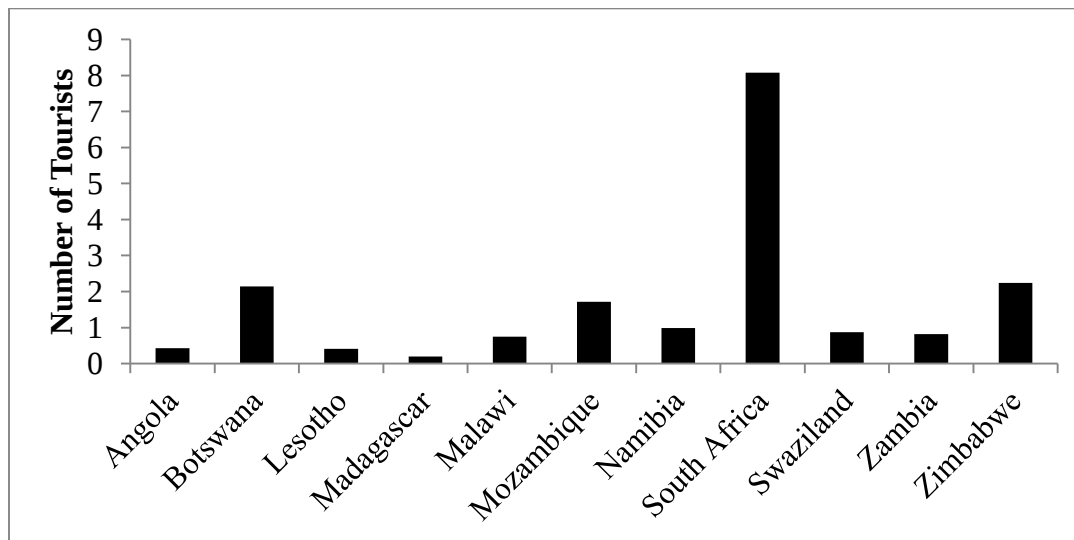
Source: WTTC (2012)

International tourist arrivals have fluctuated over the years but have steadily increased from 0.58 million in 2002 to 0.9 million in 2011, with a projected 1.3 million international tourist arrivals³ in 2022 (WTTC, 2012).

The total contribution of the tourism sector to GDP⁴, in real monetary terms, has also shown an increase over the years. However, the percentage share of travel and tourism receipts to GDP has generally declined over the years from seven percent in 2002 to five percent in 2012, mainly due to growth in other important sectors of the economy. It is expected to increase by only 2.2 percent per annum to 5.5 percent in 2022.

Figure 2 below shows the international tourist arrivals in the southern Africa region in 2010 in millions.

Figure 2: Tourists Arrivals in southern Africa in 2010 (Millions)



Source: UNWTO (2012)

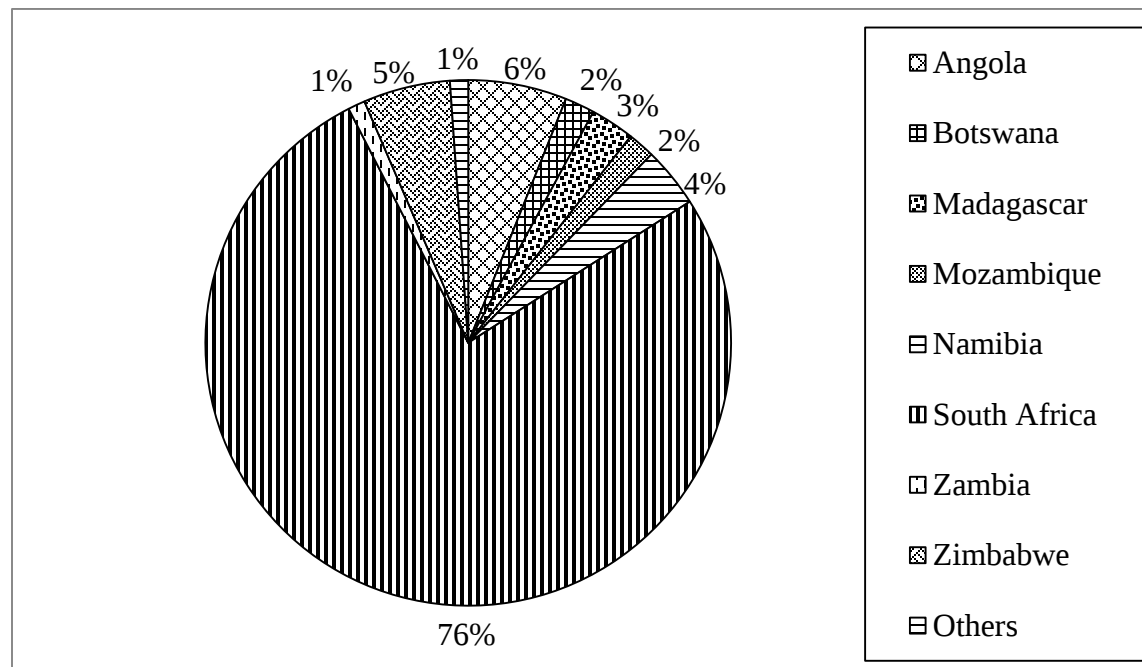
³ 2012e: estimated figures

⁴ Total contribution to GDP refers to GDP generated directly by the travel and tourism industry plus indirect and induced impacts.

South Africa received the largest number of international tourists, at 8, 074 million, followed by Zimbabwe and Botswana at about two million. Zambia trailed at 7th position, behind Mozambique, Namibia and Swaziland, having received only 815 thousand international tourists. Globally, international tourist arrivals grew by over 4 percent in 2011 to 982 million, generating USD1.030 billion in export earnings (UNWTO, 2012).

Figure 3 below shows the share of international tourist receipts in southern Africa in 2010. South Africa earned the largest share (over three quarters) of total international tourist receipts at USD9, 070 Million, followed by Angola at six percent and Zimbabwe at 5.35 percent. Though Botswana had fairly large tourist arrivals, the receipts were very low at two percent of the total international receipts in the region mainly because of the nature of the tourism industry in Botswana.

Figure 3: Percentages of International Tourist Receipts in southern Africa (2010)



Source: UNWTO (2012)

According to Mbaiwa (2005), at Okavango Delta, the tourism haven of the country, foreigners dominate ownership and management of the tourism facilities and tourism profits are sent back to their own countries. Langa (2011) also highlights loss of tourism profits in developing countries as a result of transactions in the earlier stages of the value chain being conducted in foreign countries. Zambia earned only one percent of the total international receipts in the region, or USD 125 Million. The “other” countries are Lesotho, Malawi and Swaziland, which together earned only one percent of the total international tourist receipts in the region.

2.1.1 MOTIVATION FOR THE STUDY

Despite empirical evidence of the economic importance and/or contribution of nature-based tourism in Zambia (Taylor & Banda-Thole, 2013; Thapa, Child, Parent & Mupeta, 2011; Sinyenga, 2005), analytical studies documenting the use and non-use values of such tourism resources in Zambia have not been conducted. Understanding the potential value of nature-based tourism through analysis of use-values for wildlife and nature-based tourism could enhance the capability of the industry to propel economic growth and reduce poverty, in line with the Zambian government’s objective of development.

Nature-based tourism offers considerable potential for socio-economic development in Zambia (World Bank, 2007; IMF, 2007). Studies have been carried out in other countries in the region such as South Africa, Botswana and Namibia on use-values for various nature-based tourism activities (Brown & Henry, 1990; Barnes, 1995; Barnes, 1996; Brown, Ward & Jansen, 1995; Turpie, 1996; Turpie, 2003; Barnes, Schier & van Rooy, 1999; Navrud & Mungatana, 1994; Mmopelwa & Blignaut, 2006; Mmopelwa, Kgathi & Molefhe, 2007; Dikgang & Muchapondwa, 2012), but so far none have been identified in the literature for nature-based tourism in Zambia. Analysis of use and non-use values is central to understanding the value that tourists place on

nature-based activities and consequently on understanding the potential benefits that could be tapped into for the Zambian government to realize its economic development and poverty reduction goals. An analytical investigation of the use values of nature-based tourism is paramount for fully exploiting the returns from the tourism sector. This premise is the basis for this analysis of tourists' use values for national parks in Zambia.

2.1.2 RESEARCH QUESTIONS

This research addresses three questions:

1. What are tourists' perceptions of park attributes at Zambian National Parks?
2. What is the use value for wildlife and natural sites in Zambia?
3. What factors influence tourists' willingness to pay for park entry fees with the status quo and with park improvements?

2.1.3 OBJECTIVES

The following objectives are established to guide this research:

1. To examine tourists' perceptions of park attributes and congestion levels of national parks in Zambia.
2. To determine the mean WTP for park entry fees to each of the four main national parks in Zambia (Mosi-oa-Tunya, South Luangwa, Lower Zambezi and Kafue).
3. To determine the mean WTP for entry into parks with improvements at each of the four main national parks.
4. To identify the determinants of WTP for park entry fees given the status quo and with park improvements and to establish the relationship between willingness to pay and the determinants of WTP for park entry fees.

2.2 THEORETICAL FRAMEWORK

The concept of willingness to pay and demand for goods not traded in the market such as wildlife and natural habitats is based on the theoretical framework of consumer demand, preferences and utility maximization. The provision of public goods, such as natural resources and environmental amenities, is often marked with negative externalities. The non-excludability and non-rivalry nature of public goods imposes costs on third parties, and public action in the form of a policy to minimize the externalities could be a Pareto improvement, resulting in increased net benefits from resource allocation.

To assess the impact of such a policy, it is important to know total costs and benefits for the public action to judge if the action is worthwhile. One way to estimate benefits to individuals is through econometric analysis, with estimation based on net changes in income that are equivalent to or compensate for changes in the quantity or quality of public goods (Haab & McConnell, 2002). The estimation of benefits is based on an individual preference function $u(\mathbf{x}, \mathbf{q})$, assuming that the individual maximizes utility subject to income, y ; where $\mathbf{x}$ is a vector of private goods available to the individual at parametric prices $\mathbf{p}$, and $\mathbf{q}$ is a vector of public goods. The resulting indirect utility function is given by:

$$V(\mathbf{p}, \mathbf{q}, y) = \max_{\mathbf{x}} \{u(\mathbf{x}, \mathbf{q}) | \mathbf{p} \cdot \mathbf{x} \leq y\} \quad (1)$$

The corresponding expenditure function is:

$$m(\mathbf{p}, \mathbf{q}, u) = \min_{\mathbf{x}} \{\mathbf{p} \cdot \mathbf{x} | u(\mathbf{x}, \mathbf{q}) \geq u\} \quad (2)$$

Welfare estimates are derived for changes in the indirect utility function and expenditure function using stated preference and revealed preference approaches. When using stated preference methods, specifically the contingent valuation method (CVM), changes in the indirect

utility function and expenditure function provide estimates of the change in welfare resulting from a non-market activity. When using revealed preference methods, consumer surplus can be estimated as the area under the consumer demand or marginal value curves and above the price, or welfare estimates can be directly computed from the indirect utility or expenditure functions. The monetary welfare measures associated with changes in welfare due to public action are based on the concepts of willingness to pay (WTP) and willingness to accept (WTA) and compensating and equivalent variation.

WTP is the maximum amount of income a person will pay in exchange for an improvement or the maximum amount a person will pay to avoid a decline, in the current state of affairs. WTA is the minimum amount of income an individual will be willing to accept for a decline in circumstances, or the minimum amount a person will accept to forgo an improvement in circumstances. WTP and WTA can also be defined in terms of the underlying property rights. If the individual does not hold the right to a good, then the relevant measure of utility of the good to the individual is the maximum he or she would be willing to pay (WTP) to acquire it. On the contrary, if the individual holds the right to the good, then the minimum the individual would be willing to accept (WTA) as compensation for its loss is the relevant utility measure, as this would be the amount that would maintain the individual's utility at the level that existed before being deprived of the good.

Theoretically, WTP and WTA should be similar in magnitude for most goods which are close substitutes and for which the income effect is small (Garrod & Willis, 1999). However, empirical evidence suggests that the disparity between the two can be significant. Several experiments have revealed that WTA is typically two to five times the magnitude of WTP values for the same good (Hammack & Brown, 1974; Banford, Knetsch & Mauser, 1977; Bishop &

Heberlein, 1979; Brookshire, Randall & Stoll, 1980; Coursey, Schulze & Hovis, 1983; Knetsch & Sinden, 1984; Adamowicz, Bhardwaj & Macnab, 1993 as cited in Garrod & Willis, 1999). A number of reasons are put forward to explain this disparity including inadequate empirical procedures used to elicit WTP and WTA (for example questionnaire design, interviewing techniques), endowment (income) effect (Thaler, 1980; Knetsch, 1989; Kahneman, Knetsch & Thaler, 1990; Morrison, 1997), substitutability (Hanemann, 1991; Shogren, Shin, Hayes & Kliebenstein, 1994), strategic behavior of respondents or punitiveness (Croson, Rachlinski & Johnston, 2005), and characteristics of the good (Horowitz & McConnell, 2002).

Endowment effect relates to the psychological factors associated with the perceived “right” to some environmental attribute. It has also been framed in the context of loss aversion by Kahneman and Tversky (1979). According to this theory, an individual places higher value on a good when that good is part of his or her endowment. Thus WTA will be larger than WTP for a commensurate entitlement. The WTA measure might also be over reported when respondents feel that they have to “sell” their property rights to some environmental attribute and, hence, report a higher bid value in response to a WTA question.

Substitutability refers to the substitution effect, which Hanemann (1991) has shown could exert a far greater impact on the relationship between WTP and WTA than the income effect. In his study, he showed that the willingness to pay to move Yosemite National Park in the United States into an individual’s consumption bundle may be far less than the willingness to accept compensation for removing it. According to Hanemann (1991), the divergence between WTP and WTA is not necessarily due to some failure in the survey methodology, but results from a general perception on the part of individuals surveyed that the private-market goods available in their choice set are, collectively, a rather imperfect substitute for the public good in consideration.

Respondents might behave strategically, resulting in the divergence between WTP and WTA. Consumers may act rationally when formulating their WTP bids, taking into account their income and budget constraints, and preferences for other goods. However, the CVM framework might not give respondents enough motivational incentives to give truthful answers, especially about the minimum they would be willing to accept as compensation for their loss to restore them to their original utility level.

According to Coursey, Hovis and Schulze (1987), WTA is likely to be biased upwards relative to values obtained from a market-like auction, whereas WTP may correspond more closely to market values than WTA measures. Also, WTA may reflect failure of the government to improve a public good, and hence, individuals' willingness to accept compensation. For the above-mentioned reasons, WTP is more prominent in the valuation literature and will be used in the current research. For a positive change in q , WTP is the amount of income that compensates for, or is equivalent to, an increase in the public good, and is described as:

$$V(\mathbf{p}, \mathbf{q}^1, y - WTP) = V(\mathbf{p}, \mathbf{q}^0, y) \quad (3)$$

Where $\mathbf{q}^1 \geq \mathbf{q}^0$ and $\partial V / \partial q_i > 0$. In terms of the expenditure function, WTP is defined as the amount of money an individual would give up to make him/her indifferent between the original state, with income y and public good q^0 , and the improved state with reduced income of $y - WTP$ and an improved state q^1 :

$$WTP = m(\mathbf{p}, \mathbf{q}^1, u) - m(\mathbf{p}, \mathbf{q}^0, u) \quad (4)$$

2.3 METHODS

2.3.1 CONTINGENT VALUATION METHOD (CVM)

Contingent valuation method is a stated preference, survey-based method used to directly elicit information about preferences or willingness to pay for access to a non-market environmental good or for a change in the level of the environmental good (Champ et al., 2003). Contingent valuation is used to estimate individual willingness to pay for changes in the quality or quantity of goods and services, as well as the effect of covariates on willingness to pay (Haab & McConnell, 2002). It is the predominant method used to measure an individual's willingness to pay or preferences for some level of an environmental good, largely because it is capable of capturing both the use and non-use values of environmental changes in contrast to revealed preference techniques such as the travel cost and hedonic pricing models. This advantage of CVM to estimate passive or non-use values has motivated its widespread use in valuation literature. According to Shogren and Crocker (2012), the major advantage of CVM is its flexibility to construct a market where no market currently exists, a hypothetical market with features of an actual market that enables an individual to reveal his or her willingness to pay for a change in the level of the good.

The essential and most important task of CVM analysis is the design of the questionnaires and the survey procedure (Haab & McConnell, 2002). The contingent value question aims to determine what the respondent would do if he/she had to make a real financial commitment (i.e., if faced with an actual budget constraint). Therefore, the objective of the contingent value study is to determine how much a respondent is willing and *able* to pay (Whittington, 1998) in monetary terms for a change in the level of an environmental good, contingent on the hypothetical scenario presented in a manner meaningful to the respondent.

Another consideration in undertaking CVM is the method or payment vehicle used to secure the good. A common payment vehicle is a tax or levy linked to the provision of the service. Another common method is adding costs onto utility bills. An appropriate payment vehicle will provide a clear link that implies the necessity of payment to receive the good. It is also imperative for the contingent valuation to specify a clear time period of the payment. Another element of CVM is the method of asking questions or response formats. Though variations exist, the response formats can be broadly categorized as open-ended, dichotomous choice and payment card. The open-ended response format is used to capture WTP by directly asking the respondent “How much would you be willing to pay for an increased abundance in wildlife?”, for example, and the respondent is free to offer a point estimate of any dollar amount indicative of his or her willingness to pay.

Dichotomous or discrete choice question format asks the respondents a simple yes or no question in the form “Would you be willing to pay X USD?” In the bidding game format, respondents are iteratively asked whether they would be willing to pay a certain amount. The amounts are increased or lowered depending on whether the respondent was willing to pay the previously offered amount or not. The bidding stops when the iterations have converged to a point estimate of willingness to pay.

The last question format is the payment card. With this approach, the survey questionnaire is designed to include an ordered set of threshold values in addition to the contingent scenario described to the respondent. After the interviewer explains to the respondent the purpose of the payment, the payment card with a list of predetermined payment values ranked from highest to lowest or vice versa is presented to the respondent. The respondent is then asked a question of willingness to pay based on the payment card. According to Haab and McConnell (2002), there

are four kinds of responses that can be elicited with a payment card. The respondent may be asked any of the following:

1. Pick the amount you are willing to pay. The number picked is essentially the respondent's willingness to pay.
2. Pick the maximum amount you are willing to pay. The respondents are presented with a payment card with the payments listed in ascending order from the smallest possible payment such that $t_k > t_{k-1}$, assuming that there are K payment options $t_1, \dots, t_k$. If the respondent picks bid amount t_k , then the willingness to pay is assumed to lie in the range between the selected payment option t_k and the next highest option t_{k+1} .
3. Pick the minimum amount you are willing to pay. For a list of K payments options, $t_1, \dots, t_k$, the respondent's WTP lies in the interval t_k and the previous bid amount t_{k-1} .
4. Pick the range that describes the amount you are willing to pay. The respondent is presented with a list of lower and upper bound ranges of payments.

The most commonly used question asks respondents to pick the maximum amount they are willing to pay from a list of K bid amounts (Welsh & Poe, 1998). Assuming that there are K payment options $t_1, \dots, t_k$, arranged in ascending order such that $t_k > t_{k-1}$, then the probability that a respondent picks a payment value t_k is the probability that willingness to pay lies between t_k and t_{k+1} . That is:

$$\Pr(\text{choose } t_k) = \Pr(t_k \leq WTP < t_{k+1}) \quad (5)$$

Assuming that the error terms are normally distributed with mean zero and variance, σ^2 , then the probability that willingness to pay lies between t_k and t_{k+1} is:

$$PR(\text{choose } t_k) = \frac{1}{\sigma} \int_{(t_k - \mu)/\sigma}^{(t_{k+1} - \mu)/\sigma} \phi(z) dz \quad (6)$$

where μ is the mean WTP and z represents a vector of covariates. Rewriting equation 6 gives:

$$\Pr(\text{choose } t_k) = \Phi((t_{k+1} - \mu)/\sigma) - \Phi((t_k - \mu)/\sigma) \quad (7)$$

where $\Phi((t_{k+1} - \mu)/\sigma)$ is the standard normal cumulative distribution function (CDF) evaluated at $(t_{k+1} - \mu)/\sigma$. The log-likelihood function, given that an individual i picks payment $t_k(i)$, is then:

$$\ln L = \sum_{i=1}^T \ln(\Phi((t_{k+1}(i) - \mu)/\sigma) - \Phi((t_k(i) - \mu)/\sigma)) \quad (8)$$

The model estimates $1/\sigma$ as the coefficient for $t_k(i)$ and $t_{k+1}(i)$, and the constant term is μ/σ . The expected willingness to pay is then obtained by dividing the estimate of μ/σ by the estimate of $1/\sigma$.

The payment card approach has two main advantages. First, because there isn't a single bid for respondents to focus on, payment cards are less likely to have anchoring and yea-saying issues. Second, payment card questions provide more efficient statistical information as the respondent's WTP lies in a narrow interval (Champ et al., 2003; Cameron & Huppert, 1989). According to Cameron and Huppert (1989), payment cards also avoid high rates of item non-response, common with open-ended response format. Though payment cards were initially developed to address starting point bias, inherent in traditional bidding applications, they are still subject to other forms of bias involving implied values (Cameron & Huppert, 1989). The two types of bias that may occur with payment cards are range bias and centering bias (Rowe, Schulze & Breffle, 1996). These biases can be addressed by using an exponential response scale, where the

listed values and the intervals between the listed payment option values increase at an increasing rate, following Weber's law using the following exponential function:

$$B_n = B_1 \times (1 + k)^{n-1} \quad (9)$$

Where $B_1, B_2, \dots, B_n$ are the increasing payment options; k is a positive constant that represents the percent increase between adjacent cells and is determined by the range selected for the payment card.

The general econometric model for payment card data specifies willingness to pay as:

$$WTP = x_i \beta + \varepsilon \quad (10)$$

Where the x 's are the explanatory variables, the β 's their coefficients, and the errors are normally distributed with mean zero and variance of one, that is, $\varepsilon \sim N(0, \sigma^2)$. Due to the ordered nature of the payment cards, payment card data analysis is based on the ordered probit model as ordinary regression analysis using OLS or multinomial logit or probit would fail to account for the ordinal nature of the dependent variable (Greene, 2008). In particular, the multinomial logit model has a problem of independence from irrelevant alternatives (IIA), whereby the odds ratio for one outcome is independent of the remaining probabilities (Greene, 2008). According to Greene (2008), if the remaining odds ratios are not truly independent, then the resulting parameter estimates will be inconsistent.

2.4 EMPIRICAL FRAMEWORK

Willingness to pay for park entry fees reflects the value placed by the respondent on access to the park. Generally, value can mean use values or non-use values. Use values are the economic benefits derived from direct and indirect use of the park and its resources. Use values can be categorized as direct use values, indirect use values and option values. Direct use values include

consumptive and non-consumptive recreation values, consumptive and non-consumptive non-recreation values, and other values related to other uses (social, spiritual, education and research, real estate valuation). Consumptive recreation values include activities such as hunting and fishing whereby recreational activities involve acquisition of wildlife for consumption. Non-consumptive recreation values, which are captured in the present case, are associated with recreational activities whereby consumers derive utility from accessing the resource but without consumption. These include wildlife viewing and/or photography and wilderness experiences. Consumptive non-recreation use values emanate from extraction of wild foods, timber and non-timber products solely for consumption purposes. Non-consumptive, non-recreation values are related to activities for cultural and/or spiritual purposes and education or research activities.

Indirect use values are associated with environmental benefits such as ecosystem services including pollination and hydrological services. Option value represents the value placed on the possibility to engage in direct or indirect use of the wildlife and natural sites in the future (Kroeger, Casey & Haney, 2006).

For this study, willingness to pay for access to wildlife and natural sites was elicited using the payment card method. An individual's willingness to pay for these non-consumptive recreation values is described as a function of the individual's characteristics:

$$WTP_{ij} = f(x_{ij}, y_{ij}, z_{ij}) \quad (11)$$

where WTP_{ij} is willingness to pay by individual i at site j , x_{ij} is a vector of socio-economic factors, y_{ij} is income, and z_{ij} is a vector incorporating the respondent's tourism characteristics such as recreational experience or expected future use.

The ordered probit regression model was used for analysis (because of the ordinal nature of the dependent variable associated with use of the payment card format). The ordered probit model for the dependent variable y , conditional on the explanatory variables $\mathbf{x}$, is built around the general latent regression model specified by:

$$y^* = \mathbf{x}'\boldsymbol{\beta} + \varepsilon \quad (12)$$

where y^* is an unobserved latent variable which is a linear function of the observed x_i and an unobserved variable ε , the $\mathbf{x}$'s are the explanatory variables and the $\boldsymbol{\beta}$'s their coefficients, and the errors are normally distributed with mean zero and variance of one. What is observable is a WTP value, y , within lower and upper threshold parameters or cut points (δ 's) as follows:

$$\begin{aligned} y &= 1 \quad \text{if } y^* \leq 1 \\ y &= 2 \quad \text{if } 1 < y^* \leq \delta_1 \\ y &= 3 \quad \text{if } \delta_1 < y^* \leq \delta_2 \\ y &= \dots \\ y &= J \quad \text{if } y^* \geq \delta_{J-1}, \end{aligned} \quad (13)$$

where $\delta_1 < \delta_2 < \dots < \delta_{J-1}$; and the δ 's are unknown threshold parameters to be estimated with $\boldsymbol{\beta}$. These threshold parameters determine the estimators for different observed values of y (for $y = 1, \dots, J$). The conditional distribution of y , given $\mathbf{x}$, can be derived from the following conditional probabilities:

$$\begin{aligned} \text{Prob } (y = 0|\mathbf{x}) &= \Phi(-\mathbf{x}'\boldsymbol{\beta}) \\ \text{Prob } (y = 1|\mathbf{x}) &= \Phi(\delta_1 - \mathbf{x}'\boldsymbol{\beta}) - \Phi(-\mathbf{x}'\boldsymbol{\beta}) \\ \text{Prob } (y = 2|\mathbf{x}) &= \Phi(\delta_2 - \mathbf{x}'\boldsymbol{\beta}) - \Phi(\delta_1 - \mathbf{x}'\boldsymbol{\beta}) \\ &\dots \end{aligned} \quad (14)$$

$$Prob(y = J|x) = 1 - \Phi(\delta_{J-1} - x'\beta),$$

where Φ is the cumulative distribution function (CDF) of the error term, in this case the standard normal distribution associated with the ordered probit. The parameters of the statistical model are then determined by the maximum likelihood estimation method. The corresponding marginal probability effects (MPE) of the change in the independent variables on WTP are obtained directly from the conditional probabilities in equation 14 as:

$$\begin{aligned}\frac{\partial Prob(y=0|x)}{\partial x} &= \phi(-x'\beta)\beta \\ \frac{\partial Prob(y=1|x)}{\partial x} &= [\phi(-x'\beta) - \phi(\delta_1 - x'\beta)]\beta \\ \frac{\partial Prob(y=2|x)}{\partial x} &= [\phi(\delta_1 - x'\beta) - \phi(\delta_2 - x'\beta)]\beta \\ \frac{\partial Prob(y=J|x)}{\partial x} &= [1 - \phi(\delta_{J-1} - x'\beta)]\beta\end{aligned}\tag{15}$$

where ϕ is the density function of the error term.

For this study, the ordered probit model is specified as:

$$\begin{aligned}WTP_i^* &= \beta_1 gender_i + \beta_2 age_i + \beta_3 region_i + \beta_4 membership_i + \beta_5 education_i + \\ &\beta_6 employment_i + \beta_7 income_i + \beta_8 kids_i + \beta_9 park_{visits_i} + \\ &\beta_9 visit_{purpose_i} + \beta_{10} diversity_i + \beta_{11} abundance_i + \beta_{12} congestion_i + \beta_{13} landscape_i + \\ &\beta_{14} safety_i + \beta_{15} conserve_imp_i + \varepsilon_i\end{aligned}\tag{16}$$

The explanatory variables were chosen based on economic demand theory. Many determinants affect demand; among these are: consumer tastes or preferences, income, consumer expectations, population, the good's own price, price of related goods – complements and substitutes, and the size of the market. Consumer tastes and preferences are commonly accounted for by assuming they are related to the demographic characteristics of the consumer such as gender,

age, level of education, nationality and family characteristics. Consumer expectations are influenced by variables such as membership to a conservation group, frequency of visits, purpose of visit, expected future visits and whether an individual visits other destinations (substitutes) on the same trip.

The explanatory variables in this study can be broadly categorized into i) socio-economic descriptors: tourists' gender, age, region of residency, membership in a conservation group, education, employment status, income, whether tourists' have children; ii) tourism characteristics: number of park visits five years prior to the date of the survey, whether the main purpose for visiting Zambia was for wildlife and natural sites tourism; and iii) tourists' perceptions of selected park or natural sites attributes (diversity of wildlife species, abundance of wildlife species, congestion of the site, and landscape quality) and the most important reason to conserve wildlife and natural sites.

The dependent variables for this study are tourists' probability of willingness to pay for entry to national parks in Zambia given the status quo and willingness to pay for entry to the parks with improvements.

2.5 RESEARCH METHODS

2.5.1 SURVEY DESIGN

A cross-sectional survey of tourist visitors to Zambia was conducted by the World Bank in November of 2005 to assess the socio-economic impact of tourism in Zambia. The survey was divided into seven main sections, capturing the socio-economic characteristics of the tourists; general trip information, including the travel costs and arrangements; general natural sites visit information and recreational activities undertaken; tourist perception of the quality of the natural

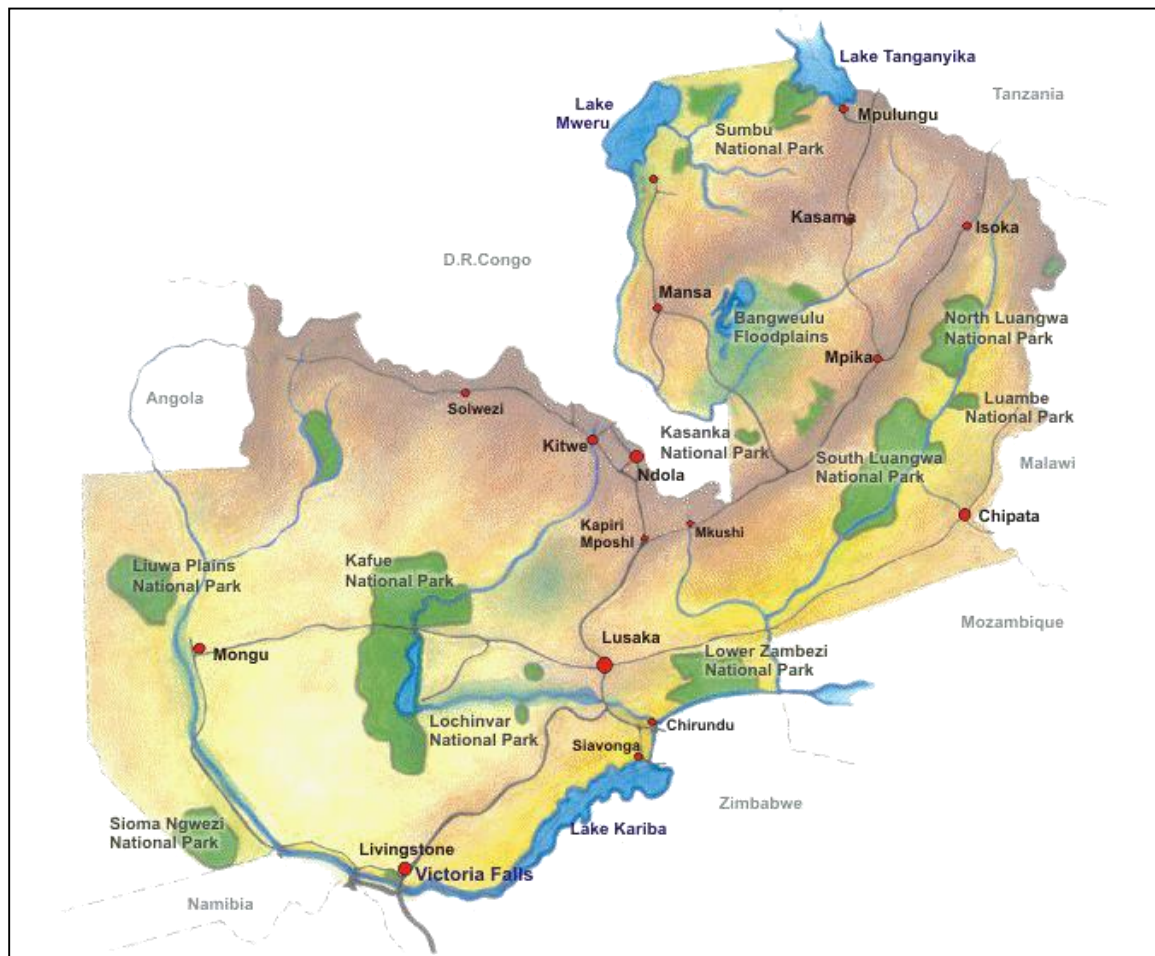
sites recreational services; and the tourists' willingness to pay for current and improved recreational services at the natural sites.

The survey section of interest to the current research captured tourists' willingness to pay for current and improved recreational services in parks and waterfall areas. The data from this section was used to determine the direct use-value of the Zambian National Parks by international tourists. A total of 1, 800 tourists were targeted and 1,578 tourists agreed to complete the survey. The target population for the survey was both resident and non-resident tourists, intercepted after their visit to the natural sites at either international airports, lodges/ hotels and around national parks. International tourists were interviewed mainly at airports, while others were interviewed in lodges and hotels and in and around national parks upon completion of their visit to Zambia.

2.5.2 RESEARCH SITES

Zambia has a total of 19 National Parks. The four national parks targeted in the survey attract the highest number of tourists out of the 19 national parks in Zambia and are considered the tourism flagships. These are Mosi-oa-Tunya, Lower Zambezi, South Luangwa and Kafue National Parks. Figure 4 shows the location of these and other main parks in Zambia.

Figure 4: National Parks in Zambia



Source: <http://www.zambiatourism.com>

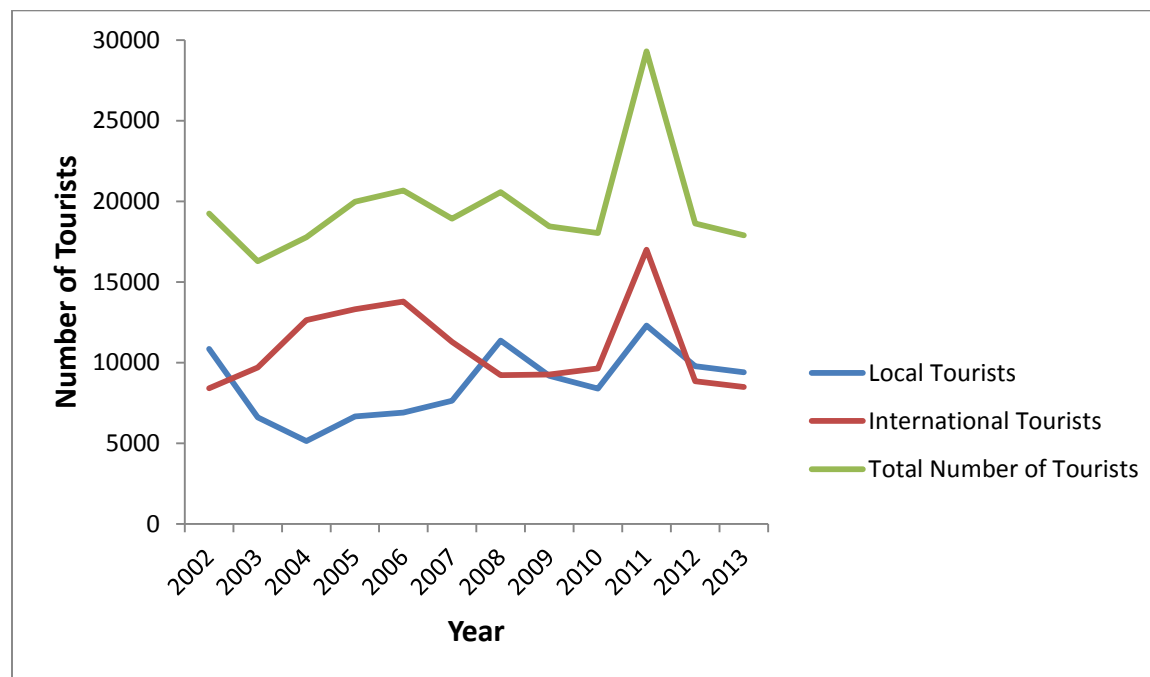
2.5.2.1 MOSI-OA-TUNYA NATIONAL PARK

The Mosi-oa-Tunya National Park is situated in Southern Zambia and is a relatively small park, measuring only 66 square kilometers. It is situated along the upper Zambezi River and includes the famous Victoria Falls, and it stretches for about 12 kilometers up the Zambezi River above the falls. The relatively small size of the park and the fact that it does not have predator wildlife species make it an ideal place for wildlife photography.

The park is home to numerous wildlife species: antelope species, zebra, giraffe, warthog, and a variety of birds and smaller animals (<http://www.zambiatourism.com>). Elephants cross the Zambezi and freely walk through the Park and the surrounding area. Visitors can drive their own vehicles through the Park or go on open-vehicle game drives organized by the park. Another interesting feature of the park is the elephant-back safaris. The park attracts a relatively large number of tourists relative to its size. Between the years 2002 and 2013, a total of 103, 690 (44.08 percent) local tourists and 131, 533 or 55.92 percent international tourists visited Mosi-oa-Tunya National Park (Zambia Wildlife Authority, personal communication via email, March 2014).

Figure 5 below shows the trend in the number of tourists who visited Mosi-oa-Tunya between 2002 and 2013.

Figure 5: Trends in Tourist Visits to Mosi-oa-Tunya National Park (2002 – 2013)



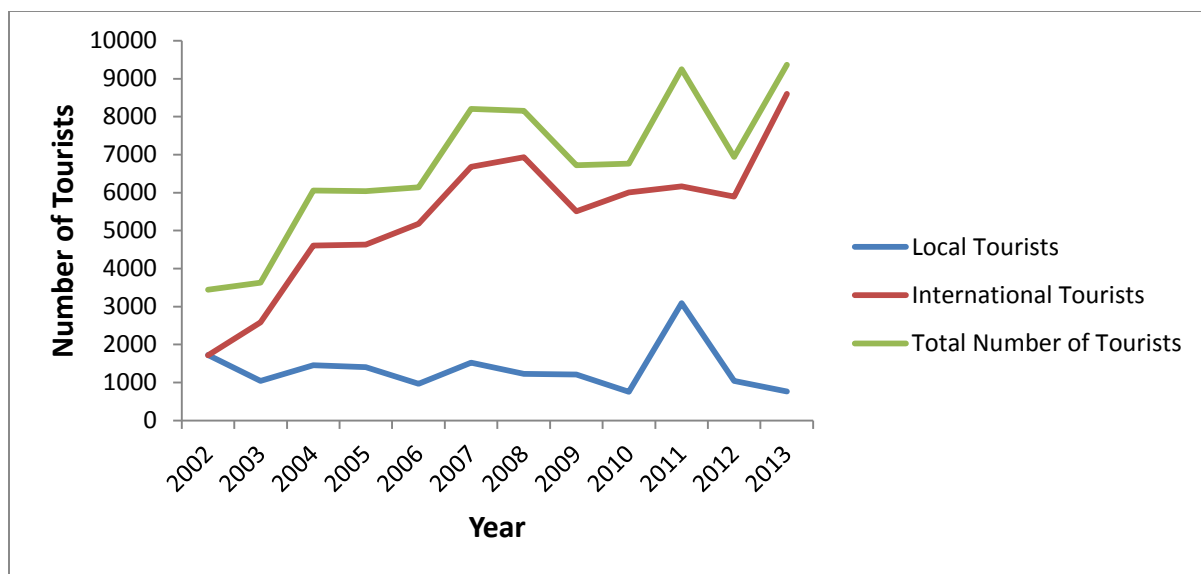
Source: Zambia Wildlife Authority, 2014

The tourist numbers have generally fluctuated over the years, but have steadily increased, with a major peak in 2011 which may be attributed to the 2010 FIFA World Cup final held in neighboring South Africa.

2.5.2.2 LOWER ZAMBEZI NATIONAL PARK

Lower Zambezi National Park is 4,092 square kilometers of wilderness popular mainly for its canoe and boat safaris along the Zambezi River. It has the largest population of hippo and elephants on a backdrop of escarpment (<http://www.zambiatourism.com>). However, the park receives a relatively small number of tourists relative to its size and to other parks such as Mosi-oa-Tunya and South Luangwa. Figure 6 shows the trends in tourists' visits to Lower Zambezi National Park between 2002 and 2013.

Figure 6: Trends in Tourist Visits to Lower Zambezi National Park (2002 – 2013)



Source: Zambia Wildlife Authority, 2014

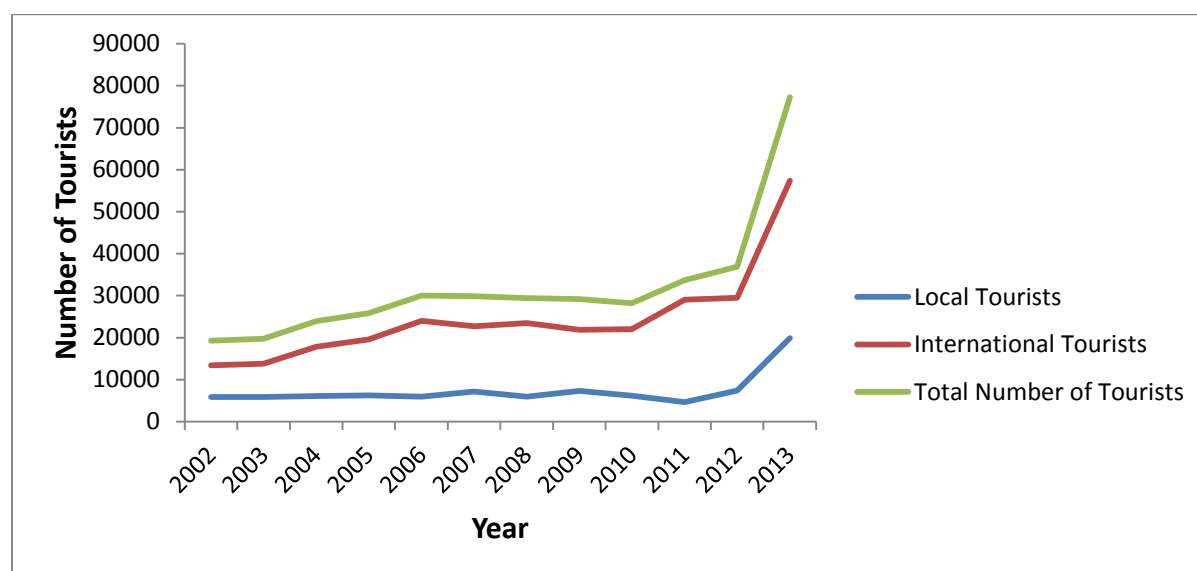
The park is more popular with international tourists, who made up almost 80 percent of the total tourist population that visited it between 2002 and 2013 (Zambia Wildlife Authority, 2014).

The number of international tourists to the park increased by over 400 percent between 2002 and 2013, whereas the number of local tourists has fluctuated. Overall, the number of tourists to Lower Zambezi National Park increased by about 172 percent (Zambia Wildlife Authority, 2014).

2.5.2.3 SOUTH LUANGWA NATIONAL PARK

South Luangwa National Park is the most popular park in Zambia with over 25,000 entries in 2005. Its main attractions are the game drives and the “walking safari”. The park measures 9,050 square kilometers and has at least 60 different animal species, among them the endemic large mammals such as Thornicroft’s giraffe and Cookson’s wildebeest, and over 400 different bird species (<http://www.zambiatourism.com>).

Figure 7: Trends in Tourist Visits to South Luangwa National Park (2002 – 2013)



Source: Zambia Wildlife Authority, 2014

South Luangwa attracted the largest number of tourists, both local and international, between 2002 and 2013. Tourists to this park comprised over 50 percent of the total tourist

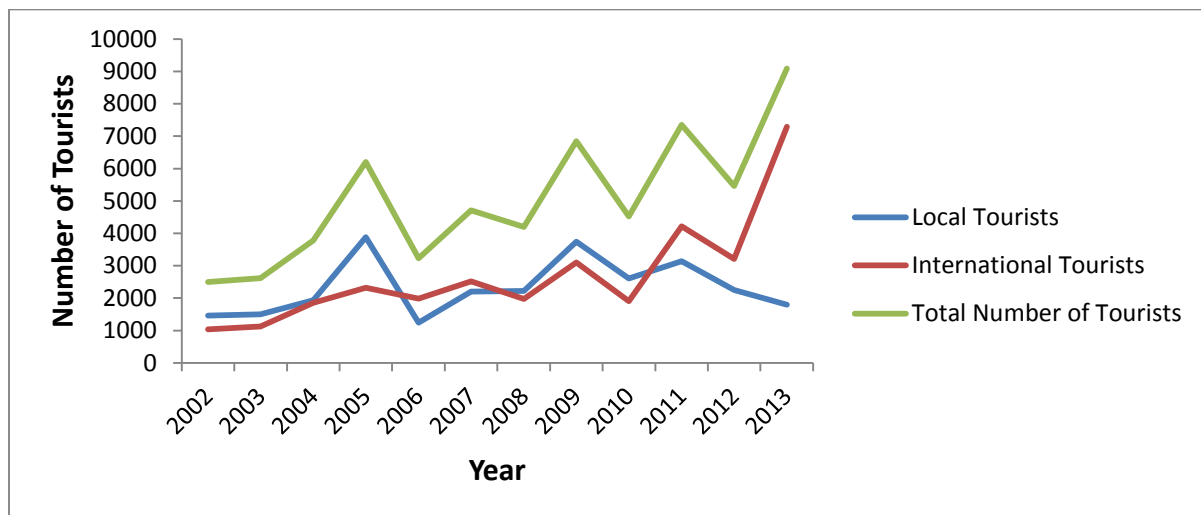
population to the four parks. However, it is most attractive to international tourists, who constituted over 70 percent of the total tourist population during the period 2002 – 2013 (Zambia Wildlife Authority, 2014). The total number of international tourists who visited south Luangwa has steadily increased over the years, reaching a peak of 57, 420 in 2013, as shown in Figure 7 above, whereas the numbers for local tourists have been stagnant, experiencing a peak only in 2013 with 19, 862 visitors.

2.5.2.4 KAFUE NATIONAL PARK

Kafue National Park is the oldest and largest national park in the Zambia. The park was established in the 1950s and measures 22,500 square kilometers (larger than Kruger National Park in South Africa). It has the greatest diversity of wildlife compared to any park in Africa (<http://www.zambiatourism.com>). According to information from <http://www.zambiatourism.com> the main features at Kafue National Park are Lake Itzhi-tezhi and the Busanga and Nanzhila Plains with large numbers of antelopes and predators such as the tree-climbing lion.

Despite its size, age and wildlife diversity, Kafue National Park attracts the fewest tourists, both local and international, among the four parks. The number of visitors to the park has generally fluctuated over the years as shown in Figure 8 below, though slightly more international tourists visit the park (53.75 of the total park visitors).

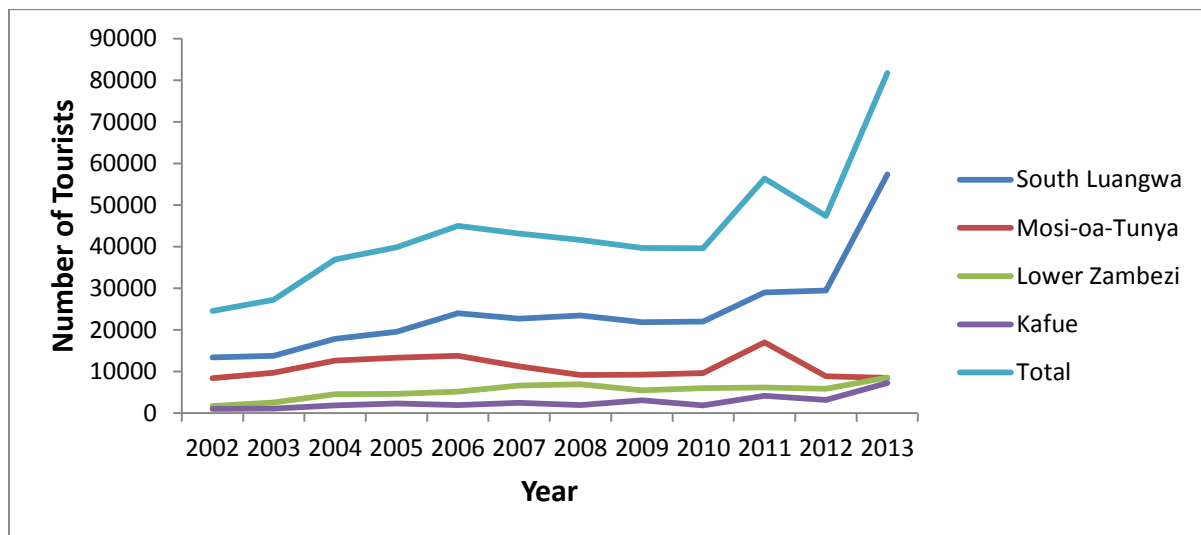
Figure 8: Trends in Tourist Arrivals at Kafue National Park (2002 – 2013)



Source: Zambia Wildlife Authority, 2014

Overall, South Luangwa attracted the highest total number of visitors, and Kafue the least total number of visitors as shown in Figure 9 below. The total number of tourists to all four parks has only slightly increased between 2002 and 2012.

Figure 9: Trends in International Tourist Visitors to Zambian National Parks (2002 – 2013)



Source: Zambia Wildlife Authority, 2014

2.5.3 SAMPLE SELECTION AND DATA COLLECTION

The survey data used was obtained from the World Bank (WB) and Zambian Central Statistics Office (CSO). Data were collected over a two-month period (01 October to 31 November 2005) at a number of locations where tourists, both local and international could be intercepted. Field assistants were engaged to carry out the face-to-face interviews with tourists at the two main airports (Lusaka and Livingstone International Airport) and at Victoria Falls and the four national parks with the highest visitation levels (Mosi-oa-Tunya, Lower Zambezi, South Luangwa and Kafue). Tourists were interviewed at the end of their visit and the interviews lasted about 30 minutes.

Tourists were stratified according to their residential status and mode of transport while in Zambia. A systematic sample selection of the i^{th} tourist entering the departure lounge, after immigration clearance, at airports was employed to select international tourists travelling by air. At the national parks, a guest list obtained from the lodge or hotel was used and again the i^{th} exiting tourist was interviewed upon completion of the visit. The sampling interval at the different locations was determined based on the available number of tourists and the required daily sample of tourists as (Sinyenga, Muwele & Hamilton, 2007):

$$\text{Sampling Interval} = \frac{\text{Available number of tourists}}{\text{Required daily sample of tourists}}$$

The valuation section of the survey, which is the core interest in the current research, set up the willingness to pay scenarios using the payment card elicitation format. Respondents were asked to choose from a payment card a number that represented their maximum willingness to pay for park entry fees in the current state at the time of the survey and for park entry fees with park improvements given the following scenarios:

i) While you were planning your trip to xxx National Park you learned that the entry fee had increased. What would be the maximum fee that you personally are prepared to pay to visit xxx National Park? This is the amount above which you would choose not to visit this park at all.

ii) There have been proposals to improve the quality of the visit to xxx National Park for tourists and raise more revenue for natural resources management. These include increasing the abundance of animals in xxx National Park. The visitors will then be sure to see elephants, zebras, giraffes, antelopes and monkeys during each visit they make. The number of big cats will also be increased, so that people can expect to see at least one of them during a week stay. What would be the maximum fee you personally are prepared to pay to visit xxx National Park in this case? Please assume you would not change the duration of your visit.

Because the survey was conducted by World Bank researchers and not for this analysis, information on the initial survey design process was not available. For example, the payment card for the willingness to pay question was not available; for this study, the payment options were gleaned from the reported willingness to pay values. From the survey data, the values listed ranged from USD0 to USD250. The bid amounts reported in USD in the data had a clear sequence and these were then listed as payment options: USD0, USD5, USD10, USD15, USD20, USD25, USD30, USD35, USD40, USD45, USD50, USD75, USD100, USD150, USD200 or more. However, data was also reported in other currencies (Euro, British Pound, South African Rand, and Zambian Kwacha) and had to be converted to USD using the exchange rate at the time of the survey.

Another limitation of using the World Bank data was that the two-month period for data collection may not be an adequate period to capture a representative sample of the tourist population over the peak tourism season which extends from April to November. Data collection could be improved by staggering the interviews over the peak tourism season.

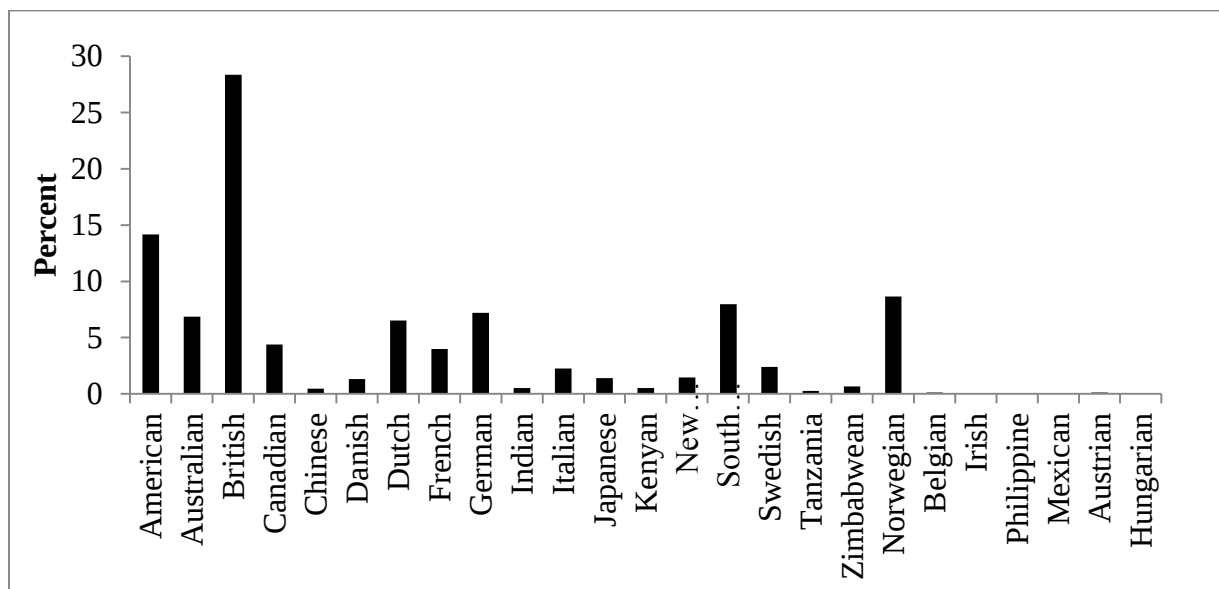
2.6 RESULTS AND DISCUSSION

2.6.1 DESCRIPTIVE ANALYSIS

A total of 1503 questionnaires were used in this analysis as only international or non-resident tourists were included. This section will cover the profile of respondents for the four parks.

As evident from Figure 10 below, the majority of the respondents were British (28.34 percent), followed by the Americans at 14.17 percent. A number of countries each comprised less than 0.5 percent (less than 10 respondents) of the total sample; these include Chinese (7), Indian (8), Kenyan (8), Tanzanian (4), Belgian (2), Irish (1), Philippine (1), Mexican (1), Austrian (2) and Hungarian (1) tourists.

Figure 10: Nationalities of Respondents, as a Percent of Total Respondents, N= 1503



At the regional level, the majority of the respondents were from Europe (61.14 percent), followed by North America (18.63 percent) as indicated in Figure 11 below. Respondents from Asia were the smallest group and made up only 2.46 percent of the total respondents. Only about nine percent of the respondents were from the African continent. These were mainly from southern Africa⁵, with respondents from other African countries comprising only 0.77 percent of the total respondents.

International tourists from South Africa constituted the majority of the respondents from the southern Africa region (63.83 percent) and all of Africa (61.22 percent), though they made up only 7.71 percent of the total respondents. This concurs with the findings of UNWTO (2012) that South Africans constitute the largest number of tourists to Zambia within the region.

Figure 11: Region of Origin of Respondents, in Percent of Total Respondents, N = 1503

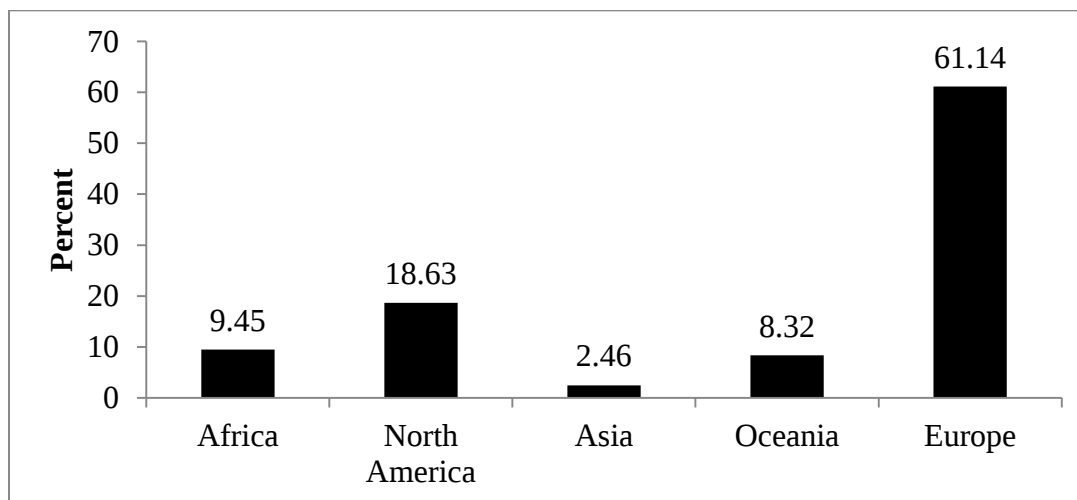
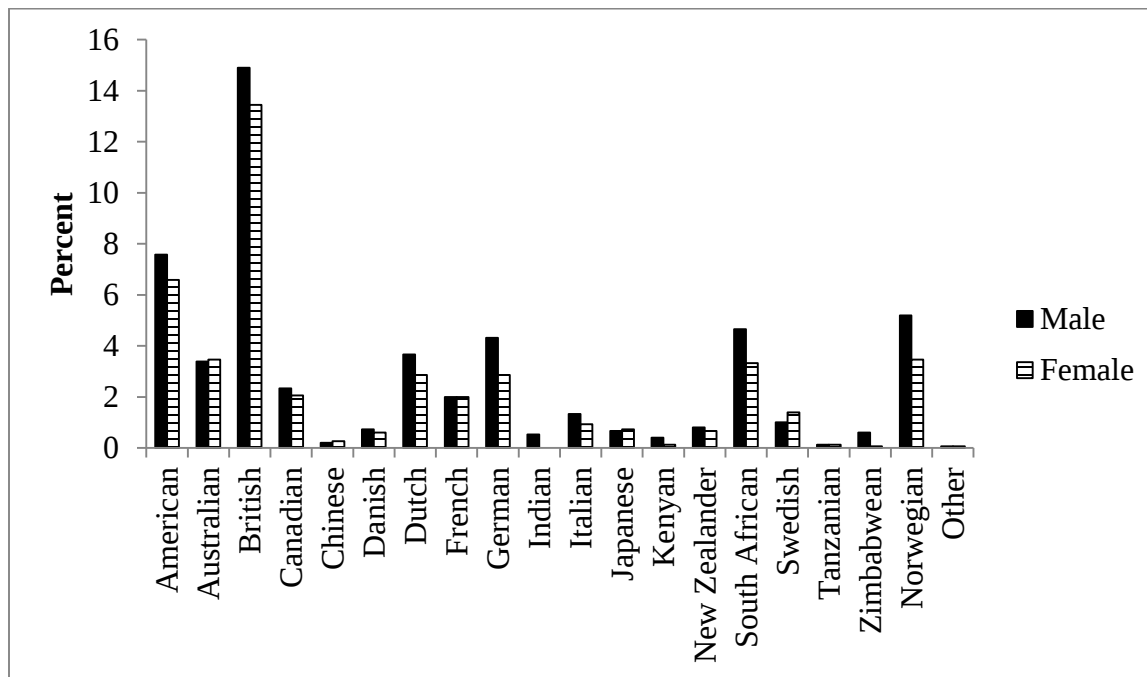


Figure 12 shows the gender of the respondents by nationality, as a percentage of the total respondents. Male respondents were in the majority at about 55 percent. This holds true for all

⁵ International tourists from southern Africa (from countries other than Zambia) comprised 8.67 percent of the total respondents.

countries as except for Australia, France, Japan and Sweden, where female respondents were equal to or slightly outnumbered male respondents. The countries included in the ‘Other’ category in this case are those that comprise less than two percent of the total sample and include Belgium, Ireland, Philippines, Mexico, Austria and Hungary.

Figure 12: Gender of Respondents by Nationality, in Percent of Total Respondents, N = 1503



The respondents’ ages ranged from 18 to more than 75 years old. Table 1 below shows the age of the respondents by nationality, as a percentage of the total respondents. According to Table 1, respondents in the age category 35 to 44 years old represented the largest percentage of respondents at 25 percent, closely followed by respondents in the ranges 25 to 34 (22 percent) and 45 to 54 years old (21 percent). There were more female respondents compared to male respondents in the two lower categories of the seven age categories. As might be expected,

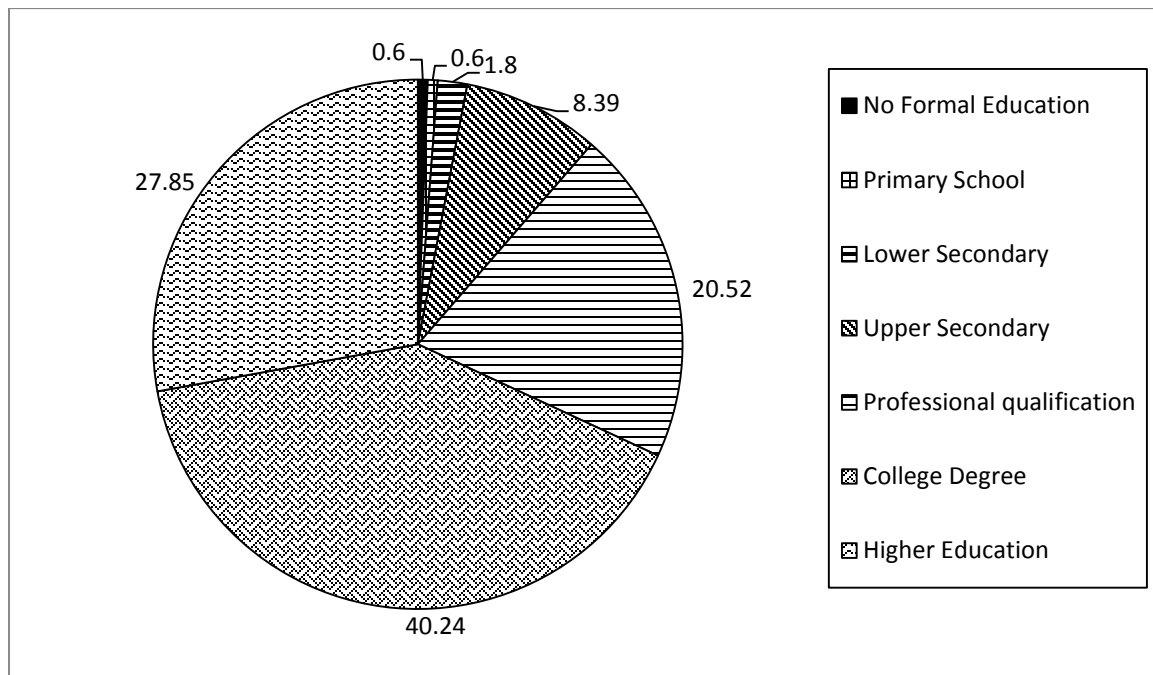
respondents aged 75 years old or more constituted only about 1.4 percent of the total respondents, the smallest percentage, followed by respondents aged 18 – 24 years.

Table 1: Age of the Respondents by Nationality, in Percent of Total Respondents, N = 1502

Age of Tourist	Gender		Total
	Male	Female	
18 – 24	2.66	3.26	5.93
25 – 34	10.12	11.98	22.10
35 – 44	14.25	10.59	24.83
45 – 54	12.45	8.66	21.11
55 – 64	9.79	6.86	16.64
65 – 74	4.92	3.00	7.92
75 and above	0.73	0.73	1.46
Total	54.92	45.08	100.00

Figure 13 below shows the highest level of education attained by the tourists. Almost 90 percent of the respondents were highly educated with at least a professional qualification or diploma. About 40 percent of the respondents had a college degree. This was the case for all countries except France and Sweden where respondents with a higher degree (MS or PhD) dominated. Respondents with no formal education or only primary education constituted a very small percentage, less than one percent of the total respondents. This is to be expected as in general level of education is a proxy for income, and those with lower education level likely cannot afford to travel.

Figure 13: Highest Education Attained by Park Visitors, in Percent of Total Respondents, N = 1501



The main form of employment is full-time employment whereby the respondent works 30 hours or more per week. Over 50 percent of the total respondents reported they were employed full-time followed by respondents who are self-employed (16.33 percent) and those who are retired (12.15 percent). Table 2 below shows the employment status of the respondents by gender, as a percentage of the total respondents. Male respondents form the majority in self-employment, full-time employment and respondents who are retired or do not work but have private means of sourcing income.

Table 2: Employment Status of Respondents by Gender, in Percent of Total Respondents, N = 1503

Employment Status	Gender		Total
	Male	Female	
Self-employed	10.45	5.85	16.43
Full-time employment	31.00	22.49	53.76
Part-time employment	2.06	4.31	6.52
Student	1.66	2.38	3.99
Unemployed	1.06	1.61	2.73
Home-maker	0.07	1.03	1.13
Retired	7.19	5.21	12.57
Do not work: private means	0.53	0.39	0.93
Sickness or disability	0.07	0.06	0.13
Unpaid voluntary work	0.33	0.58	0.93
Other	0.47	0.58	0.86
Total	54.89	45.11	100.00

There were an equal number of respondents who reported that they do not work due to illness or disability for both male and female respondents (0.06 percent), the smallest percentage of work status for the total respondents. A higher percentage of female respondents were engaged in part-time employment, studying (student), looking after the home full-time, voluntary work, and other work engagements compared to their male counterparts. In general, 76.87 percent of the respondents reported being gainfully and formally employed (self-employed, full-time or part-time employed). Employment is another proxy for income, and those in full-time employment would have more disposable income for leisure activities. Self-employed and retired respondents could

have the income for leisure activities but also a more flexible schedule and time available for leisure activities.

The majority of the respondents (57 percent) did not have children as indicated in Table 3 below. This trend was evident for respondents for all the regions. The percentage of respondents with children (including independent children) was lower than the percentage of respondents without children. In general, the lack of children makes it more likely for respondents to travel as there is relatively more disposable income and time for leisure.

Table 3: Respondents With and Without Children, by Region, in Percent of Total Respondents, N = 1487

Region	Have Children		Total
	No	Yes	
Africa	5.11	4.30	9.41
North America	10.29	8.27	18.56
Europe	35.98	25.15	61.12
Asia	1.55	0.94	2.48
Oceania	4.71	3.70	8.41
Total	57.63	42.37	100.00

Figure 14 shows the gross income for the international tourists, which was reported in Zambian Kwacha in 15 categories. The observations were highly right skewed with the majority of the respondents reporting an annual gross (individual) income in the range of K270, 000,000 – K399, 000,000 (about 64,500 – 95, 300 2005 USD based on the exchange rate at the time of the study). This may be an indication that to participate in tourism activities, your income should be relatively high. Almost 70 percent of the respondents have an annual gross income of at least K160

Million (2005 USD 38, 200) and this is expected, especially for international tourists, as travel for leisure, as a normal good, would be expected to increase with an increase in income.

Figure 14: Gross Income Ranges of Respondents, in Percent of Total Respondents (in Millions of Zambian Kwacha), N = 1229

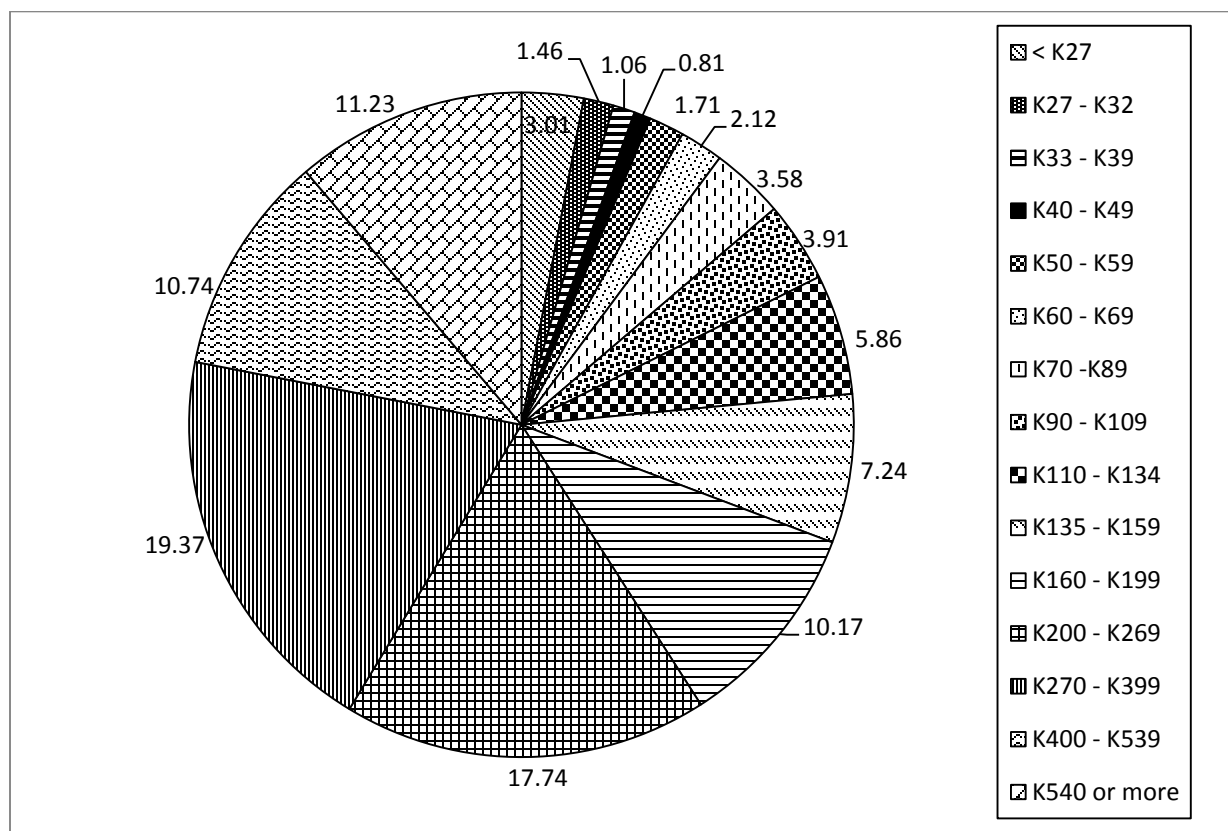


Table 4 below shows the main reason international tourists (non-residents) visited Zambia. The majority of respondents, about 66 percent, visited Zambia for tourism activities, mainly to visit Victoria Falls (43 percent) and for wildlife viewing and photography (23 percent). The percentage of respondents who visited Zambia for other reasons (other than to visit Victoria Falls and to view and/or photograph wildlife), including business and conference purposes, hunting, cultural trip and because visiting Zambia was part of a packaged tour, made up 34 percent.

Table 4: Main Reason for Visiting Zambia by International Tourists, N = 1416

Reason for visiting	Percentage
Business reasons	8.26
Conference	1.48
Visit Victoria Falls	43.29
Hunting trip	0.56
Adventure trip (rafting, boating, bungi jumping)	4.17
Cultural trip	1.84
Wildlife viewing and photography	22.53
Visit family/friends	9.25
It was included in packaged tour	3.88
Close to where I live	0.07
Recommended by friends/relatives/book	2.12
Good experience on previous trip	2.05
Other reason	0.49
Total	100.00

Tourism experience for international respondents was captured by asking respondents how often they had visited Zambia, inclusive of the trip when the survey was carried out. Table 5 below shows the international tourism experience of the international tourists. The majority of the respondents were visiting for the first time (71 percent), and only about 12 percent had been to Zambia at least 3 times in the 10 years prior to the date of the survey.

Table 5: International Respondents' Zambian Tourism Experience in the past 10 years, N = 1439

Number of visits (including on date of survey)	Percentage
First time	70.95
Twice	16.96
3 to 5 times	6.05
6 to 10 times	2.99
Over 10 times	3.06

Respondents' tourism experience was also captured by asking them the number of wildlife parks visited in the last five years (from the date of the survey) both in sub-Saharan Africa and in

the world, as well as the number of natural sites of outstanding beauty (excluding wildlife parks). Over 22 percent of the respondents had not visited any wildlife parks. On average, respondents had visited five wildlife national parks and ten natural sites in the world.

Respondents were also asked to state what they consider the most important reason for conservation of wildlife and natural landscapes in national parks. The results are presented in Table 6 below.

Table 6: Most Important Reason for Conservation of Wildlife and Natural Landscapes, in Percent of the Total Respondents, N = 1488

Importance	Percentage
Direct benefit by users (visitors)	6.59
Indirect benefit by non-users (non-visitors)	1.21
Option for visiting in future	4.23
Important for animal and plant life, regardless of its current or future use	24.87
Part of culture and identity of the local population	5.78
Important for future generations	21.64
Economic importance for the country	35.62
Other	0.07
Total	100.00

Overall, non-use values (existence and bequest values) and socio-economic values (economic importance and cultural identity for locals) were cited as most important reason to conserve wildlife and natural landscapes rather than use values (direct and indirect benefits by visitors and non-visitors).

Table 7 below shows the respondents' perceptions of selected park attributes at each of the four national parks. The majority of the respondents perceived Mosi-oa-Tunya National park as

‘good’ in all the selected attributes, that is, wildlife abundance and diversity, landscape quality, and congestion (number of people on site).

Table 7: Respondents’ Perceptions on Selected Park Attributes at Each Park

	Mosi-oa-Tunya	South Luangwa	Lower Zambezi	Kafue
Wildlife abundance	N = 967	N = 444	N = 147	N = 177
Very bad/Bad	13.34	2.03	10.20	4.52
Fair/ Average	34.02	9.23	16.38	21.47
Good/ Very good	52.64	88.74	73.47	74.01
Wildlife diversity	N = 960	N = 443	N = 146	N = 177
Very bad/ Bad	13.54	2.03	10.27	4.51
Fair/ Average	33.65	12.19	17.12	23.73
Good/ Very good	52.81	85.78	72.61	71.75
Landscape quality	N = 1014	N = 441	N = 144	N = 176
Very bad/ Bad	6.02	1.36	1.39	1.70
Fair/ Average	17.55	16.10	9.72	5.68
Good/ Very good	76.43	82.54	88.89	92.61
Congestion	N = 1013	N = 442	N = 145	N = 177
Very bad/ Bad	4.34	2.27	0.69	1.69
Fair/ Average	16.68	12.22	8.28	5.08
Good/ Very good	78.97	85.52	91.04	93.32

However, compared to the other parks, Mosi-oa-Tunya National Park had the highest percentage of respondents who ranked the park attributes as being ‘bad’ or ‘very bad’. Wildlife abundance and diversity were perceived as being ‘bad’ or ‘very bad’ by about 13 percent of the respondents who visited Mosi-oa-Tunya National Park. The majority of the respondents who

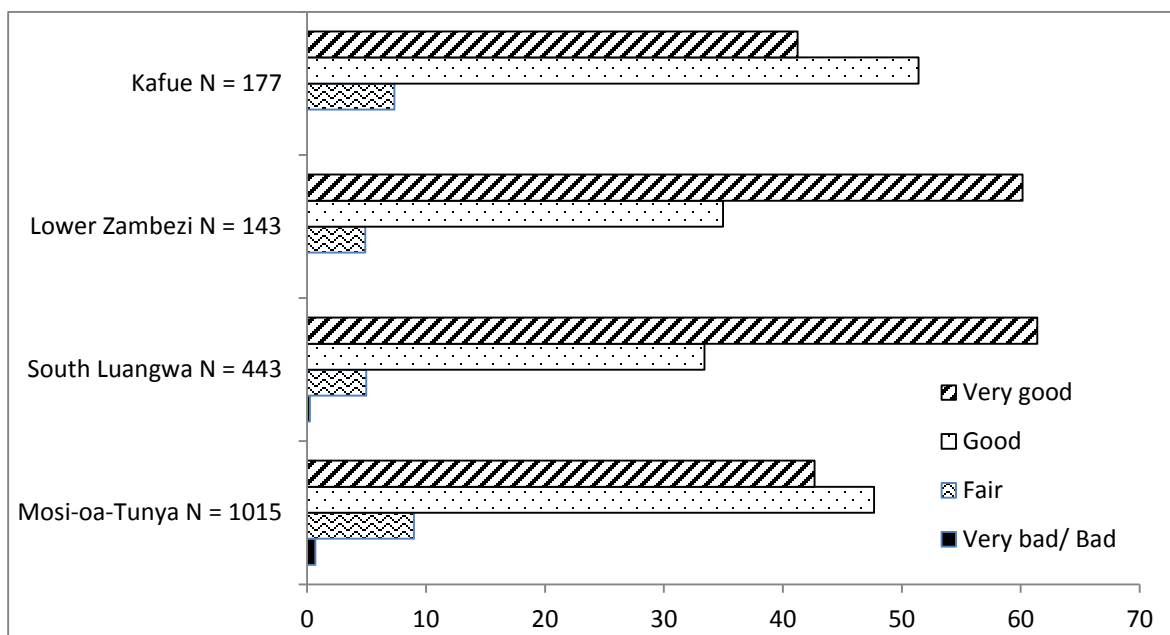
visited South Luangwa National Park ranked it as very good or good in all the selected park attributes. Only about two (2) percent of the respondents ranked any of the park attributes as being bad or very bad, with over 80 percent of the respondents who visited the park ranking all the attributes as good or very good. The majority of the respondents were happiest about wildlife abundance and diversity, which were ranked as very good or good by over 85 percent of the respondents who visited the park.

Compared to South Luangwa National Park, a lower percentage of respondents were satisfied with the wildlife abundance and diversity at Lower Zambezi National Park (about 70 percent). About 10 percent of respondents ranked these attributes as being unsatisfactory (bad or very bad). The majority of the respondents were happy with the level of congestion at the park, which was ranked as good or very good by almost 90 percent of the respondents who visited this park. The next highly ranked park attribute for Lower Zambezi National Park was landscape quality, which was ranked as good or very good by 88.89 percent of the total respondents who visited this park.

All of the selected park attributes were ranked by the majority of the respondents as either good or very good at Kafue National Park. The majority of the respondents were especially happy with the landscape quality and level of congestion at this park, which was ranked as good or very good by over 90 percent of the respondents who visited Kafue National Park. For all the attributes, only about 5 percent of the respondents at Kafue National Park were unhappy with the park services and ranked them as either bad or very bad. Overall, over 80 percent of the respondents who visited this park were happy with all the park attributes, and ranked them as either good or very good.

Figure 15 below shows the overall park experience at each of the four parks. The majority of the respondents at South Luangwa and Lower Zambezi had the highest ranking of ‘very good’. Respondents at Mosi-oa-Tunya National Park had the least number of respondents who ranked their overall experience as ‘very good’. Only about 43 percent of the respondents who visited this park ranked their overall experience as ‘very good’ compared to 61 percent and 60 percent at South Luangwa and Lower Zambezi, respectively.

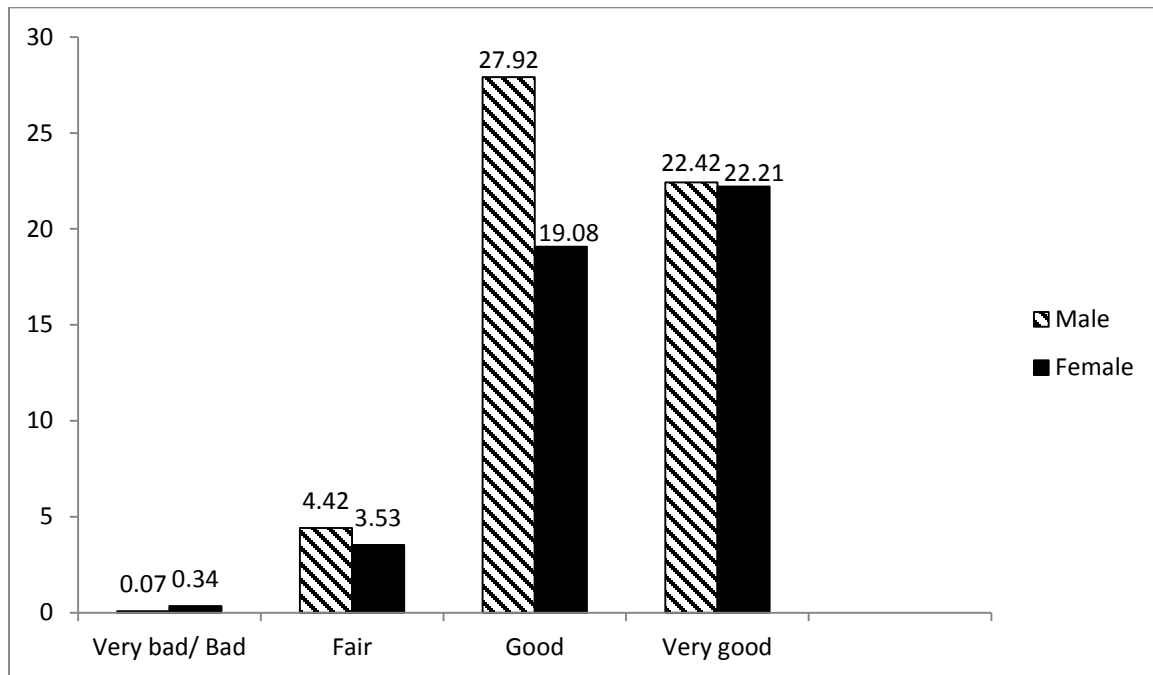
Figure 15: Respondents’ Perception on Overall Experience at Each Park



The overall experience at Lower Zambezi National Park was ranked by the majority of the respondents (60 percent) as ‘very good’ and ‘good’ (34.97 percent). None of the respondents ranked their overall experience at the park as being either ‘bad’ or ‘very bad’. The overall experience at Kafue National Park was considered by the majority of respondents as ‘good’ at 51.41 percent, followed by 41.24 percent of the park visitors who ranked their overall park experience as ‘very good’. None of the respondents ranked their overall park experience as being either bad or very bad at this park.

Figure 16 below shows the respondents' overall experience by gender as a percent of total respondents. Male respondents were generally happier with their overall park experience.

Figure 16: Respondents' Overall Experience by Gender in Percent of Total Respondents, N = 1472



Only about 0.07 percent of the male respondents ranked their overall experience as poor (bad or very bad) compared to 0.34 percent of the female respondents. Almost 10 percent more male respondents reported their overall park experience as 'good' relative to their female counterparts. About the same percentage of male and female respondents (22 percent) ranked their overall experience as 'very good'. Overall, the majority of the respondents was highly satisfied with their park experience (91.64 percent) and ranked their overall park experience as 'good' or 'very good'. Less than one percent of the total respondents ranked their overall experience as being 'bad' or 'very bad'.

2.6.1.1 VALUATION SECTION

The valuation section of the survey posed the willingness to pay question and asked each respondent the maximum fee he or she would personally be prepared to pay to visit a particular national park under current conditions and under improved conditions, including enhancement of the natural sites and increased wildlife abundance. Because entry fees are different for citizens, residents and non-residents, respondents were identified as citizens, residents and non-residents at inception, and the corresponding current entry fee was also identified. Respondents were then given the CV scenario and asked to identify and pick the maximum entry fee they would be willing to pay from the payment options on the payment card. For example, for respondents who visited South Luangwa National Park, the willingness to pay question was phrased as follows:

“The South Luangwa National Park is acknowledged as one of the greatest wildlife sanctuaries. The concentration of game there is among the most intense in Africa. Whilst staying in South Luangwa National Park, you can experience a walking safari, that allows you to get as close as possible to elephants, hippos or even lions...While you were planning your trip to South Luangwa National Park you learned that the entry fee had increased. What would be the maximum fee you personally are prepared to pay to visit South Luangwa National Park? This is the amount above which you would choose not to visit this park at all.”

Respondents were then shown a payment card from which they selected the maximum amount they would be willing to pay to enter the park. Also, for example, the follow-up question regarding improvements at South Luangwa read as follows:

“There have been proposals to improve the quality of the visit to South Luangwa National Park for tourists and raise more revenue for natural resources management. These include increasing the abundance of animals in South Luangwa National Park. The visitors will then be sure to see elephants, zebras, giraffes, antelopes and monkeys during each visit they make. The number of big cats will also be increased, so that people can expect to see at least one of them during a week stay. What would be the maximum fee you personally are prepared to pay to visit South Luangwa National Park in this case?”

The respondents were again shown the payment card to make their selection for the maximum amount they would be willing to pay. Respondents were also reminded that the length of their visit would be the same no matter what they pay and that they should not state an amount they could not afford, were unsure about, or felt would be better spent on other things. The phrasing of the questions for other parks was similar to the two scenarios above. (The language used for all parks is provided in Appendix 30.)

Table 8 below shows the interval ranges for WTP as gleaned from the survey data. The data is presented as intervals rather than point bids because the payment amounts were reported and captured in the data in various currencies (US Dollar, Euro, British Pound, South African Rand, and Zambian Kwacha⁶).

⁶ The Zambian Kwacha (ZMK) was rebased to the Zambian Kwacha (ZMW) on January 1, 2013 whereby 1000 ZMK = 1 ZMW. ZMK ceased to be legal tender in Zambia on June 13, 2013.

Table 8: Interval Selection for WTP for Park Entry Fee in Percent of Total Respondents at each Park

Code	Interval (USD)	Number (Percent)				Total
		Mosi-oa-Tunya N = 1132	South Luangwa N= 477	Lower Zambezi N = 156	Kafue N= 157	
1	0 – 4.99	5 (0.44)	1 (0.21)	1 (0.64)	3 (1.91)	10
2	5 – 9.99	11 (0.97)	11 (2.31)	3 (1.92)	19 (12.10)	44
3	10 – 14.99	61 (5.39)	7 (1.47)	4 (2.56)	7 (4.46)	79
4	15 – 19.99	99 (8.75)	1 (0.21)	2 (1.28)	30 (19.11)	132
5	20 – 24.99	256 (22.61)	77 (16.14)	34 (21.79)	59 (37.58)	426
6	25 – 29.99	243 (21.47)	106 (22.22)	25 (16.03)	16 (10.19)	390
7	30 – 34.99	240 (21.20)	106 (22.22)	30 (19.23)	12 (7.64)	388
8	35 – 39.99	57 (5.04)	17 (3.56)	9 (5.77)	1 (0.64)	84
9	40 – 44.99	55 (4.86)	68 (14.26)	22 (14.10)	1 (0.64)	146
10	45 – 49.99	14 (1.24)	7 (1.47)	0	1 (0.64)	22
11	50 – 74.99	75 (6.63)	53 (11.11)	23 (14.74)	7 (4.46)	158
12	75 – 99.99	8 (0.71)	6 (1.26)	1 (0.64)	1 (0.64)	16
13	100 – 149.99	6 (0.53)	15 (3.14)	2 (1.28)	0	23
14	150 – 199.99	2 (0.18)	2 (0.42)	0	0	4
15	200 or more	0	0	0	0	0

These were converted to 2005 US Dollar⁷ amount (two decimal places) using the OANDA online currency converter (www.oanda.com). Payment card data gives the interval within which each respondent's willingness to pay falls. For example, if a maximum WTP of USD30 is reported, then the assumption is that the respondent's true point valuation lies somewhere in the interval between the selected value and the next highest option (Cameron & Huppert, 1989). In this case

⁷ The exchange rate at the time of the survey was used (31 October 2005): 1ZMK = 0.00025USD; 1 Euro = 1.20590 USD; 1 British Pound = 1.77400 USD; 1 South African Rand = 0.14888 USD.

the true willingness to pay would be greater than or equal to USD30, but less than USD35. The mean WTP for park entry fees given the status quo and with park improvements at each of the four parks are presented in Table 9 below.

Table 9: Summary Statistics for WTP for Park Entry Fees with the Status quo and with Improvements at the Different Parks

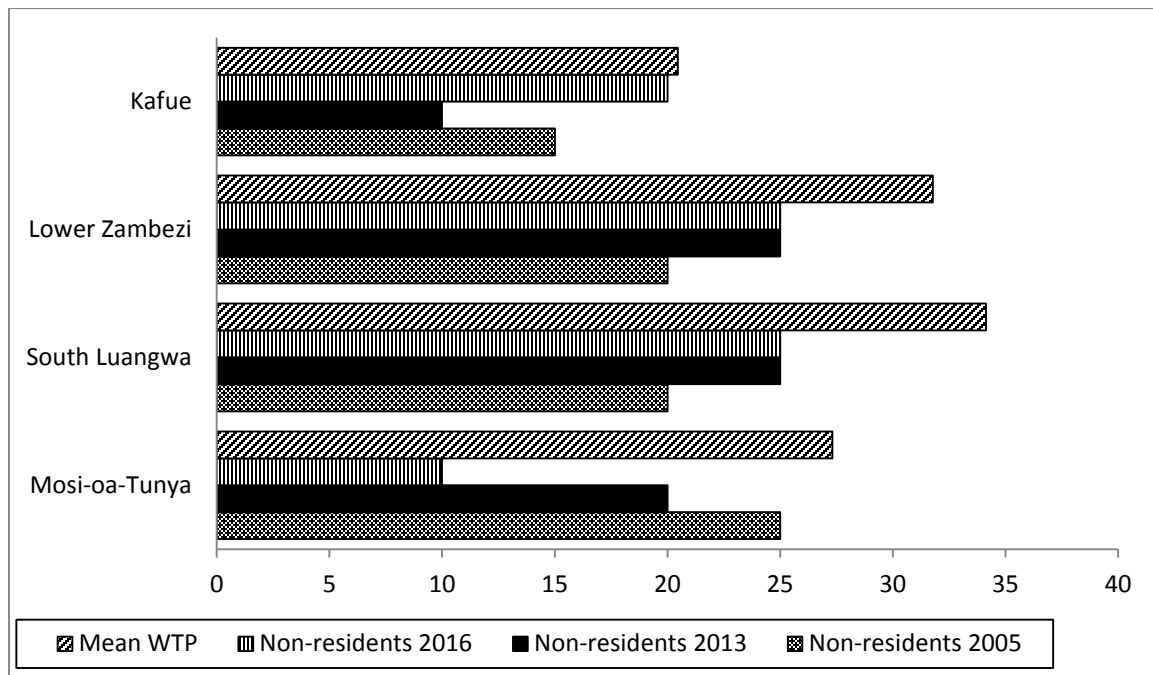
National Park	Observations (N)	Mean WTP (2005 USD)	Median (2005 USD)	Minimum (2005 USD)	Maximum (2005 USD)
Mosi-oa-Tunya					
Status quo	1132	27.32	25.00	1.49	150
Improvement	1132	36.48	30.00	2.23	200
South Luangwa					
Status quo	477	34.14	30.00	1	150
Improvement	476	42.45	35.00	4	250
Lower Zambezi					
Status quo	156	31.77	30.00	0	100
Improvement	162	38.25	35.00	0	100
Kafue					
Status quo	157	20.46	20.00	0	85
Improvement	155	25.48	25.00	0	100

The mean WTP was computed as the average WTP for all international respondents who reported their maximum willingness to pay at a particular park. Respondents who visited South Luangwa National Park had the highest overall mean willingness to pay of USD34.14 for park entry fee with the status quo. This corresponds to the level of satisfaction with park attributes

above. South Luangwa National Park had the highest number of respondents who rated their overall park experience as very good. Respondents who visited Lower Zambezi had the next highest overall mean willingness to pay of USD31.77 followed by Mosi-oa-Tunya (USD27.32), and lastly Kafue National Park (USD20.46). With respect to willingness to pay to visit a park with improvements such as increased wildlife abundance, a similar pattern emerges, with respondents who visited South Luangwa National Park reporting the highest overall mean willingness to pay for park improvements (USD42.45), followed by respondents who visited Lower Zambezi National Park (USD38.25) and Mosi-oa-Tunya (USD36.48), and lastly, Kafue with an overall mean willingness to pay for park improvements of USD25.48. The higher stated willingness to pay values for park improvements could be a result of the ‘warm glow effect’. According to Kahneman and Knetsch (1992), stated contingent valuation values do not represent the values of environmental resources but those of the moral satisfactions associated with such a ‘pledge’. The disparity between the mean willingness to pay per person per day and the median willingness to pay is not very large, an indication that the stated willingness to pay values are not skewed.

Figure 17 below shows the park entry fees for international tourists for the years 2005, 2013 and 2016 and how these compare to the mean willingness to pay at the four parks. The park entry fee for non-residents at Mosi-oa-Tunya National Park has declined from USD25.00 per person per day in 2005 to USD20.00 in 2013 to the current fee of USD10.00 in 2016. The lower fees may be a strategy to attract more tourists to this park, which respondents also ranked lower in terms of satisfaction on overall experience. However, the lower prices may not be desirable given that Mosi-oa-Tunya received the highest number of visitors relative to its size (an average of 19,639 per annum and it is only 66km²).

Figure 17: Mean WTP at the Four National Parks and Entry Fees in 2005, 2013 and 2016 for Non-residents



The international tourists were also generally dissatisfied with the level of congestion at this park. A high value but low density pricing policy may result in higher levels of utility for the international visitors. The park entry fees per person per day have increased from USD20.00 in 2005 to USD25.00 in 2013 for South Luangwa and Lower Zambezi National Parks and are currently at USD25.00. The park entry fees for Kafue National Park decreased from USD15.00 in 2005 to USD10.00 in 2013 but have since increased, and the current fee is USD20.00.

Comparison of the elicited mean WTP to the actual fees paid at the four parks in 2005, 2013 and currently shows that the reported willingness to pay is much higher than the prices in place, both in 2005 and in 2013, and even currently. This may be an indication that with appropriate targeted marketing strategies and suitable facilities the tourists could be willing to pay much more

than the current rates; hence there is great potential for increased receipts from tourism if the Zambian government invests in it.

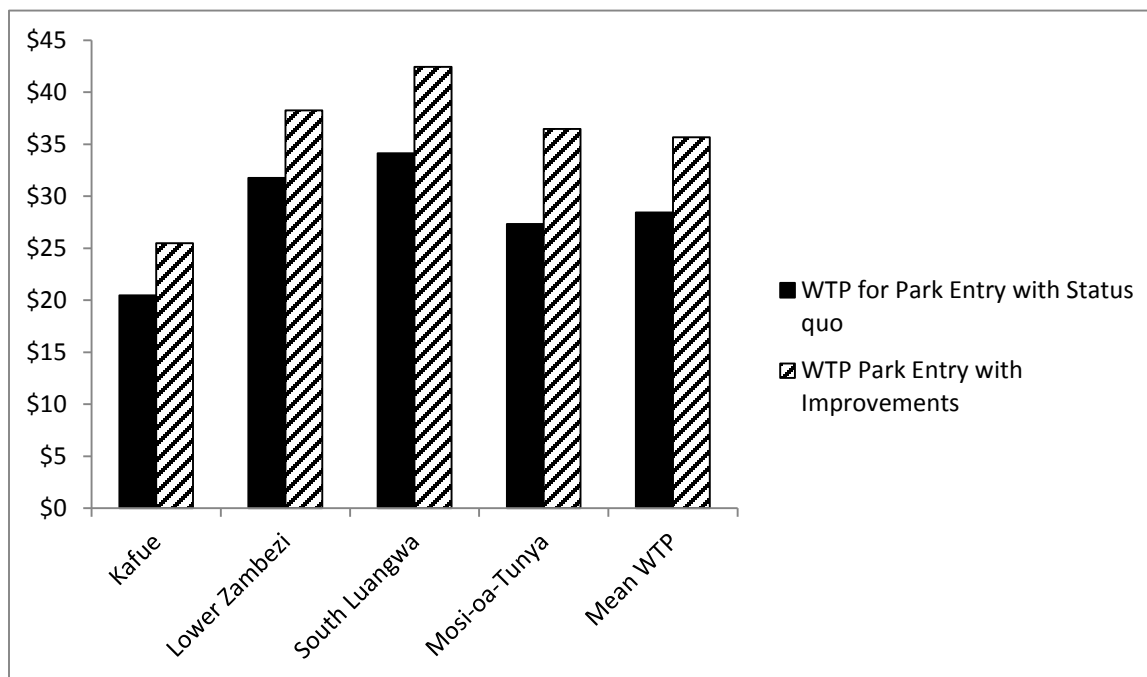
Also, from the above discussion, it is apparent that the use value or willingness to pay for park entry is closely linked with the actual fee charged or the cost of park access. Baron and Maxwell (1996) indicate that stated willingness to pay increases with cost even when the benefit is constant. In this case, the park entry fees for South Luangwa and Lower Zambezi National Parks are relatively higher than for Kafue and Mosi-oa-Tunya National Parks. The mean willingness to pay for park entry fees at Mosi-oa-Tunya was relatively close to what international tourists paid; however, the current park entry fees are more than 50 percent lower than what international tourists were willing to pay in 2005. The estimated mean willingness to pay park entry fees at South Luangwa are 45 percent higher the park entry fees in 2005 and about 20 percent higher than the current park entry fees. These estimates are relatively similar to those of Lower Zambezi National Park. The disparity between the mean willingness to pay and the park entry fees at Kafue National Park was about 27 percent when compared to park entry fees in 2005, but is only 2.25 percent at the current park entry fees. It is worth noting that the current park entry fee structures at the four parks are comparable to other national parks in the region⁸, if not slightly higher; hence, it cannot be definitely concluded that Zambian national parks are underpriced.

Figure 18 below shows how the willingness to pay park entry fees at the status quo compares with willingness to pay with park improvements. Willingness to pay for park entry with park improvements was higher than willingness to pay for park entry under current conditions at all the parks. The mean willingness to pay for park entry fees by international tourists with parks

⁸ South Africa's Kruger National Park charges park entry fees of about USD20.00 for foreign visitors or non-residents.

in the current state at Zambian National Parks was estimated to be USD28.42 per person per day and the mean willingness to pay for park entry with improvements at Zambian National Parks was estimated to be USD35.67. These represent the mean maximum willingness to pay above which the respondent would choose not to visit a park with and without the improvements.

Figure 18: Comparison of WTP for Park Entry with Status Quo and with Park Improvements



2.6.2 ECONOMETRIC ANALYSIS

This section presents the regression model used to evaluate the effect of the selected explanatory variables on willingness to pay for park entry fees to parks with the status quo and entry to parks with park improvements, a description of the dependent and explanatory variables, and the hypotheses. Two models for each park were analyzed for respondents' willingness to pay; one for park entry fees to parks as they currently exist and the other for park entry fees to parks with improved amenities (increased abundance of wildlife). Ordered probit was used because the

dependent variable was ordinal. An ordered probit is used to estimate models with more than two outcomes when the dependent variable is both discrete and ordinal (Borooah, 2002). According to Kromrey and Rendina-Gobioff (2002), ordinary least squares (OLS) models are not appropriate when data is ordinal as OLS treats the data as cardinal and assumes all values represent a continuous interval-level measure with the interval between any pair of categories assumed to be of the same magnitude as the interval between any other pair.

The general model describing the relationship between WTP and the different socio-economic covariates was specified as:

$$\begin{aligned}
 WTP_i = & \beta_1 gender + \beta_2 age + \beta_3 region + \beta_4 member + \beta_5 education + \\
 & \beta_6 employment + \beta_7 income + \beta_8 kids + \beta_9 park_visits + \beta_{10} reason_visit + \\
 & \beta_{11} diversity + \beta_{12} abundance + \beta_{13} congestion + \beta_{14} landscape + \beta_{15} safety + \\
 & \beta_{16} conserve_imp + \varepsilon_i
 \end{aligned} \tag{17}$$

where WTP_i = is willingness to pay by respondent i , and the β 's are estimated coefficients. These are not directly interpretable, but are important for showing the direction of the relationship between the dependent variable and the explanatory variables.

2.6.2.1 DESCRIPTION OF COVARIATES

A description of the explanatory variables included in the empirical analysis and the hypothesized impacts of the explanatory variables on willingness to pay are shown in Table 10 below and discussed subsequently. A total of 30 covariates was included in the models. All the explanatory variables except PARK_VISITS and INCOME are binary (either zero or one).

Table 10: Definition of Covariates used in Econometric Estimation

Variable name	Type of variable	Description	Variable Code	Hypothesized sign
Socio-economic Descriptors				
Gender	Binary	Gender of the respondent	1 if Male, 0 otherwise	+
Age	Binary	Age of the respondent	1 if 18 – 24 years, 0 otherwise* 1 if 25 – 34 years, 0 otherwise 1 if 35 – 44 years, 0 otherwise 1 if 45 – 54 years, 0 otherwise 1 if 55 – 64 years, 0 otherwise 1 if 65 years or more, 0 otherwise	+
Region	Binary	Respondent's region of residency	1 if Africa*, 0 otherwise 1 if Asia, 0 otherwise 1 if from Oceania, 0 otherwise 1 if Europe, 0 otherwise 1 if North America, 0 otherwise	+
Membership	Binary	Respondent is a member of a conservation, wildlife or environmental organization	1 if Yes, 0 otherwise	+
Education	Binary	Respondent's highest level of education	1 if secondary education or less, 0 otherwise* 1 if Professional qualification, 0 otherwise 1 if College degree, 0 otherwise 1 if Higher degree, 0 otherwise	+
Employment	Binary	Respondent gainfully employed	1 if employed, 0 otherwise	+
Income	Continuous	Gross yearly personal income	K13.5 to K620 (Millions)	+
Kids	Binary	Respondent has children	1 if Yes, 0 otherwise	-

Table 10 (cont'd)

Variable name	Type of variable	Description	Variable Code	Hypothesized sign
Tourism Characteristics				
Park_visit	Continuous	Number of wildlife parks visited	0 – 60	-
Purpose_visit	Binary	Main reason for visiting Zambia was to view wildlife and/or natural sites	1 if Yes, 0 otherwise	+
Falls	Binary	Visited Mosi-oa-Tunya	1 if Yes, 0 otherwise	+/-
Perceptions of Park Attributes				
Diversity	Binary	Perception on diversity of wildlife	1 if fair, good or very good, 0 otherwise	+
Abundance	Binary	Perception on abundance of wildlife	1 if fair, good or very good, 0 otherwise	+
Congestion	Binary	Perception on number of people on site	1 if fair, good or very good,, 0 otherwise	+
Landscape quality	Binary	Perception on landscape quality	1 if fair, good or very good,, 0 otherwise	+
Conserve_imp	Binary	Importance of conservation to society	1 if non-use benefits, 0 otherwise* 1 if use benefits, 0 otherwise 1 if socio-economic contribution to Zambian economy, 0 otherwise	+
Dependent Variable (WTP_i)				
wtp_entry	Categorical	Willingness to pay park entry fee with status quo	1= USD0.00 - USD24.99 2= USD25.00 - USD49.99 3=USD50.00 or more	
wtp_improvement	Categorical	Willingness to pay for park entry with park improvements	1= USD0.00 - USD24.99 2= USD25.00 - USD49.99 3=USD50.00 or more	

*: indicates the reference category

The socio-economic descriptors hypothesized to influence willingness to pay are as outlined below.

GENDER: The variable GENDER represents the gender of the respondent. It is included as a dummy variable, where 1 indicates male and 0 otherwise. It is expected that men would have a higher willingness to pay. According to Dupont (2004), women are likely to have a lower willingness to pay as they may have less money and less time to spend on recreational activities as they may be entrusted with child-rearing; they may also have a lower willingness to pay because of the systematic income gap between men and women. Nuva, Shamsudin, Radam and Shuib, (2009) found that male visitors to Gunung Gede Pangrango National Park were on average willing to pay a bid price 1.775 times higher than female visitors.

AGE: The age of the respondent is represented by seven binary variables representing age categories ranging from 18 – 24 years to 65 years or more. The age category 18 – 24 years, defined as AGE1, is the reference category; it is expected to include mostly students with relatively low income. It is expected that age of the respondent will be positively related to willingness to pay. That is, as age increases, willingness to pay increases. This is expected as generally we expect income to increase with age as an individual gains more experience. This hypothesis is in line with previous literature where a positive relationship between age and willingness to pay was observed (Hammitt, Liu, J-T. & Liu, J-L., 2001; Muchapondwa, Carlsson & Köhlin, 2008; Baral, Stern & Bhattarai, 2008; Jin et al., 2010).

REGION: Geographic regions are represented with a series of five binary variables representing Africa (REGION1), Asia (REGION2), Oceania (REGION3), Europe (REGION4) and North America (REGION5). It is expected that individuals from geographic regions with a higher average gross domestic product (GDP) per capita will have a higher willingness to pay.

Africa was selected as the base category since, from the five regions defined, it has the lowest GDP per capita (www.worldbank.org). It is therefore expected that the coefficients for the region dummy variables for the other regions will be positive as they are likely to have a higher willingness to pay than respondents from Africa.

MEMBERSHIP: Membership in an environmental organization would imply that an individual has preferences aligned with environmental concerns and subsequently would have more information and be more aware of environmental issues. Membership in an environmental organization is expected to have a positive effect on willingness to pay. This hypothesis reflects results of previous studies; for example, Jin et al. (2010) and Baral et al. (2008) found membership in an environmental organization to be positively related to (and a highly significant determinant of) willingness to pay for marine turtle conservation.

EDUCATION: Education level is represented by four (4) dummy variables representing secondary education or less (EDU1), professional qualification (EDU2), college degree (EDU3) and higher degree (EDU4). EDU1 was selected as the base category since, from the four categories defined, it represents the lowest level of education. In general, individuals with a higher educational attainment would appear to appreciate nature-based activities and have increased awareness of conservation and/or preservation of natural habitats and wildlife resources more than people with less formal education. Also, education is generally related to income; when somebody has a high level of education, most probably they will earn a higher income (Samdin, Aziz, Radam & Yacob, 2010). Thus, it is expected that education will have a positive effect on willingness to pay, and the hypothesized sign is positive given a reference category of ‘secondary education or less’.

EMPLOYMENT: The covariate employment is a binary variable indicating whether a respondent is formally employed or not. Respondents were categorized into formal employment if they were either self-employed or in full-time or part-time employment. A positive relationship is hypothesized between employment (1 if employed, 0 otherwise) and willingness to pay. Respondents engaged in formal employment are likely to have higher income and are likely to have a higher willingness to pay relative to a student or someone who is retired, an unpaid volunteer, or someone on disability allowance.

INCOME (gross annual personal income): Another variable expected to influence an individual's willingness to pay is level of income. The income was reported in Zambian Kwacha only, in 15 categories. Income was represented as a continuous variable found by computing the midpoints of the income ranges reported. Nature tourism activities related to wildlife and natural sites are widely considered to be normal goods; thus, with other things held constant, the higher the respondent's gross annual personal income, the higher the expected willingness to pay. The coefficient for the income variable is expected to be positive.

KIDS: In willingness to pay studies, the more common variable is the household or family size. However, in this case, household size was not included in the survey. Instead respondents were asked whether they have any children (including independent children). This variable is expected to be negatively related to willingness to pay for park entry under the current conditions and with improvements as a respondent with no children may have a higher willingness to pay for park entry given the status quo and with park improvements as preferences are more likely to be leisure-oriented than when children are present (Ekert-Jaffe & Grossbard, 2011).

The tourism characteristics hypothesized to influence willingness to pay are the number of wildlife park visits and tourism as the main reason for visiting Zambia.

PARK_VISITS: This variable represents the number of times a respondent has visited a wildlife park in the 5 years prior to the survey. A respondent who has visited wildlife parks numerous times can be expected to have lower marginal utility from an additional wildlife park visit than someone who sparingly visits wildlife parks. It is expected that an increase in the number of park visits may result in a lower willingness to pay; thus a negative sign is hypothesized.

PURPOSE_VISIT: This independent variable shows whether the main reason a respondent visited Zambia was to view (or photograph) wildlife and/or to see Victoria Falls. The 13 initial categories were recoded into a binary variable coded 1 if the main reason for visiting Zambia was for wildlife viewing and photography and/or to visit Victoria Falls and 0 otherwise. As the majority of respondents visit Zambia to visit for wildlife viewing and photography and to visit Victoria Falls, a natural site, visitors to the parks for these purposes are expected to have a higher willingness to pay as the demand for visits to Victoria Falls and wildlife viewing and photography is higher. Thus, a positive relationship is hypothesized for this covariate.

FALLS: This variable captures the variability associated with the unique offerings of Mosi-oa-Tunya National Park which has the Victoria Falls. The variable is coded 1 if a respondent visited Mosi-oa-Tunya, and 0 otherwise. Given that Mosi-oa-Tunya is the only park with access to the Victoria Falls, we expect that respondents who visit it would have a higher willingness to pay, thus a positive coefficient is hypothesized for this variable.

The following explanatory variables represent the respondents' perception of the quality of selected features of the national parks, ranked on a five-point Likert scale ranging from 'very bad' to 'very good'. The variables were recoded into dummy variables where 'very bad' and 'bad' were coded as 0 and 'fair', 'good' and 'very good' as 1.

DIVERSITY: This variable shows the respondent's perception of wildlife diversity at the national parks. A positive relationship is hypothesized as lower rankings will be associated with low willingness to pay and higher rankings of either 'fair', 'good' or 'very good' with higher willingness to pay.

ABUNDANCE: This variable shows the respondent's perception of wildlife abundance at the national parks visited. Tourists visit wildlife parks expecting to attain a certain level of utility from seeing wildlife in abundance. A positive relationship is therefore hypothesized as low rankings will be associated with low willingness to pay and ranking of fair, good or very good with higher willingness to pay.

CONGESTION: The explanatory variable congestion captures the relationship between the perceived level of congestion, which is the number of people on site during a park visit, and willingness to pay. National parks are congestible resources by nature of being excludable but non-rival. Though non-rival (one person's consumption will not diminish the amount available to others), increased congestion will reduce an individual's level of utility and recreational benefits associated with a park visit and therefore will result in lower willingness to pay. According to Cicchetti and Smith (1973) the quality of an individual's wilderness experience declines as a direct result of perceived congestion. A positive relationship is therefore expected with low rankings associated with low willingness to pay, and high rankings with higher willingness to pay.

LANDSCAPE QUALITY: This explanatory variable shows the respondent's perception of the landscape quality at the national parks visited. Perceived high landscape quality will be associated with high willingness to pay. A positive relationship between landscape quality and willingness to pay is hypothesized.

CONSERVE_IMP: This variable captures the respondent's perceptions of the most important reason to conserve wildlife parks and natural landscapes for society. The variable was categorized from the original seven categories as shown in Table 6 into three binary variables representing non-use benefits (option values, existence values and bequest values), defined as USE1, use benefits (direct or indirect) or USE2, and socio-economic benefits defined as USE3 (part of culture and identity of the local population and contribution to country's economy through local livelihoods, employment, tourism etc.). According to Loomis (2012) the importance of non-use values relative to use values appears to vary by uniqueness of the natural environment being valued. However, empirical evidence suggests that non-use values are often higher than use values for the same resource (Marre et al., 2015; Brander & van Beukering, 2013; Loomis, 2012; Becker & Freeman, 2009). Theoretically, it can be expected that respondents who view non-use benefits as the most important reason to conserve wildlife and natural sites will have a lower willingness to pay, as there is no tangible or direct benefit, when compared to those who view conservation as important for use benefits including socio-economic importance to the local people and economy. Thus, the coefficients for the other dummy categories for importance of conservation are expected to be positive with the base category of 'non-use benefits'.

The dependent variables are categorical variables representing the respondents' probability of willingness to pay for park entry fees with parks in their current state and with park improvements being in a certain category. For regression purposes and ease of analysis and interpretation, the dependent variable was re-categorized into 3 categories from the 15 previously stated as specified above. Adjacent categories for the dependent variable were combined further as in some models convergence was not achieved due to small number of observations in the categories. According to Long (1997), ordered probit in STATA may fail to run if the dependent

variable takes on too many different values. This problem might be solved by merging an outcome category with a small number of cases into an adjacent category. In the final models, the dependent variables were categorized into three: 1 = 0 – 24.99, 2 = 25 – 49.99 and 3 = 50 or more; representing low, moderate and high willingness to pay, respectively.

Table 11 and 12 below show the ranges of possible willingness-to-pay categories as well as the distribution of responses for park entry fees with park in the current state and with park improvements, respectively. According to Table 11, for all the parks, except Kafue National Park, the majority of the respondents, which is at least 50 percent of the respondents at any given park, fall into the moderate willingness to pay category (USD25 to USD49.99) for park entry fees with the current park state.

Table 11: Distribution of WTP Park Entry Fees with Status quo by WTP Category

WTP	Mosi-oa-Tunya		South Luangwa		Lower Zambezi		Kafue	
Category	N = 1132		N = 477		N = 156		N = 155	
(USD)	Freq.	Percent	Freq.	Percent	Freq.	Percent	Freq.	Percent
1:0 to 24.99	432	38.16	97	20.34	44	28.21	71	45.81
2: 25 to 49.99	609	53.80	304	63.73	86	55.13	73	47.10
3: 50 or more	91	8.04	76	15.93	26	16.67	11	7.20

Respondents who visited South Luangwa and Lower Zambezi had the highest proportion of respondents in the high willingness to pay category of USD50 or more at about 16 percent. The highest proportion of respondents in the low willingness to pay category for park entry fee was at Kafue National Park with almost 78 percent.

Table 12: Distribution of WTP for Park Entry fee with Improvements by WTP Category

WTP	Mosi-oa-Tunya		South Luangwa		Lower Zambezi		Kafue	
Category	N = 1131		N = 474		N = 162		N = 155	
(USD)	Freq.	Percent	Freq.	Percent	Freq.	Percent	Freq.	Percent
1: 0 – 24.99	180	15.92	57	12.03	34	20.99	71	45.81
2: 25 – 49.99	720	63.66	259	54.64	74	45.68	73	47.10
3: 50 or more	231	20.42	158	33.33	54	33.33	11	7.10

The majority of respondents at two of the four parks (Mosi-oa-Tunya and South Luangwa) reported a willingness to pay that fell into the moderate willingness to pay category of USD25.00 to USD49.99. Respondents at Kafue National Park recorded the highest percentage of respondents in the lowest willingness to pay category.

2.6.2.2 REGRESSION MODELS DIAGNOSTICS

The model was tested for multicollinearity and specification error. The presence of any of these diagnostic problems will result in a number of problems including biased coefficient estimates or standard errors and/ or very large standard errors and, hence, invalid significance tests and statistical inference. Multicollinearity results in larger coefficients with wide confidence intervals and very small test statistics. In an effort to minimize multicollinearity problems in the regression models, correlation matrices and variance inflation factors (VIFs) were used to help detect multicollinearity.

To use the VIF method to determine whether multicollinearity is an issue, all the models were initially run using OLS regression analysis, and the VIF command in STATA was executed.

According to Menard (2002) the functional form of the model for the dependent variable is irrelevant to the estimation of collinearity. Hence diagnostic information for multicollinearity, for example VIFs, can be obtained from running an OLS regression model using the same dependent and independent variables as in the ordered probit, but ignoring all of the results except those pertaining to multicollinearity.

A VIF quantifies the severity of multicollinearity in an OLS regression model. It shows how much the variance (the square of the estimate's standard deviation) of the estimated regression coefficients is inflated or increased because of collinearity. In the presence of multicollinearity the standard errors and hence the variances of the estimated coefficients are inflated. A VIF of 1 means that there is no correlation among the k^{th} predictor and the remaining predictor variables, and hence the variance of b_k is not inflated at all. The general rule of thumb is that VIFs exceeding 4 warrant further investigations, while VIFs exceeding 10 are signs of serious multicollinearity requiring correction (Cohen, J., Cohen, P., West, & Aiken, 2003). However, it is worth noting that there are instances when high VIFs are not a problem and can be safely ignored. According to Allison (2012) there are three instances when a high VIF is not a problem and can be safely ignored:

1. The variables with high VIFs are control variables, and the variables of interest do not have high VIFs;
2. The high VIFs are caused by the inclusion of powers or products of other variables;
3. The variables with high VIFs are indicator (dummy) variables that represent a categorical variable with three or more categories.

Because analysis of correlations only among *pairs* of predictors is limiting as it is possible that the pairwise correlations are small, and yet a linear dependence exists among three or even

more variables, both bivariate and simple correlations of estimated coefficients were used together with the *VIFs* to help detect multicollinearity. The correlation matrices showed that the variables abundance and diversity (wildlife) were moderately correlated (0.79), with *VIFs* of 2.56 (mean *VIF* of 2.48). Since the variables were not highly correlated and had low *VIFs* both variables were included in the models.

To insure that the ordered probit model is the correct model specification given the data used, the final restricted models were subjected to a specification error test using the *linktest* command in STATA. If the model is properly specified, it will not be possible to find any additional predictors that are statistically significant (UCLA Statistical Consulting Group, 2014). The *linktest* uses the linear predicted value, defined as *_hat* in STATA, and linear predicted value squared (*_hatsq*) as the predictors to rebuild the model after the ordered probit regression command. If the model is properly specified, the variable *_hatsq* would have no predictive or explanatory power except by chance and should therefore not be significant (StataCorp, 2009). That is, the link test should not be significant ($p\text{-value} \geq 0.1$).

Heteroscedasticity results in biased standard errors and in turn biased test statistics and confidence intervals. Though the presence of heteroscedasticity was not confirmed by running any specific test, to insure that it was minimized, robust standard errors were used for all the models. Robust standard errors address the problem of errors that are not independent and identically distributed. According to Allison (1999), the use of robust standard errors does not change coefficient estimates, but the test statistics will give reasonably accurate *p*-values.

The ordered probit statistical model was used to compute the average marginal probability effects (AME) of changes in the explanatory variables on the probability of a high, moderate or low willingness to pay. AME are thought to be superior to the often popular Marginal Effect (ME)

that compute the marginal effects when all the independent variables are at their mean, because with AME the marginal effect is computed for each observation, and then all the computed effects are averaged (Long & Freese, 2006).

2.6.3 ECONOMETRIC ANALYSIS RESULTS AND DISCUSSION

This section presents the results from the ordered probit models used to evaluate the effects of different selected explanatory variables on willingness to pay for park entry fees at the current state and with park improvements for national parks in Zambia. The empirical models were estimated using the OPROBIT command in STATA, which is a maximum likelihood estimator for ordered probit models. The parameter estimates and the average marginal effects (AME) for willingness to pay for park entry fees with parks in their current state are presented and discussed first, followed by those for willingness to pay for park entry fees with park improvements.

2.6.3.1 WILLINGNESS TO PAY PARK ENTRY FEES WITH THE STATUS QUO

The Likelihood ratio (LR) test results show that the covariates are not simultaneously zero and therefore explain some of the variability in the model. Out of the 30 explanatory variables, only seven were found to be statistically significant determinants of WTP for park entry fees at the current state. Table 13 below shows the estimated coefficients, standard errors (in parentheses) and the average marginal effects for willingness to pay for park entry fees in Zambia.

Table 13: WTP Park Entry Fees with Status quo and the AME, N = 1189

Variable	Coefficient (Robust standard error)	Outcome 1 (0 ≤ WTP < 25)	Outcome 2 (25 ≤ WTP < 50)	Outcome 3 (WTP ≥ 50)
GENDER	-0.149 (0.070)**	0.053	-0.029	-0.024
AGE				
AGE2	0.046 (0.186)	-0.018	0.012	0.006
AGE3	0.057 (0.183)	-0.022	0.014	0.007
AGE4	0.247 (0.191)	-0.091	0.055	0.036
AGE5	0.339 (0.196)	-0.123	0.069	0.053
AGE6	0.584 (0.223)***	-0.202	0.089	0.111
REGION				
REGION2	-0.527 (0.262)**	0.203	-0.163	-0.041
REGION3	0.217 (0.154)	-0.081	0.052	0.030
REGION4	0.286 (0.115)**	-0.106	0.065	0.041
REGION5	0.225 (0.130)*	-0.084	0.053	0.031
MEMBERSHIP	0.114 (0.076)	-0.041	0.022	0.018
EDUCATION				
EDU2	0.145 (0.129)	-0.050	0.023	0.026
EDU3	-0.136 (0.119)	0.049	-0.028	-0.021
EDU4	-0.005 (0.125)	0.016	-0.0009	-0.0009
EMPLOYMENT	0.107 (0.105)	-0.038	0.021	0.017
INCOME	0.00017 (0.0002)	-0.00006	0.00003	0.00003
KIDS	-0.104 (0.077)	0.037	-0.020	-0.017
PARK_VISIT	-0.003 (0.005)	0.001	-0.0007	-0.0006
PURPOSE_VISIT	0.035 (0.073)	-0.013	0.008	0.006
FALLS	-0.038 (0.071)	0.014	-0.007	-0.006
DIVERSITY	0.133 (0.186)	-0.047	0.026	0.021
ABUNDANCE	-0.228 (0.184)	0.082	-0.045	-0.037
CONGESTION	0.226 (0.205)	-0.081	0.044	0.037
LANDSCAPE	-0.028 (0.191)	0.010	-0.005	-0.004
CONSERVE_IMP				
USE2	0.232 (0.139) *	-0.086	0.053	0.033
USE3	0.246 (0.142)*	-0.091	0.056	0.035
Cut 1	0.253			
Cut 2	2.031			
N	1189			
LR Chi² (25)	52.53***			
Pseudo R²	0.0243			

*, **, *** indicate significance at the 10, 5 and 1 percent level, respectively.

Determinants of WTP for park entry fees were found to be GENDER, AGE, REGION and CONSERVE_IMP. The variable GENDER was significant at the five percent level, though it had an unexpected negative sign. According to the results female tourists are more likely to be in the higher categories of WTP compared to male tourists. Only one of the age categories, AGE6 (65 years or more) was significant, at the one percent significance level, and had the hypothesized sign implying that relative to respondents 18 - 24 years of age, respondents aged 65 years or more are more likely to be in the higher willingness to pay categories.

Whether a respondent was from Asia (REGION1), Europe (REGION4) or North America (REGION5) was an important determinant of willingness to pay park entry fees. Tourists from Asia are less likely to report a higher willingness to pay or be in the highest willingness to pay category compared to tourists from African countries. On the contrary, tourists from Europe and North America are more likely to be in the higher willingness to pay category as expected, given the higher average GDP per capita in these regions.

Other statistically significant variables were the two dummy variables for importance of conservation to society, USE2 (use benefits to visitors and non-visitors) and USE3 (socio-economic benefits to Zambian economy). These variables were statistically significant at the 10 percent level and had the expected positive sign.

As hypothesized, the results indicate that tourists who cited socio-economic or use benefits as the more important reason for conservation are more likely to be in the higher WTP category than those who say non-use benefits are more important but are less likely to be in the lower categories. The rest of the explanatory variables were not statistically significant. That is, these explanatory variables do not have a significant effect on willingness to pay for park entry fees at

their current state. It is interesting to note that most of the insignificant variables do however have the correct a priori sign, for example MEMBERSHIP, EMPLOYMENT and INCOME.

2.6.3.2 AVERAGE MARGINAL EFFECTS

The average marginal effects show the change in probability of being in a given dependent variable category when the predictor or independent variable increases by one unit, for continuous variables, or when there is a change in the category for the categorical variable. The average marginal effects are computed by default by the margins command in STATA. This command computes the marginal effect of each observation with respect to an explanatory variable, averaged over the estimation sample.

From the AME in Table 13 above, male tourists are about five percent more likely to be in the 0 to 24.99 willingness to pay category and two to three percent less likely to be in the moderate or high willingness to pay category compared to their female counterparts. Respondents who are age 65 years and above are about 20 percent less likely to be in the lowest willingness to pay category and are about nine percent more likely to be in the moderate willingness to pay category and 11 percent more likely to be in the highest willingness to pay category relative to respondents in the 18 – 24 category.

Respondents from Asia are 20 percent more likely to be in the lowest willingness to pay category compared to tourists from Africa and 16 percent less likely to be in the moderate willingness to pay range. Tourists from Asia are only about four percent less likely to be in the highest willingness to pay category. Respondents from Europe and North America were found to be 11 percent and eight percent less likely to be in the lowest willingness to pay category,

respectively, as compared to those from Africa, and about five to seven percent and three to four percent more likely to be in the moderate or high willingness to pay categories, respectively.

Tourists who viewed wildlife conservation as being important because it is a vital component of use benefits for visitors and non-visitors (USE2) were nine percent less likely to be in the lowest willingness to pay category and five and three percent more likely to be in the moderate and highest willingness to pay categories, respectively. Respondents who perceived conservation as important for Zambian economic development (USE3) were also about nine percent less likely to be in the lowest willingness to pay category and six percent more likely to be in the moderate category and four percent more likely to be in the highest willingness to pay category compared to those who viewed non-use benefits as the main importance of wildlife conservation.

2.6.3.3 WILLINGNESS TO PAY PARK ENTRY FEES WITH IMPROVED PARKS

The determinants of willingness to pay to visit a park with improvements were identified as GENDER, AGE4, AGE5, AGE6, REGION4, PURPOSE_VISIT, CONGESTION and the two binary variables for CONSERVE_IMP, USE2 and USE3. Table 14 below shows the estimated coefficients and standard errors for the willingness to pay park entry fees for a park with improvements at Zambian national parks. GENDER was significant at the 10 percent and indicates that, contrary to expectation, female tourists are more likely to have a higher willingness to pay or to be in the higher willingness to pay category than male tourists. The coefficient in the age category 45 - 54 years (AGE4) was significant at the 10 percent level and had the hypothesized sign, indicating that these respondents are more likely to be in the higher willingness to pay categories compared to respondents in the base category (18 - 24 years).

Table 14: WTP for Improved Parks and the Average Marginal Effects, N = 1187

Variable	Coefficient (Standard error)	Outcome 1 (0 ≤ WTP < 25)	Outcome 2 (25 ≤ WTP < 50)	Outcome 3 (WTP ≥ 50)
GENDER	-0.126 (0.069)*	0.031	0.005	-0.036
AGE				
AGE2	0.285 (0.177)	-0.082	0.014	0.065
AGE3	0.275 (0.173)	-0.080	0.014	0.066
AGE4	0.368 (0.182)**	-0.103	0.011	0.092
AGE5	0.46 (0.185)**	-0.114	0.008	0.110
AGE6	0.565 (0.211)***	-0.145	-0.008	0.153
REGION				
REGION2	-0.144 (0.272)	0.044	-0.011	-0.033
REGION3	0.163 (0.158)	-0.044	0.001	0.043
REGION4	0.223 (0.120)*	-0.058	-0.001	0.060
REGION5	0.191 (0.136)	-0.051	0.0002	0.050
MEMBERSHIP	0.110 (0.074)	-0.027	-0.004	0.031
EDUCATION				
EDU2	0.217 (0.140)	-0.050	-0.020	0.069
EDU3	-0.016 (0.130)	-0.005	-0.0007	0.006
EDU4	0.050 (0.136)	-0.015	-0.003	0.018
EMPLOYMENT	-0.129 (0.107)	0.032	0.005	-0.037
INCOME	0.00008 (0.0002)	-0.00002	-2.86x10 ⁻⁶	0.00002
KIDS	-0.036 (0.077)	0.009	0.001	-0.010
PARK_VISIT	-0.0004 (0.005)	0.00009	0.00001	-0.0001
PURPOSE_VISIT	0.140 (0.073)*	-0.034	-0.005	0.040
FALLS	0.013 (0.068)	-0.003	0.003	0.004
DIVERSITY	-0.128 (0.188)	0.031	0.005	-0.036
ABUNDANCE	0.196 (0.191)	-0.048	-0.007	0.056
CONGESTION	0.426 (0.185)**	-0.104	-0.016	0.121
LANDSCAPE	-0.213 (0.190)	0.053	0.008	-0.062
CONSERVE_IMP				
USE2	0.480 (0.131)***	-0.138	0.022	0.116
USE3	0.439 (0.132)***	-0.128	0.024	0.104
Cut 1	0.106			
Cut 2	1.906			
N	1187			
LR Chi² (25)	56.98***			
Pseudo R2	0.0258			

*, ** indicate significance at the 10 and 5 percent level, respectively.

The coefficients for the age categories 55 - 64 years (AGE5) and 65 years or more (AGE6) were significant at the five percent significance level and had the hypothesized positive sign, thus as expected, willingness to pay to visit an improved park increases with age and it can be expected that respondents in the base category of 18 to 24 years are more likely to be in lower willingness to pay category than respondents in the higher age categories. The variables REGION4 and PURPOSE_VISIT were statistically significant at the 10 percent level of significance and had the expected sign. As expected respondents from Europe were more likely to be in the higher willingness to pay category compared to respondents originating from African countries. Tourists who visited Zambia for tourism activities were more likely report a willingness to pay in the higher willingness to pay category compared to tourists who visited for other reasons such as business or to visit friends or family.

The coefficient for the variable CONGESTION was significant at the five percent level. Tourists who perceived congestion levels as fair, good or very good were more likely to report willingness to pay in the higher willingness to pay category. The variables USE2 and USE3 were highly statistically significant and had the positive expected sign. Again, this indicated that tourists who perceived the importance of wildlife and natural sites conservation as use benefits directly to visitors or indirectly to non-visitors and for socio-economic benefits to Zambia were more likely to report willingness to pay in the higher willingness to pay categories.

2.6.3.4 AVERAGE MARGINAL EFFECTS

Table 14 above also shows the average marginal effects of the explanatory variables for the three possible outcomes ($0 \leq WTP < 25$; $25 \leq WTP < 50$; $WTP \geq 50$). Male tourists are about three percent more likely to be in the 0 to 24.99 willingness to pay category and only about 0.5

percent more likely to be in the moderate willingness to pay category compared. Male tourists are four percent less likely to be in the highest WTP than female tourists. In general, higher age categories are associated with being more likely to be in the intermediate or high WTP category. The results indicate that respondents in higher age categories are about 10 to 15 percent less likely to be in the low willingness to pay category of $0 \leq WTP < 25$. Though tourists aged 45 - 54 years and 55 - 64 years are more likely to be associated with a higher chance of being in the moderate willingness to pay category (0.8 to 1.1 percent), respondents aged 65 years and more are less likely to be in this willingness to pay category, relative to 18 – 24 year olds. Tourists in these higher age categories are however about nine percent to 15 percent more likely to be in the highest willingness to pay category of $WTP \geq 50$, compared to respondents in the base category of 18 to 24 years. In particular, respondents aged 65 years and more (AGE6) are about 15 percent less likely to be in the lowest willingness to pay category, 0.8 percent less likely to be in the moderate willingness to pay bracket and 15 percent more likely to be in the high willingness to pay category relative to those in the 18 to 24 age bracket.

Respondents from REGION4 (Europe) are about six percent less likely to be in the low willingness to pay category, only about 0.1 percent less likely to be in the moderate willingness to pay category and six percent more likely have a willingness to pay greater than or equal to USD50 compared to respondents from Africa. Respondents who visited Zambia specifically to view wildlife and/or natural sites were 3.4 and 0.5 percent less likely to be in the low and moderate WTP categories, respectively, and about four percent more likely to be in the highest WTP category relative to those who visited Zambia for other reasons. Tourists who were satisfied with the level of congestion were 10 percent less likely to be in the lowest willingness to pay category and about two percent less likely to be in the moderate willingness to pay category. These were,

however, 12 percent more likely to report a willingness to pay in the highest willingness to pay category of USD50 or more.

The results show that respondents who indicated use benefits (USE2) and socio-economic benefits to Zambians (USE3) as the more important reasons for conservation of wildlife and natural landscapes are less likely to be in the lowest WTP category than those who say non-use benefits (USE3) are more important but are more likely to be in the moderate and highest willingness to pay categories. Respondents who perceived use benefits (USE2) and socio-economic benefits (USE3) as important reasons for wildlife conservation are about 13 to 14 percent less likely to be in the low willingness to pay category and are more likely to be associated with the high willingness to pay category by about 10 to 12 percent, compared to those who indicated non-use benefits as the important reason for conservation. Respondents who perceived use benefits (USE2) and socio-economic benefits (USE3) as important reasons for wildlife conservation are only about two percent more likely to be in the moderate willingness to pay bracket.

The income variable was not statistically significant in any of the models, though theoretically and from other empirical results it was expected to positively and significantly influence willingness to pay (Barnes et al., 1999; Samdin et al., 2010; Khan, Ali, Shah & Shoukat, 2014). One possible explanation may be that other variables such as age and education level may be proxies for income and the income effect has been captured by these.

2.7 CONCLUSIONS AND POLICY RECOMMENDATIONS

2.7.1 TOURISTS' PERCEPTIONS OF PARK ATTRIBUTES AND CONGESTION LEVELS

Overall, the majority of the respondents (95.11 percent) was happy with their park experience and ranked their overall park experience as 'good' or 'very good'. The results indicate that tourists were highly satisfied with their visit to Zambian tourism sites, especially South Luangwa and Lower Zambezi National Parks. However, the results also indicate the need to improve on tourists' satisfaction levels at Kafue and especially at Mosi-oa-Tunya National Parks. Highly satisfied tourists are more likely to return again as tourists and/or recommend Zambian tourism sites to potential tourists.

Congestion levels were considered satisfactory (good and very good) especially at Kafue, Lower Zambezi and South Luangwa National Parks. However, the results showed a need to reduce the number of tourists at any given time in the national parks, especially at Mosi-oa-Tunya. Given the unique features of Mosi-oa-Tunya in comparison to the other national parks in Zambia, a tourism policy based on low volume, high value (cost) may be considered for Mosi-oa-Tunya National Park.

The other attributes considered were wildlife abundance and diversity, landscape quality and personal safety. The majority of the tourists, at least 80 percent for all the parks except for Mosi-oa-Tunya, were satisfied with these attributes, though there was an indication of a need for increased wildlife abundance and diversity especially at Mosi-oa-Tunya.

2.7.2 MEAN WTP PARK ENTRY FEES AT CURRENT PARK STATUS

The highest reported mean willingness to pay for park entry fees in their current state was for tourists who visited South Luangwa National Park (35.13 2005 USD), followed by those who visited Lower Zambezi National Park (31.77 2005 USD). The lowest mean willingness to pay is recorded for tourists who visited Kafue National Park (20.46 2005 USD). Given that the willingness to pay values are higher than the entry fees for parks in their current state, the entry fees can potentially be increased without the Zambian tourist market pricing itself out of the regional tourism market.

The overall mean willingness to pay for park entry fees was 28.42 2005 USD, which is more than the current park entry fees at any of the parks. This is an indication that there is still potential for the Zambian park authority to increase park entry fees to capture more of the consumers' willingness to pay and thus prospects to increase revenues from non-consumptive tourism activities.

2.7.3 MEAN WTP PARK ENTRY FEES WITH PARK IMPROVEMENTS

Similarly, the highest mean willingness to pay for park improvements reported is for respondents who visited South Luangwa National Park (42.45 2005 USD), followed by those who visited Lower Zambezi National Park. The least mean willingness to pay is recorded for respondents who visited Kafue National Park (25.48 2005 USD). The higher willingness to pay values may indicate high use values associated with an improvement in the quality of the good offered. The results indicate great potential to market Zambian national parks, especially South Luangwa and Lower Zambezi National Parks as high value but low volume tourism destinations and to charge premium prices, relatively close to the tourists' willingness to pay. Lower levels of

satisfaction at Mosi-oa-Tunya are correlated with the lower willingness to pay for entry into the park given the status quo. However, with improvements in the park attributes, the park also has great potential to be marketed as a high value, low volume tourism site and to charge premium prices for entry.

The overall mean willingness to pay for park improvements is 35.67 2005 USD. So, not only do tourists have high use values for the Zambian National Parks, but they would be willing to pay even higher amounts for entry into the parks with desirable improvements in certain park attributes, essentially increased wildlife abundance and diversity, as well as infrastructural improvements. Given the high willingness to pay for park entry with park improvements, it could be a worthwhile investment for the Zambian government to publicly fund national park improvements and, through strategic and targeted marketing, adopt a tourism policy of low density, high value for at least three of the parks, that is, Mosi-oa-Tunya, South Luangwa and Lower Zambezi National Parks.

2.7.4 DETERMINANTS OF WTP FOR PARK ENTRY FEES WITH STATUS QUO

Determinants of willingness to pay include socio-economic characteristics and tourist perceptions of park attributes. The explanatory variables found to have a significant effect on willingness to pay park entry fees given the status quo were gender and age of the respondents, region of origin (nationality) and perceived importance of wildlife and natural sites conservation. Contrary to expectation, female respondents were more likely to be in the higher willingness to pay category than their male counterparts. Male respondents were about five percent more likely to be in the low willingness category and about two percent less likely to be in the moderate and highest willingness to pay categories. This indicates that contrary to empirical findings, female

tourists contribute significantly to recreational activities and marketing strategies to attract tourists to Zambia should ideally be targeted at both male and female potential tourists.

The variable AGE6 was found to be statistically significant and positive as expected in both models. Thus, tourists in the higher AGE6 categories are more likely to be in the average and high WTP categories than tourists in the reference category. Though all tourists are important in the growth of the tourism sector in Zambia, public funding for targeted marketing for tourists in the higher age categories, with more disposable income can in turn generate more revenue for the Zambian government.

Asian, European and North American tourists play a significant role in Zambian tourism. Compared to their African counterparts, Asian tourists are less likely to be in the moderate and highest willingness to pay categories. European and North American tourists, however, are over five percent more likely to be in the 25 to 49.99 WTP category and three to four percent more likely to be in the highest category of the three. The current differential pricing for citizens, residents and non-residents should therefore be maintained and aggressive and extensive marketing undertaken in Europe and North America to increase awareness and demand for Zambia tourist products. Socio-economic benefits to Zambian nationals and use values were also significant determinants of willingness to pay park entry fees. The Zambian tourism authorities should therefore market Zambian tourism as an eco-tourism product that aims to conserve wildlife and natural sites with the help of communities living in their vicinity and also show involvement of these communities in the tourism operations, and such communities should be seen to benefit from wildlife and natural sites.

2.7.5 DETERMINANTS OF WTP FOR PARK ENTRY FEES WITH PARK IMPROVEMENTS

According to the regression results, willingness to pay park entry fees for parks with improvements is affected by socio-economic descriptors as well as and tourist perceptions of park attributes. Nine of the explanatory variables were significant determinants of willingness to pay for improved parks. These variables were GENDER, AGE4, AGE5 and AGE6, REGION4, PURPOSE_VISIT, CONGESTION, USE2 and USE3. All the significant explanatory variables had the hypothesized signs except GENDER. The average marginal effects show an increase in the probability of being in the highest willingness to pay category for higher age categories and for respondents who perceived ‘use benefits’ and ‘socio-economic benefits to Zambians’ as the important reason to conserve wildlife. Tourists who visited Zambia for wildlife and nature tourism and those who were satisfied with the level of congestion at the parks were more likely to be in the higher willingness to pay categories also.

In conclusion, tourists to Zambian tourism sites are highly satisfied with the quality of service and park attributes offered by the Zambian national parks. However, the target for the Zambian Tourism Board should be to have 100 percent satisfaction of tourists. That is, none of the tourists should rank any of the park attributes below average. It is also apparent that strategized, targeted marketing is essential in retaining return tourists and attracting new tourists to Zambian natural sites. From the general tourist populace, the target market will be tourists who are retired with relatively higher disposable income for leisure.

The high willingness to pay for park entry fees with parks in their current state and with improvements imply that there is room for increasing park entry fees if the park attributes that maximize tourists’ utility are also optimized. Hence any public investment into the tourism sector

to improve the park attributes and services could be worthwhile depending on the level of investment and this has potential to generate the much needed foreign exchange and boost the Zambian economy. Determinants of willingness to pay are mainly the socio-economic characteristics of tourists and tourists' perceptions of park attributes.

The reduction in park entry fees at Mosi-oa-Tunya over the years (2005 – 2016) will likely increase congestion problems given that the park is already receiving a large proportion of international tourists relative to its total area which will result in lower willingness to pay by international tourists and is therefore not recommended. Though the prices may be aligned with prices in Zimbabwe, which shares the Victoria Falls with Zambia, offering high value experience which includes low congestion levels may prove more worthwhile than reducing park entry fees and increasing congestion levels which have been proved would negatively affect the willingness to pay park entry fees, even with park improvements.

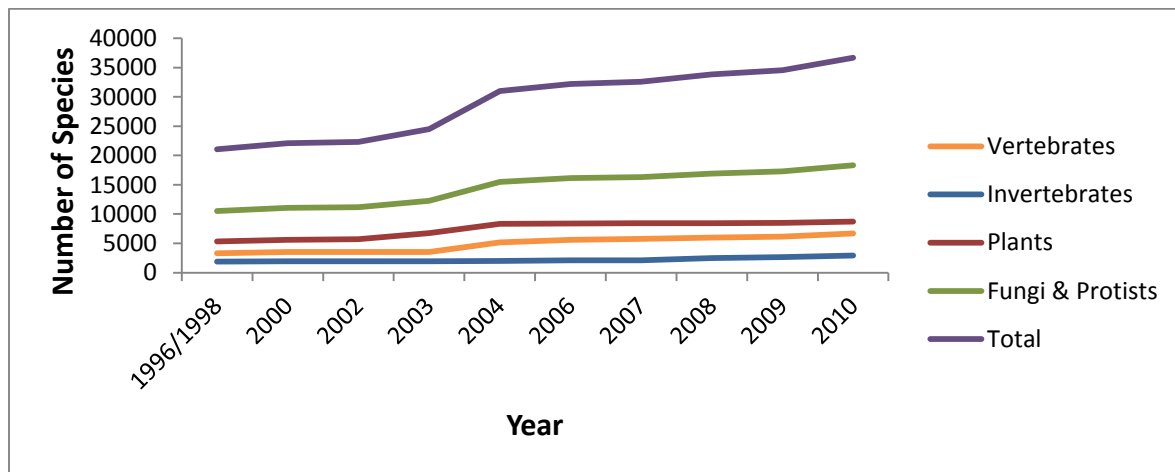
CHAPTER 3: ECONOMIC VALUE OF WILDLIFE-BASED RECREATION IN DEVELOPING COUNTRIES: A META-ANALYSIS

3.1 INTRODUCTION

Wildlife conservation is often used synonymously with biological diversity conservation (van Kooten & Bulte, 2000). Biodiversity describes the number, variety and variability of living organisms (Pearce & Moran, 1994). It is defined in the Convention on Biological Diversity, Article 2, as “the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part”. It encompasses three hierarchical but interlinked levels: genes, species and ecosystems, with species diversity commonly considered the measure of biodiversity (Swingland, 1993). Biodiversity conservation therefore targets maintaining a diverse gene pool of organisms as well as individual animal and plant species, and their ecosystems.

Globally, there is generally an increase in the loss in biodiversity in the form of wildlife species extinction as seen in Figure 19 below.

Figure 19: Annual Total Number of Species Identified as Threatened by International Union for Conservation of Nature (1996 to 2010)

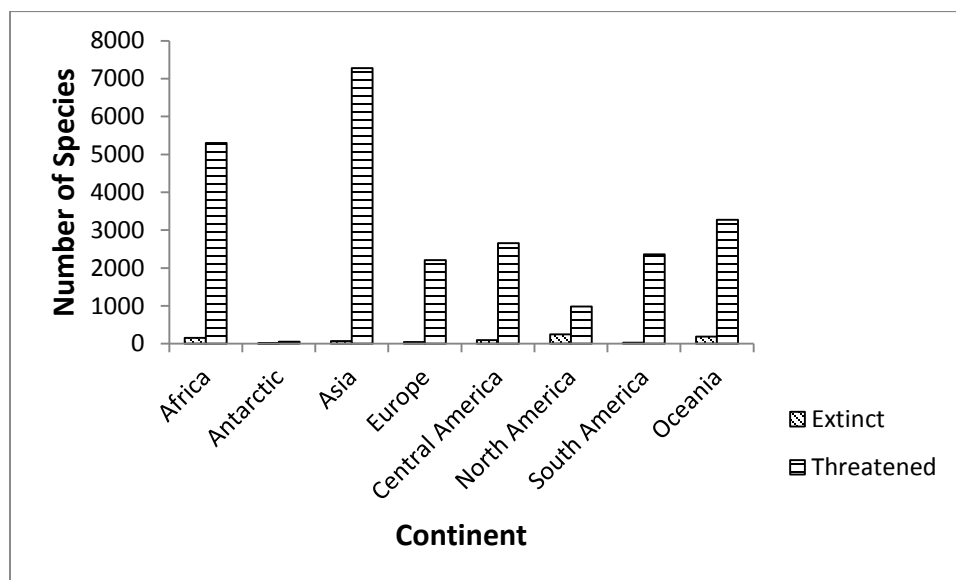


Data source: IUCN (2010)

This increased loss is at unprecedented levels in many countries, but more so in developing ones. Developing countries host most of the world's biodiversity and wildlife; however, according to the International Union for Conservation of Nature (IUCN) (2010), they also have the highest levels of species extinction and wildlife species identified as threatened.

Figure 20 below shows levels of animal species classified as extinct (both in the wild and in captivity) and threatened across the different regions globally, according to the IUCN Red List (2010). Asia, followed by Africa, currently has the highest number of threatened wildlife species. These include birds, mammals, fish (bony), amphibians and insects. Threatened animal species include those categorized as critically endangered, endangered or vulnerable according to the IUCN Red List categorization.

Figure 20: Number of animal species identified as threatened or extinct in 2010, by continent



Data source: IUCN (2010)

The two main causes of biodiversity loss are human population growth and economic development. These have been categorized into direct and underlying causes (Swanson, 1995). The underlying causes include portfolio choice, market failure, policy failure, and development; the direct causes are habitat destruction and/or fragmentation associated with population growth and economic development, overexploitation, introduction of exotic species, and animal diseases.

In developing countries, where conservation policies may not be enforced for cultural and socio-economic reasons, biodiversity loss can be expected to be more rapid. For example, Harder, Labao and Santos (2008) found that only about one percent of Davao residents in the Philippines gave priority to environmental issues and instead were more concerned about economic issues, poverty and governance. Cultural practices, such as the medicinal use of the rhino horn in Asia, result in high demand (Walpole, Morgan-Davies, Milledge, Bett & Leader-Williams, 2001) that creates economic incentives for poaching which counters conservation efforts. This biodiversity loss is compounded by the fact that a majority of biodiversity hotspots are found in developing countries (Myers et al., 2000), which often have charismatic and endemic animal species and habitats.

3.1.1 CONTRIBUTION OF TOURISM TO ECONOMIC GROWTH IN DEVELOPING COUNTRIES

For many developing countries, tourism, and more precisely eco-tourism, has been heralded as the epitome of biodiversity conservation and community development (Mawere & Mabuya, 2012). Many definitions have been coined for eco-tourism (Weaver, 2001; Sirakaya, Sasidharan & Sonmez, 1999; Willis & Pangeti, 1998; Bjork, 2000; Boo, 1990). From these many definitions, eco-tourism is essentially a way of promoting both conservation and economic development taking into account both eco-systems and the needs of the local people. According to

Cater (1993), ecotourism offers nations the opportunity to get the most out of natural attractions and to gain all the economic benefits without losing their rich biological resources (Cater, 1993; Isaacs, 2000).

The benefits of tourism can be categorized as direct and indirect or induced. The direct benefits to the host country include increased foreign exchange receipts, infrastructure development, job creation, new market for locally produced goods, and increased government revenues through fees and taxes paid by visitors. The indirect or induced benefits associated with eco-tourism are high quality tourism experience (Muzvidziwa, 2013), diversification of the economic base (Notzke, 1999), creation of social benefits and infrastructure improvements (Brandon, 1996), generation of funds for the management and conservation of natural areas (Weaver, 1998), provision of economic justification for protection of natural resources (Boo, 1990), fostering of environmental awareness or values and support for conservation among both local residents and tourists (Ross & Wall, 1999), and promotion of cultural preservation (Slinger, 2000).

Worldwide, tourism generated about USD1158.9 billion in receipts in 2013 as noted in Table 15 below. According to United Nations World Tourism Organization (2014), the contribution of tourism to economic growth and development was significant as it accounted for 29 percent of all export services, an equivalent of USD1.4 trillion, making it one of the largest categories of international trade. In Africa, Fayissa, Nsiah and Tadasse (2007) and Makochehanwa (2013) found that receipts from the tourism industry contributed significantly to gross domestic product (up to 50 percent and 30 percent in Seychelles and Mauritius, respectively), employment, export receipts and investments. The market share for tourism receipts in Africa has increased by 41 percent from 2.9 percent in 2003/2004 to 4.1 in 2012/2013 (UNWTO, 2005; UNWTO, 2014).

Table 15: International Tourism Receipts by Region, in Nominal Dollars

	2012 (USDbillion)	2013 (USDbillion)	Market Share (%)
World	1077.8	1158.9	100
Europe	454	489.3	42.2
Americas	329.1	358.9	31.0
Asia/ Pacific	212.9	229.2	19.8
Middle East	34.3	34.2	3.0
Africa	47.5	47.3	4.1

Source: UNWTO (2014)

In an effort to address biodiversity loss, in addition to spurring economic activity, many countries are developing eco-tourism (Bookbinder, Dinerstein, Rijal, Cauley & Rajouria, 1998). According to Theobald (1998), ecotourism entails travelling to natural areas to learn about host communities, while at the same time providing economic opportunities that promote conservation and preservation of the ecosystem. Just as biodiversity conservation is often synonymous with species conservation, eco-tourism is increasingly being linked to biodiversity conservation, particularly wildlife species conservation (Gossling, 1999). Mega-fauna or larger and more visible wildlife species unique to certain regions often attract international tourists and hence are more attractive for eco-tourism activities. Increasingly, governments in developing countries are cooperating with non-governmental organizations (NGOs) to recover or maintain endangered and threatened wildlife species to safe minimum standards through community eco-tourism activities which generate economic incentives for nature conservation (Lindsey, Alexander, Mills, Romanach & Woodroffe, 2007a). An example is establishment of a nature reserve in Vietnam in hopes of saving a mysterious twin-horned creature known as the saola which was only discovered

in 1992 and is "on the brink of extinction" according to the World Wildlife Fund (as cited by BBC News Services, 2011, April 18). Other examples are the active involvement of the Vietnamese government in the conservation of the Vietnamese rhinoceros (Thuy, 2003) and the Philippine government's partnership with the private sector and NGOs in conserving the Philippines' eagle (Harder et al., 2008).

Local communities have proven to be invaluable in conservation efforts in developing countries (Lepper & Goebel, 2010). Governments now seek to develop conservation policies that promote the initiation and support of eco-tourism activities at the local level. Such activities have been found to drive economic activity in rural areas by creating employment (Lepper & Goebel, 2010; Navrud & Mungatana, 1994). Also, the income generated could be used in funding additional conservation programs, which often depend on foreign aid because the government's contribution is usually minimal (Harder et al., 2008).

Without the economic incentive to conserve wildlife species and their habitat, local communities will yield to the pressures of human population and economic growth and continue to infringe on wildlife and forest frontiers resulting in habitat loss and/or fragmentation (van Kooten & Bulte, 2000). This would be more so for species with no apparent use values or those that compete with local communities for the same food sources such as the Asian elephants in Sri Lanka (Bandara & Tisdell, 2005), the rhinoceros in Vietnam (Thuy, 2003), and African elephant in Namibia (Sutton, Larson & Jarvis, 2008), or are considered problem animals or predators (e.g., African wild dog in South Africa (Lindsey, Alexander, du Toit & Mills, 2005)). In countries where communities are actively engaged in the management and control of wildlife resources, they gain economic benefit from charging entry fees for access to view and/or photograph wildlife. A major revenue earner for such communities is undoubtedly trophy hunting where local communities have

been given hunting rights (Lewis & Alpert, 1997; Lindsey, Roulet & Romanach, 2007b). These community trusts have been well established in Southern Africa. Institutions such as wildlife management groups (WMG) in Zambia (Fernandez, 2010), Communal Areas Management Programme for Indigenous Resources (CAMPFIRE) in Zimbabwe (Muchapondwa et al., 2008), and Community Based Natural Resource Management (CBNRM) in Botswana and Namibia (Jones, 1999) have been found to positively drive conservation efforts and could be adopted in other developing countries for wildlife conservation efforts.

Wildlife resources and natural habitats are by nature public goods because they are non-rival and non-exclusive. Non-rivalry means that consumption of the resource by one individual does not reduce its availability for consumption by others, and non-excludability means that no one can be effectively excluded from using the resource (Perman, Ma, Common, Maddison & McGilvray, 2003). Like any public good, this non-exclusive and non-rival nature of wildlife resources implies that they are likely to be inefficiently allocated by private markets. The responsibility to ensure provision of public goods therefore generally falls to the government, and if governments decide to provide them they often face funding challenges to ensure conservation of wildlife resources and natural habitats. The lack of funds for the provision of public goods may be more of a problem in developing countries where the conservation of wildlife may be deemed a luxury for the rich developed countries with disposable income to invest in wildlife conservation.

3.1.2 MOTIVATION FOR THE STUDY

Though Meta-analysis (MA) has been used numerous times to synthesize and summarize values for diverse environmental amenities and services in developed countries, meta-analytic studies of primary studies carried out exclusively in African countries are lacking. Yet, with the

increasing application of non-market valuation techniques, and specifically CVM and CM, to capture WTP for wildlife recreation in developing countries, new insights may be gained on the economic value of wildlife and natural habitats in developing countries to inform policy recommendations that would promote investment in wildlife conservation by governments in these countries. Only one empirical paper has been identified that attempted to focus solely on developing countries (Tuan & Lindhjem, 2008), and it explored nature conservation values in Asia and Oceania.

The main contribution of this research is that it is the first MA that attempts to synthesize the nature tourism literature focusing solely on valuation studies of wildlife and habitat in African countries. Another motivation for the study is the lack of empirical work that attempts to summarize the growing literature on the value of wildlife and natural habitats in Africa. Though eco-tourism has been identified by many countries as a potential economic driver and important component of sustainable use of wildlife and natural habitats, there is still minimal government investment in ecotourism. The lack of empirical evidence on the value of wildlife and natural habitats in Africa may contribute to the minimal investment in their preservation and conservation. For most African countries, as in other developing countries, there are no sustainable funding mechanisms for conservation purposes. The dominant sources of funding are often foreign assistance and revenue from park entry fees (Adams & Victurine, 2011). Government funding is often limited as higher priority is given to financing immediate social needs such as poverty alleviation and highly visible economic development projects (Adams & Victurine, 2011). The limited national funding may also be attributed to a failure to recognize both the market and non-market benefits of wildlife and natural habitat resources.

An estimate of the economic value of wildlife species in African countries can be used to develop environmental policy for efficient pricing and conservation strategies to optimize investment in wildlife and natural resources and to maximize financial returns from such assets. This research aims to synthesize the results of primary studies and to summarize the willingness to pay values for wildlife and natural habitats in African countries and to apply MA to explain the systematic variation across studies of willingness to pay for wildlife and natural habitats.

3.1.3 RESEARCH QUESTIONS

The present research aims to address the following research question:

What are the causes of variation in willingness to pay estimates for wildlife and natural habitats in developing countries?

3.1.4 OBJECTIVES

The specific research objectives are to:

1. Document the valuation literature available on willingness to pay for wildlife and natural habitats in Africa.
2. Summarize the willingness to pay values for wildlife and natural habitats in Africa.
3. Explain the source of systematic variation in willingness to pay estimates for wildlife and natural habitats in Africa.

3.2 ECONOMIC VALUATION OF WILDLIFE AND NATURAL HABITATS

Wildlife and the natural habitats in which they are found offer many environmental benefits including ecological services as well as human consumptive and non-consumptive use of species. These environmental benefits are captured by the total economic value (TEV) of wildlife

and natural habitats and are estimated by summing all the use and non-use economic benefits derived from these resources.

A number of non-market valuation methods have been used to estimate the economic value of wildlife and natural habitats (Bandara & Tisdell, 2004; Lindsey et al., 2005; Navrud & Mungatana, 1994). These are broadly categorized into stated preference and revealed preference methods. Revealed preference methods involve observing actual behavior which reflects utility maximization subject to some constraint (Freeman, 2003). Stated preference methods involve asking people hypothetical questions rather than making valuation inferences from observations of real-world choices. The stated preference methods are better-suited to estimating the economic value of wildlife as they capture both use and non-use values. In particular, the CVM uses surveys to present a hypothetical scenario to respondents and directly asks for their WTP for a proposed change in the level of preservation or conservation of the wildlife species and their habitat.

Numerous MA studies in environmental economics have been conducted to evaluate willingness to pay for environmental goods and services in developed countries. These have used various valuation techniques for various resource types in different geographic regions. Nelson and Kennedy (2009) provide a list of meta-studies in biodiversity conservation. The environmental goods and services valued range from endangered wildlife species (Loomis & White, 1996) to wetlands (Brander, Florax & Vermaat, 2006) and forestry recreation (Bateman & Jones, 2003). Though the majority of the meta-studies estimate recreation values, a substantial number of them estimate the value of wetland services (Ghermandi, van den Bergh, Brander, de Groot & Nunes, 2008; Woodward & Wui, 2001; Brouwer, Langford, Bateman & Turner, 1999), threatened and endangered species (Richardson & Loomis, 2009; Saloio, 2008; Borisova-Kidder, 2006; Kroeger et al., 2006; Loomis & White, 1996; Santos, 1998), aquatic resources (Ahtiainen, 2009; Shuang &

Stern, 2008; Brander et al. 2006; Johnston, Besedin, Helm & Ranson, 2006; Platt & Ekstrand, 2001; Sturtevant, Johnson & Desvousges, 1996; Boyle, Poe & Bergstrom, 1994), forests (Lindhjem, 2007; Zandersen & Tol, 2005; Bateman & Jones, 2003), coral reefs (Abdullah & Rosenberger, 2012; Brander, van Beukering & Cesar, 2007) and wildlife and nature conservation (Jacobsen & Hanley, 2009; Tuan & Lindhjem, 2008).

Meta-analytic studies of primary studies carried out exclusively in African countries are lacking. Only two studies were identified that have attempted to incorporate value estimates from developing countries to estimate the international WTP for wildlife species conservation. Saloio (2008) compares meta-regression results between the United States and the rest of the world (ROW), but the majority of the ROW studies are from Canada and Europe, with only seven percent of the studies from developing countries. Martín-López, Montes, and Benayas (2007) also had only six percent of the studies from developing countries (only Sri-Lanka) and the rest from developed countries. With the increasing application of non-market valuation techniques, and specifically the CVM, to capture WTP for conservation in developing countries, new insights may be gained on the economic value of wildlife and natural habitats in developing countries. Policy recommendations that promote investment in wildlife and natural habitat conservation by governments in these countries could be informed by this type of work.

The meta-analytic framework in the present study includes studies that use stated preference valuation methods as there are insufficient primary studies using a single methodology. The use of primary studies with different valuation methods is uncommon in environmental valuation using MA. Inclusion of different valuation studies can be important when the objective of the research is to determine the variation in willingness to pay estimates resulting from the type of valuation method used in the primary study. The following are examples of studies that used

various valuation studies in their meta-analyses: Woodward and Wui, (2001); Brander et al., (2006); Johnston et al., (2006); Lindhjem, (2007); Ghermandi et al., (2008); Tuan and Lindhjem, (2008); and Ahtiainen, (2009). Characteristics of these studies are summarized in Table 16.

Woodward and Wui (2001) used MA to value wetland services in North America and Europe. They incorporated estimates from diverse valuation techniques, citing that the use of CVM studies only, as in Brouwer et al. (1999), may be too restrictive as it may eliminate variability associated with the valuation method, hence the variability in the services that can be considered.

Table 16: Meta-analyses based on Primary Studies Using Different Valuation Methods

Reference	Region(s)/ Countries	Environmental good	Valuation Methods	No. of primary studies	No. of observations
Ahtiainen (2009)	Baltic Sea	Water quality improvement	CVM TCM CM	32	54
Ghermandi et al. (2008)	North America Asia Europe Africa South America Australasia	Wetland conservation and creation	CVM Hedonic Pricing TCM Replacement cost Net factor income Production function Market prices Choice experiment	167	385
Tuan and Lindhjem (2008)	Asia and Oceania	Nature and biodiversity conservation	CVM TCM CM Hedonic pricing Market price	79	421
Brander et al. (2006)	North America Asia Europe Africa South America Australasia	Wetland services	Opportunity cost Market prices Production function Net factor income TCM Hedonic pricing CVM	80	215

Table 16 (cont'd)

Reference	Region(s)/ Countries	Environmental good	Valuation Methods	No. of primary studies	No. of observations
Johnston et al. (2006)	North America	Recreational fishing	TCM CVM Non-nested RUM Nested RUM	48	391
Lindhjem (2007)	Norway Sweden Finland	Non-timber forest benefits	CVM CM	28	72
Woodward and Wui (2001)	North America	Wetland services	Net factor input TCM Replacement cost CVM	39	65

Brander et al. (2006) included estimates from eight valuation methods and incorporated a much broader range of wetland services (the MA valued five wetland types, offering up to 10 wetland services) compared to Woodward and Wui (2001). In addition, the study had a much broader geographical scope, incorporating studies from six continents. An important addition, according to Brander et al. (2006) was the inclusion of external socio-economic variables such as GDP per capita and population density.

Ghermandi et al. (2008) studied wetland conservation as well as creation. The meta-data set was built by adding to the data set created by Brander et al. (2006) though additional new primary studies made it less biased toward North America than in Brander et al. (2006). An important addition was the inclusion of man-made wetlands. In all the three wetland meta-studies the estimates were converted to a single welfare measure of annual wetland value per unit area (hectare or acre).

Ahtiainen (2009) valued WTP for water quality improvements. The primary studies included a variety of recreational activities as well as non-use values related to water quality in sea areas in general. The summary statistics revealed four study focal areas: eutrophication, fisheries, oil spills and water quality in general, though this variation was not captured in the meta-regression. The studies were from nine European countries that share the Baltic Sea marine resources and are based on stated preference methods - CVM and CM and revealed preference techniques – the travel cost method (TCM). Ahtiainen (2009) highlighted the inherent heterogeneity of the data due to the inclusion of studies from several countries and from the characteristics of the available valuation studies. The welfare measure was standardized to annual WTP per person.

Lindhjem (2007) focused on non-timber forest benefits in 3 Scandinavian countries – Norway, Finland and Sweden. Only primary studies based on stated preference methods (CVM and CM) were used and hence the values were interpreted as the WTP to obtain a positive change in an attribute describing the forest environment. Simple OLS and OLS with Huber and White robust standard errors meta-regressions were reported. Tuan and Lindhjem (2008) incorporated studies of species and nature conservation from Asia and Oceania. Diverse valuation techniques were included as well as different types of habitats and services. The welfare measure was the WTP per household per year for an increase in the level of nature conservation, whereby nature conservation was defined as “protection or active management of any natural ecosystem or resource or amenity” (Tuan & Lindhjem, 2008, p. 2). The random effects GLS regression model was used to explain the variation in WTP.

The last example, by Johnston et al. (2006), focused on the welfare associated with changes in the quality of recreational fishing. The primary studies used employed valuation techniques such as CVM, TCM, and random utility models (RUM) and the welfare measure was marginal WTP per fish by recreational anglers. The geographical scope was the U.S. An important feature of the meta-data was the division of fish species into big game and small game to capture the variation in biological and/or regional characteristics of the fish.

3.3 THEORETICAL FOUNDATION

The true value of wildlife and natural habitats in developing countries is captured by the total economic value (TEV), comprised of use and non-use values. That is:

$$TEV = Actual\ Use\ Values + Option\ Values + Existence\ Values \quad (1)$$

where the actual use values include direct and indirect use values of such resources. Direct use values can be further categorized into consumptive, for example hunting and fishing, and non-consumptive such as wildlife viewing, educational and research values. Indirect use values comprise values associated with benefits derived indirectly from a resource, for example ecosystem services such as pollination services, erosion prevention, biodiversity maintenance and hydrological services (Kroeger et al., 2006).

Option values are related to the concepts of uncertainty and irreversibility (Bromley, 1995). Also termed quasi-option values, these represent individual preferences for the preservation of resources against some probability that the individual will make use of it at a later date (Turner & Pearce, 1993).

Existence values are associated with the knowledge that the resource exists and feelings of concern about the continued existence of the resource. They are not associated with actual use or even the option to use the resource but instead are taken to reflect people's preferences for the existence of the resource. Variants of existence values are stewardship and bequest values. Stewardship value is based on a sense of personal responsibility for species or habitat existence, and bequest value represents a willingness to pay to preserve the environment for the benefit of future generations. Individuals may value the very existence of certain species or whole ecosystems (Turner & Pearce, 1993).

3.3.1 CONSUMER WELFARE MEASURES

Changes in the availability of a public good have direct implications for the well-being of individuals who value such changes as well as policy implications. An individual's WTP is based on the precept of consumer preferences and utility maximization theory. Generally, preferences

are assumed to have two properties: non-satiation (more is better) and substitutability. To understand the effects of public policy on consumer welfare, a number of welfare measures have been applied. The most common measure of consumer welfare is the Marshallian consumer surplus derived from the observable Marshallian demand function. However, it cannot accurately measure changes in consumer welfare as the Marshallian demand function does not yield a unique Marshallian consumer surplus (Dumagan & Mount, 1991; van Kooten & Bulte, 2000). Instead the Hicksian compensated or equivalent surplus is estimated from the unobserved Hicksian demand function. For changes in the price of a good, the resulting change in consumer welfare is measured using compensating variation (CV) and equivalent variation (EV).

Consumer welfare changes resulting from a change in either quality or quantity (ΔQ) of an environmental non-market good can be measured using compensating surplus (CS) and equivalent surplus (ES). These measures are based on the utility maximization theory that, based on a set of preferences, a consumer chooses quantities of various market commodities (x) and the good to be valued (q) to maximize his/her utility. The individual's utility function is thus defined as $u(x, q)$, with the corresponding indirect utility function $v(p, q, y)$, where p is a vector of the prices of the market commodities and y is the individual's income. Following Champ et al. (2003), CS for an environmental improvement⁹ is the maximum amount of money an individual would be willing to pay to experience an increase in wildlife and habitat conservation from the status quo Q^0 to a new level of conservation Q^1 ($Q^0 < Q^1$). The CS represents the value of the improvement in conservation to the individual in monetary terms and therefore his/her WTP for it to occur. CS can be represented using the indirect utility function as:

⁹ If the change is regarded as being for the worse, $CS < 0$ and $ES < 0$; CS measures the individual's WTA to endure the change, while ES measures her WTP to avoid it.

$$V(\mathbf{p}, Q^0, y) = V(\mathbf{p}, Q^1, y - CS) \quad (2)$$

Equivalent surplus (ES) for an improvement is the minimum amount of money the individual would require to willingly forego an increase in the level of wildlife and/or habitat conservation from the initial level Q^0 to Q^1 , for $Q^0 < Q^1$, or the willingness to accept (WTA) payment to forego an improvement in wildlife and habitat conservation. ES for an improvement is defined in terms of the indirect utility function as follows:

$$V(\mathbf{p}, Q^0, y + ES) = V(\mathbf{p}, Q^1, y) \quad (3)$$

where Q^0 indicates the status quo or the original level of wildlife and habitat conservation, and Q^1 denotes the increased level of wildlife and habitat conservation; $\mathbf{p}$ is a vector of prices of market commodities and y is an individual's income.

The WTP function, following Carson and Hanemann (2005), can be defined in terms of CS and ES as follows:

$$WTP(\mathbf{p}, Q^0, Q^1, y) = \begin{cases} CS(\mathbf{p}, Q^0, Q^1, y) & \text{if } CS \geq 0 \\ ES(\mathbf{p}, Q^0, Q^1, y) & \text{if } ES \leq 0 \end{cases} \quad (4)$$

For $CS = CS(\mathbf{p}, Q^0, Q^1, y)$ and $ES = ES(\mathbf{p}, Q^0, Q^1, y)$

The two measures, CS and ES, differ by the implied assignment of property rights (Champ et al., 2003). Whether CS or ES is elicited in contingent valuation (CV) depends upon whether or not, in the hypothetical scenario, the respondent has the right to the greater level of wildlife conservation. ES, and thus WTA, is elicited from respondents if hypothetically the respondent has the right to the change (for example, an increased level of wildlife and/or habitat conservation) and must be compensated for giving it up. Eliciting WTP (CS) assumes the respondent does not have the right to an increased level of wildlife and/or habitat conservation and must pay to receive it (van Kooten & Bulte, 2000).

In biodiversity and wildlife species conservation, an environmental improvement, for example an increased level of conservation, is desirable, and most empirical studies commonly estimate WTP rather than WTA. WTA has been found to be much higher than WTP in the literature (Hatton, Morrison & Barnes, 2010; Petrolia & Kim, 2011) and though there are still conflicting theories about the cause of this disparity, the most common explanations are: i) substitution effect (Hanemann, 1991); ii) moral responsibility (Anderson, Vадnjal & Uhlin, 2000); iii) endowment or entitlement effect (Kahneman et al., 1990), also termed the loss aversion (Thaler, 1980; Morrison, 1997, 1998), and iv) presence of bias in CVM results (Mansfield, 1999; Plott & Zeiler, 2005).

Overall, WTP is preferred as it offers real market options and does not presume a right to improvement as compared to WTA. Real markets operate under conditions of uncertainty, irreversibility and learning over time (Zhao & Kling, 1998) which are captured in WTP valuations and not WTA. Therefore, the focus henceforth will be on WTP for an increase in wildlife and habitat conservation.

3.3.2 VALUATION TECHNIQUES

Market and non-market valuation techniques can be used to capture both use and non-use values. However, non-market valuation techniques have been used extensively to estimate non-use and option values and some direct and indirect use values. The concept of WTP is used to capture people's preferences for goods and services for which there is no functioning market. Non-market valuation techniques, which can be categorized as direct and indirect, have been used to estimate WTP.

Direct non-market valuation techniques, also termed revealed preference or behavioral methods include TCM and hedonic pricing models. These methods are based on the observed or actual behaviors of individuals and reflect utility maximization subject to constraints (Champ et al., 2003). The TCM is the most commonly used revealed preference method. It typically uses time and monetary costs associated with travelling to a recreation site to estimate the use values of a recreational experience and the changes in these use values associated with changes in environmental quality. TCM has been applied to estimate the WTP for consumptive and non-consumptive recreational uses of the ecosystem such as hunting, fishing and wildlife viewing (Navrud & Mungatana, 1994; Shrestha, Seidi & Moraes, 2002).

The hedonic method is used to infer how much households would pay to buy property near (or far from) an environmental amenity (disamenity) (Champ et al., 2003). It estimates the household's value of the characteristics of a resource from observable market transactions; for example, housing prices may be used to value the need to live in a less densely populated area with ecosystems still intact. When values, either use or non-use, cannot be observed or inferred from market transactions, then they can only be estimated through stated preference methods such as contingent valuation and choice modelling.

3.3.2.1 CONTINGENT VALUATION METHOD

CVM is a stated preference, survey-based valuation technique used to elicit values people place on wildlife and habitat (Champ et al., 2003). It is used to capture an individual's monetary value for a change in the level of an environmental good, for example WTP for an increased opportunity to view wildlife and natural habitat. The survey attempts to establish the sample population's stated preferences for the environmental good "contingent" on the details of the

hypothetical market presented to the respondents (Carson & Hanemann, 2005). It is the predominant method used to measure an individual's willingness to pay or preferences for an environmental improvement such as an increased level of protection of a species, mainly for two reasons: i) it can deal with both use and non-use values, and ii) the CVM answers are directly theoretically monetary measures of utility changes (Perman et al., 2003).

There are three basic formats in which the hypothetical questions are asked to obtain WTP in CVM. These are: i) open-ended format in which a respondent is asked how much she is willing to pay; ii) payment card in which individuals are given a range of estimates from which to choose their willingness to pay, and finally iii) dichotomous or discrete choice format in which respondents are asked to respond with a yes or no to questions of whether they would be willing to pay a certain amount (Haab & McConnell, 2002). The most commonly applied formats are the open-ended and dichotomous choice.

The survey responses obtained from a CVM study are used to generate a deterministic WTP model (non-random). This deterministic WTP model has to be recast as a stochastic (random) model that can generate a probability distribution for the survey responses (Carson & Hanemann, 2005). This involves the introduction of a stochastic component into the deterministic utility model to obtain the WTP cumulative distribution $[\Phi(x)]$ such that compensating surplus (CS) is defined as a random variable. The WTP cumulative distribution specifies the survey responses in terms of the probability that an individual's willingness to pay for a greater level of wildlife and habitat conservation is less than or equal to some value x [i.e. $\Phi(x) = Pr(CS \leq x)$].

In the case of the open-ended question format respondents are asked: "How much would you be willing to pay for an increased level of wildlife conservation from Q^0 to Q^1 ?" Respondents are free to offer any dollar amount. Assuming an individual's response is "USD X ", then this

implies that the respondent's value of WTP is USDX. The WTP cumulative distribution function Φ (USDX) implies that the probability of obtaining this answer from an individual is:

$$Pr (\text{Respondent offers USDX}) = Pr (CS \leq USDX) \equiv Pr (WTP \leq USDX) \quad (5)$$

The open-ended format responses directly reveal the respondent's value of CS, with the mean WTP for a household computed from the sum of the individual WTP open-ended question responses divided by the number of respondents, N . i.e. $\sum_{i=1}^N \frac{WTP_i}{N}$

The open-ended CVM format has been found to be susceptible to strategic behavior which may be associated with lower mean WTP compared to the dichotomous choice format (Mitchell & Carson, 1995). Dichotomous choice format has been found to have numerous advantages over the open-ended format, which may increase the validity of the WTP estimates. According to van Kooten and Bulte (2000), the main advantages of the dichotomous choice format are that it mimics an actual market choice as the individual gets to choose whether or not to purchase a good at a given price, and it also addresses some of the uncertainty related to the hypothetical nature of CVM (measurement uncertainty; uncertainty about respondents' preferences and respondents' uncertainty about what they are valuing).

The dichotomous choice format asks the question "Would you be willing to pay USDX for an increase in the environmental amenity from Q^0 to Q^1 ?" The respondent has a dichotomous choice of "Yes" or "No". The probability that a respondent answers "Yes" given the WTP cumulative distribution function $\Phi(x)$ is:

$$Pr (\text{Response is "Yes" to paying USDX}) = Pr (CS \geq USDX) \equiv 1 - \Phi(USDX) \quad (6)$$

The respondent's value of CS is some amount more than the specified bid USDX. Unlike the open-ended format, the dichotomous choice only provides an interval in which the WTP value must lie. To obtain statistical estimates for the CVM responses, parametric and non-parametric

response probability models are developed. One common approach used to estimate the response probability model is maximum likelihood (Carson & Hanemann, 2005). If respondent i (of the N total respondents) responds with “Yes” to bid level $USDX$ (assuming k different bid levels), equation 6 above becomes:

$$1 - \Phi(USDX) = \pi_i^{Yes}(USDX_k) \quad (7)$$

Where $\pi_i^{Yes}(USDX_k)$ is the probability that the respondent votes “Yes”. The probability of a “No” response to the offer of paying $USDX$ is therefore $\pi_i^{No}(USDX_k)$, and the likelihood of such responses is:

$$L = \prod_{k=1}^K \prod_{i=1}^{N_k} [\pi_i^{Yes}(USDX_k)]^{d_i} [\pi_i^{No}(USDX_k)]^{1-d_i} \quad (8)$$

The corresponding log-likelihood function will then be:

$$\ln L = \sum_{k=1}^K \sum_{i=1}^{N_k} \left[d_i \ln(\pi_i^{Yes}(USDX_k)) + (1 - d_i) \ln(\pi_i^{No}(USDX_k)) \right] \quad (9)$$

Where:

K = the total number of separate bid values

N_k = the number of respondents randomly assigned a bid value

$USDX_k$ = k^{th} bid value respondents must accept or reject

$d_i = 1$ if respondent i accepts bid value k (equal to 0 otherwise)

$1 - d_i = 1$ if respondent i rejects bid value k (equal to 0 otherwise)

Equations 8 and 9 yield a fitted response model that relates the probability and bid value. The response model can then be used to compute a summary measure of people’s WTP for a change in Q (typically a mean or median WTP for the survey sample population). The median WTP would be the dollar value at the 50th percentile probability level. The mean WTP is estimated as:

$$WTP_{Mean} = \int_{C_{min}}^{C_{max}} x\varphi(x) dx \quad (10)$$

Where C_{min} and C_{max} are the lower and the upper limits of the WTP distribution, respectively, and $\varphi(x)$ is the probability density function (pdf) corresponding to the estimated WTP distribution.

CVM has been widely applied in policy-related research, both in developing and developed countries. In developing countries it has been used in health, drinking water and sanitation research and research addressing demand for improved water quality and for provision of a sewage treatment system (Briscoe et al., 1993; Whittington, Briscoe, Mu & Barron, 1990a; Whittington, Mu & Roche, 1990b; Whittington, Lauria, Wright, Choe, Hughes & Swarna, 1993). It has not been widely used for wildlife resources valuation in developing countries, but there are examples. Van Tonder, Saayman and Krugell (2013), Sultanian and van Beukering (2008), Hatfield and Malleret-King (2007), Muchapondwa et al. (2007), and Lindsey et al. (2005) valued individual species or groups of species. Amponin, Bennagen, Hess and Cruz (2007), Do (2007), Calderon et al. (2005), Hammit et al. (2001), Nam, Nhan, Trinh and Thong (2001), Manoka (2001), Bogahawatte (1999), and Ekanayake and Abeygunawardena (1994) valued natural wildlife habitats such as wetlands and forests.

Contingent valuation studies are even more numerous in developed countries such as the United States, Canada and Europe. In the United States, contingent valuation has been recognized as a valid method for valuing environmental changes and peoples' preferences for these since a contingent valuation study was conducted to assess the damages from the 1989 Exxon Valdez oil spill and for purposes of filing natural resource damage claims for lost passive use values (Carson et al., 2003) against Exxon. In the United States, both in the published and grey literature, such studies are abundant. Its use in Europe has gained popularity, though most studies have been

conducted for general valuation purposes, rather than for environmental policy or regulation purposes.

In developing countries, the use of contingent valuation is still limited, with the majority of such studies often policy-related and solicited by international donor agencies such as the World Bank, mainly due to limited research resources, both financial and trained human capital. About a decade ago, only a handful of studies on WTP for wildlife resources existed in developing countries, and Whittington (1998) notes that the validity of the WTP estimates from these contingent valuation studies carried out in developing countries has been subject to considerable criticism.

However, over the last ten years, the use of contingent valuation in developing countries to estimate the willingness to pay for and total economic value of biodiversity, and specifically endangered and threatened species and their habitats, has steadily increased and improved. One reason for this increase in CVM studies is its wide acceptability in developed countries and hence its adoption by funding agencies, often based in developed countries, which sponsor CVM research in developing countries. The other reasons would be those proposed by Whittington (1998) that it is generally less expensive to carry out in-person CVM in developing countries than in developed countries and that response rates are higher and the respondents more willing to participate and take the surveys seriously than respondents in developed countries. In fact, Whittington (1998) contends that “it is easier to administer high-quality contingent valuation surveys in many developing countries than it is in industrialized countries” (Page 28), though there are still limitations.

The largest comprehensive contingent valuation study in developing countries was conducted by the Economy and Environment Program for Southeast Asia (EPPSA) based in

Singapore which conducted a total of 6,000 contingent valuation household surveys in four Asian countries, valuing five different endangered and threatened wildlife species. However, even though the number of primary studies on WTP for wildlife conservation in developing countries has been increasing over the last couple of decades, there are no MA studies that have attempted to synthesize the findings from these studies.

This increase in CVM studies and the time and financial constraints associated with carrying out new primary studies present an opportunity for aggregation of similar studies for research synthesis and hypothesis testing using meta-analytic approaches. Results from these meta-analyses are now more commonly applied to infer benefits for unstudied “policy” sites from results obtained under a different context, in a practice termed meta-analytic benefit transfer (MA-BT) (Bergstrom & Taylor, 2006).

3.3.2.2 CHOICE MODELLING

Like CVM, CM is a stated preference valuation technique for environmental valuation. CM is also a survey-based method for modelling preferences for goods, based on the Lancaster (1966) theory that a commodity is most usefully treated as the embodiment of a bundle of attributes or characteristics, which are the things of real interest to consumers (Perman et al., 2003). As compared to CVM, CM involves a more experimental and involved analysis of choice behavior (Boxall, 1996) and according to Bennett and Adamowicz (2001) has the advantages of providing a richer data set and reduction of strategic bias common with CVM.

A vital component of any CM application is the questionnaire in which survey respondents are presented with a number of choices between alternative resource use options (Morrison, Bennett & Blamey, 1997). The questionnaire is posed as a choice experiment (CE) and the analysis

of the choices made by respondents is used to obtain the estimates of non-market values (Morrison et al., 1997). According to Boxall, Adamowicz, Swait, Williams and Louviere (1996), the experimental designs of choice experiments can be used to make “packages” of attributes that reflect different states of the environment. The design of the questionnaire is therefore crucial to a successful application of CM that will provide useful and valid estimates of environmental values. According to Morrison et al. (1997), a CM questionnaire will include a description of the study site; details of the proposed changes; a sequence of choice sets made up of combinations of site attributes at specified levels; and a series of socioeconomic and attitudinal questions. Empirically the use of CM in environmental valuation is relatively new, more so in developing countries.

Respondents are presented with alternative descriptions of a good, which are differentiated by their attributes, including price and levels, and are asked to rank the various alternatives, and to rate them or to choose their most preferred (Hanley, Mourato & Wright, 2001). As a stated preference method, CM measures use and non-use values and, as with CVM, the stated values are direct monetary measures of utility changes, theoretically. It is based on the random utility model, which describes discrete choices in a utility maximizing framework. The indirect utility function is comprised of the observable or measurable component, specified as a linear index of the attributes, and a stochastic or random component which represents unobservable influences on individual choice. It is specified as:

$$U_{iq} = V_{iq} + \varepsilon_{iq} \quad (11)$$

where:

U_{iq} = utility derived by consumer q from option i .

V_{iq} = attribute vector representing the observable component of utility from option i for consumer q .

ε_{iq} = unobservable component of latent utility derived by consumer q from option i .

The indirect utility function is conditional on the choice of a given alternative from a choice set whereby selection of one option over another implies that the level of utility derived from the selected option is greater than the utility derived from any other option in the choice set. That is, alternative i is preferred to alternative j if and only if (*iif*) the probability of individual q ranking alternative i higher is greater than for any other alternative j in the set of choices available. The probability of choosing alternative i is therefore:

$$P(i|A) = P(V_{iq} + \varepsilon_{iq} \geq V_{jq} + \varepsilon_{jq}; \forall j \in A) \quad (12)$$

where A is the choice set (Boxall et al., 1996; Louviere, Hensher & Swait, 2000; Do & Bennett, 2007; Lee, Hosking & du Preez, 2014).

3.3.3 META-ANALYSIS

Meta-analysis is a technique used to review and summarize empirical studies. It has commonly been used in controlled experiments in research fields such as medicine to integrate similar research findings but has also been applied extensively in the fields of education and psychology research. It is a way to bring together and synthesize new findings from a plethora of empirical studies on a particular topic which are often scattered throughout the scientific literature and are uneven in quality. The technique, as a statistical tool, was first used by Glass in 1976, who applied it to education research and defined it as “.... the statistical analysis of a large collection of results from individual studies for the purpose of integrating the findings” (Glass, 1976).

MA is increasingly being used in environmental economics research to provide estimates that capture consumer preferences for environmental goods and services. It attempts to statistically measure systematic relationships between reported valuation estimates for an environmental good

or service and the attributes of the studies that generated the estimates (Bergstrom & Taylor, 2006). Meta-analyses have been used for purposes of research synthesis on a particular topic, hypothesis testing, and more recently and frequently, in environmental value or benefit transfer (Bergstrom & Taylor, 2006; Smith & Pattanayak, 2002) whereby the results of studies on environmental valuation are applied to new policy contexts (Brouwer, 2000).

Results from meta-regressions are now commonly “transferred” from a study site to an unstudied policy site using a practice termed “benefit transfer” which uses existing data or summary statistics from existing research and applies them to a different context or setting other than the purpose for which they were originally collected (Champ et al., 2003). The information may be used to infer the economic benefit of a similar environmental amenity at the same or a different location (Lindhjem & Navrud, 2008; Rosenberger & Loomis, 2000a; Smith & Pattanayak, 2002; Tuan & Lindhjem, 2008).

Though there are a number of utility theoretical approaches, the “weak structural utility theoretic” (WSUT) approach outlined by Bergstrom and Taylor (2006) is common for MA where estimates of mean WTP are sourced from different studies and the explanatory variables may not be informed by a theoretical model (i.e., equation 12 above) (Lindhjem & Navrud, 2008; Rosenberger & Loomis, 2000a).

In the WSUT approach the WTP bid function is assumed to be derivable from some unknown utility function, and, more importantly, it gives flexibility for the introduction of atheoretical explanatory variables, such as study characteristics (Bergstrom & Taylor, 2006; Lindhjem & Navrud, 2008; Tuan & Lindhjem, 2008).

3.4 METHODS

3.4.1 STUDIES OF WILLINGNESS TO PAY FOR WILDLIFE AND HABITAT

The meta-analytic framework in the present study allows the inclusion of studies that originate from several African countries, use the two main stated preference valuation methods, CVM and CM, and focus on wildlife and natural habitats. A total of 19 primary studies from 10 developing countries in Africa were found to have adequate information to include in the MA of the economic values of wildlife and habitats. These countries are Botswana, Kenya, Morocco, Mozambique, Namibia, Rwanda, South Africa, Tanzania, Uganda, and Zambia.

The primary studies included focus on wildlife-based recreation, either for an opportunity to experience wildlife and natural habitat recreation or for some enhanced or increased opportunity to experience. The assumption is that activities undertaken by tourists in accessing wildlife and natural habitats provide a typical tourist with approximately the same set of services (wildlife and natural habitat access and/or sightings and photography). Because of the consistency in the activities provided by wildlife and natural habitats in relation to wildlife-based recreation, wildlife and natural habitats are aggregated into a MA. Because only primary studies that focused on wildlife recreation were used, the respondents were tourists (local or international). The willingness to pay estimates for all the studies captured willingness to pay per visitor per visit. For all the studies, therefore, the payment was once-off. Other than commodity consistency, the other requirement for MA is welfare consistency. As only primary studies that used stated preference valuation methods are included, the MA model represents the same Hicksian exact welfare change measure (Bergstrom & Taylor, 2006).

Tables 17, 18 and 19 show the CVM and CM valuation studies included in the MA by country and also the mean WTP in USD 2012 for each study. There were a total of 88 observations

from all the 19 primary studies included. The highest number of observations and primary studies were for wildlife and habitat, giving a total of 61 observations from 13 studies. The majority of the studies (52.3 percent) reported use values with the highest WTP estimate being the use value (wildlife viewing) of wildlife for large game in South Africa, which averaged 172.38 2012 USD. About 48 percent of the observations captured total economic values.

Table 17: Valuation Studies by Author and Country – Wildlife Species (N = 22)

Reference	Country	Type of publication	Type of wildlife	Respondents	N	Valuation Method	Focus of Study	Economic Value	Mean WTP 2012USD
Lee et al. (2014)	South Africa	Journal	Fish	Recreational users	6	CM	Increased fish stock	TEV	21.87
Saayman (2014)	South Africa	Journal	Marine species-whale, penguin, great white shark, dolphin, seal	Tourists	5	CVM	Wildlife sighting of a particular species	Use values (Non-consumptive)	33.7
van Tonder et al. (2013)	South Africa	Journal	lion, leopard, rhino, buffalo, elephant	Park visitors	5 ¹⁰	CVM	Wildlife viewing	Use values (Non-consumptive)	172.38
Lindsey et al. (2005)	South Africa	Journal	Wild dogs	Tourists	4	CVM	Increased wild dog sightings	Use values (Direct)	41.76
Turpie & Jourbert (2004)	South Africa	Journal	Wild flowers	Tourists	2	CM	Increased plant biodiversity	TEV	6.62
Total					22				

¹⁰ An additional WTP estimate which reported willingness to pay for a group of five different wildlife species regarded as the “big five” was removed from this study because it was an outlier.

Table 18: Valuation Studies by Author and Country – Wildlife and Habitat (N = 61)

Reference	Country	Type of Publication	Type of Habitat	Respondents	N	Valuation Method	Focus of study	Economic Value	Mean WTP (2012USD)
Kgosikoma (2016)	Zambia	Dissertation	Parks	International tourists	8	CVM	Access to wildlife	Use values	35.66
Daly (2013)	Mozambique	MS Thesis	MPA	Tourists	3	CVM	Access to MPA	Use values	46.96
El-Bekkay, Moukrim & Benchakroun (2013)	Morocco	Journal	Park	Tourists	1	CVM	Park improvement	Use values	6.44
Zeybrandt & Barnes (2010)	Namibia	Journal	Fishery	Anglers	6	CVM	Fish conservation	TEV	64.56
Bush, Hanley & Colombo (2008)	Rwanda	Conference paper	Park	International tourists	1	CM	Increased gorilla sightings	Use values	164.29
Mmopelwa et al. (2007)	Botswana	Journal	Park	Tourists	8	CVM	Access to wildlife	Use values	25.13
Naidoo & Adamowicz (2005)	Uganda	Journal	Birds	Tourists	1	CM	Increased bird sightings	Use values (Direct)	59.80
Krug (1998)	Namibia	Dissertation	Parks	Tourists	15	CVM	Wildlife viewing	TEV	20.15
Barnes et al. (1999)	Namibia	Discussion paper	Parks	Tourists	7	CVM	Wildlife viewing	TEV	64.24
Barnes (1996)	Botswana	Journal	Park	Tourists	2	CVM	Access to wildlife	Use values	106.21

Table 18 (cont'd)

Reference	Country	Type of Publication	Type of Habitat	Respondents	N	Valuation Method	Focus of study	Economic Value	Mean WTP (2012USD)
Moran (1994)	Kenya	Journal	Parks	International Tourists	1	CVM	Preservation of parks	Use values	99.30
Total					61				

Table 19: Valuation Studies by Author and Country - Habitat (N = 5)

Reference	Country	Type of Publication	Type of Habitat	Respondents	N	Valuation Method	Focus of Study	Economic Value	Mean WTP (2012USD)
Mladenov, et al. (2007)	Botswana	Journal	Delta	Tourists	5	CVM	Preservation of the delta	TEV	98.67
Total					5				

The majority of the studies reported valuation estimates for terrestrial wildlife and natural habitats. For all of the studies the payment was voluntary and the respondent unit was the individual visitor or tourist.

The largest number of studies in a given country was five primary studies which were carried out in South Africa, giving a total of 22 observations. Most of the individual studies provided more than one observation for the MA. For example, the van Tonder et al. (2013) study provided five observations because it captured tourists' willingness to pay for five different animals: lion, leopard, rhino, buffalo, and elephant. The majority of the primary studies were non-grey literature published in refereed journals, mainly in the country of origin. Only studies related to wildlife-based recreation activities were included. The CVM and CM scenarios represented an opportunity for wildlife viewing or access or an enhanced recreation experience ranging from increased plant biodiversity, wildlife sightings, and park and wildlife access. Unlike in other MA, for example Ahtiainen (2009) where the primary studies reported the percentage change in the environmental resource, the primary studies used for the current MA did not value percentage change related to increased or enhanced wildlife-based recreation activities.

3.5 DATA

3.5.1 DATA SOURCES

Data was sourced through intensive literature search in online international valuation databases such as Envalue, MSU Library databases such as Web of Science and WorldCat, dissertation and thesis databases, bibliographies from previous meta-analyses, and internet searches for self-published and directly accessible CVM and CM studies. According to Jacobsen and Hanley (2009), restrictions on studies to include or exclude can be imposed based on

geography, valuation method applied, topic, or quality of the study. In the present research, sample studies to be included in the MA were selected to limit data heterogeneity, which would result in problems of heteroscedasticity. Restrictions were made on the valuation methods used, the environmental good valued and the location of the studies. Only studies that used stated preference methods were considered for inclusion. However, these studies were also required to value wildlife-based recreation and to have been carried out in Africa.

Also, to qualify for inclusion, the primary study must have reported a WTP value for access or for an improvement in wildlife-based recreation experience. Studies must have also provided sufficient data for analysis. Studies with incomplete data or data that does not permit computation of mean willingness to pay per person per visit were eliminated to avoid dealing with a large number of missing values.

To reduce the risk of introducing selection bias in meta-regression analysis, an attempt was made to include both published and gray literature. Some researchers (Loomis & White, 1996; Richardson & Loomis, 2009) advise inclusion of both published and unpublished primary studies especially if MA is for purposes of benefit transfer. All WTP estimates available in a single study were included, with each estimate entered as a single observation, instead of averaging them. Averaging estimates would hide possible estimation differences (Jacobsen & Hanley, 2009). Multiple estimates from a single study were thus treated as a panel, and the WTP estimates were standardized to a single base year and currency as outlined below.

3.5.2 STANDARDIZING WTP ESTIMATES

The mean annual willingness to pay in the raw data is reported in various currencies and for various years. To make WTP from different countries comparable, the WTP estimates were

standardized to a single monetary unit (2012 US dollar) as suggested by some authors (Ahtiainen, 2009; Lindhjem, 2007; Saloio, 2008) and following the procedure used in The Economics of Ecosystems and Biodiversity (TEEB) report (2010, as cited by A. McVittie, personal communication via email, 2011). The estimates were converted to US dollar using purchasing power parities (PPP) and adjusted to 2012 USD using country-specific consumer price indices (CPI) for the year of the study. PPP is used rather than nominal exchange rate as it adjusts for differences in price levels between countries and therefore more accurately measures differences in WTP (Lindhjem, 2007). Relevant GDP deflators and PPP conversion data were obtained from the World Bank's World Development Indicators dataset which is available online at <http://data.worldbank.org/indicator>. The GDP deflators are necessary to convert values to a common year.

3.5.3 CODING OF THE DATA FOR META-REGRESSION ANALYSIS

Primary studies reporting estimates of WTP for wildlife and habitat conservation were reviewed to identify key common characteristics that could be used to develop explanatory variables to include in the meta-regression analysis. Initially, a dataset capturing as much information as possible from each primary study was created. This dataset included methodological details, good characteristics, and socio-economic and geographic data as reported in the primary studies, without coding. From this, another dataset with common variables coded for analysis was created. Each WTP estimate was entered as an independent observation with multiple estimates from a single study treated as a panel.

Table 20: Description and Coding of Meta-analytical Variables

Variable	Description	Coding
Dependent variable		
LnWTP2012	Mean WTP in 2012 USD	Continuous
Methodological Characteristics		
CVM	Stated preference valuation method used	Binary: 1 if CVM, 0 otherwise (CM)
FACE2FACE	The survey mode used	Binary: 1 if face-to-face, 0 otherwise
RESPRATE	Response rate as a percent of total surveys distributed	Continuous (ranges from 22 to 100 percent)
SAMPLESIZE	Sample size	Continuous (ranges from 11 to 1158)
NON-PARAMETRIC	Whether WTP estimated using non-parametric methods	Binary: 1 if non-parametric methods used, 0 otherwise
ZERO-BIDS	Whether zero bids were included in computing WTP estimates	Binary: 1 if zero-bids were included, 0 otherwise
TEV	Whether WTP captured total economic value	Binary: 1 if WTP estimates captured total economic value, 0 otherwise
GAIN	Whether the WTP scenario proposed an increase or not	Binary: 1 if an increase was proposed, 0 otherwise
Good Characteristics		
LAND	Whether or not good valued was land animal or habitat	Binary: 1 if good valued was land animal or habitat
SCOPE	Whether single species (habitat) or a group was valued	Binary: 1 if a single species (habitat), 0 otherwise
MEGAFAUNA	Whether wildlife is big game or small game	Binary: 1 if large game, more than 45kg or 100lb, 0 otherwise
Socio-economic Characteristics		
LOCAL	Whether respondents were local or international tourists	Binary: 1 if tourists were local, 0 otherwise

Table 20 (cont'd)

Variable	Description	Coding
Geographic Characteristics		
REGION	Whether the study was conducted in southern Africa	Binary: 1 if conducted in southern Africa, 0 otherwise*
	Whether the study was conducted in East Africa	1 if conducted in East Africa, 0 otherwise
	Whether the study was conducted in North Africa	1 if conducted in North Africa, 0 otherwise
AREA	Total area under national parks for each country	Continuous (ranges from 1955 to 225, 784 square kilometers)
Study Quality Characteristics		
PUBLISH	Whether the study was published or not	Binary: 1 if published, 0 otherwise
AGE	The age of the primary study in years	Continuous (ranges from 1 to 21: 1992 to 2012)

3.6 EMPIRICAL MODEL

Meta-regression models typically include theoretical variables such as methodological characteristics; variables describing characteristics of the environmental good; socio-economic variables; variables describing geographical characteristics and other study-specific atheoretical variables such as the study quality and systematic trends in WTP over the years.

3.6.1 DESCRIPTION OF EXPLANATORY VARIABLES

The explanatory variables included in the meta-regression models were chosen based on theory and empirical results of previous meta-analyses, as well as the availability of information from the primary studies. The description of the variables hypothesized to explain the variation in WTP for wildlife and natural habitats is outlined below.

3.6.1.1 METHODOLOGICAL VARIABLES

Methodological variables describe the way the study was carried out. These include variables such as the stated preference method used to solicit the data (whether CVM or CM was used); the survey mode (that is, whether it was presented to the respondent via mail, telephone, drop-off or face-to-face); and the type of offer posed to the respondents (i.e. status quo or an increase or improvement to the status quo); the sample size and response rate and the estimation mode and the basis for the model specification.

CVM: According to Boxall et al. (1996) and Adamowicz et al. (1998), it is possible to combine and analyze the data for estimates of changes in environmental quality from CVM and choice experiment approaches as these are both based on random utility theory. In general, empirical results indicate that CVM results in higher estimates than choice experiments (Boxall et

al. 1996; Adamowicz et al. 1998; Lockwood & Carberry, 1998). WTP estimates from CVM are expected to be higher and thus a positive sign is hypothesized for the variable CVM.

FACE2FACE: Another common explanatory variable in environmental valuation MA is the survey mode used in collecting the data. Surveys can be conducted directly through face-to-face and telephone interviews, or through self-administered means such as the mail or drop-off mode. Interviewers in face-to-face or telephone interviews may be better able to convey information about the resource, and a higher WTP may be stated due to better understanding of the good. However, there is always the danger of “yea-saying” or warm glow effect. Empirical studies indicate that face-to-face surveys have a higher WTP than self-administered surveys, but telephone surveys generate lower WTP than the indirect survey methods such as mail (Barrio & Loureiro, 2010); for this study, a positive sign is expected for the variable FACE2FACE.

RESPRATE: The response rate can be a methodological variable as well as a proxy for study quality. Loomis and White (1996) and Loomis and Richardson (2009) found that there was no impact of response rate on WTP. However, from the methodological perspective, studies with a higher response rate could be expected to have a lower average WTP, since it can be assumed that the survey has managed to capture a more broadly representative sample including the less-interested, low WTP respondents. According to Arrow, Solow, Portney, Radner and Schuman (1993), a higher response rate is an indicator of sound methodological practices and should yield a conservative estimate according to the NOAA Panel on Contingent Valuation Report. For this study, the variable RESPRATE is expected to be negatively related to WTP.

SAMPLE SIZE: As it is the case with the response rate, the variable SAMPLE SIZE can be expected to be negatively related to WTP; studies with larger sample sizes are likely to report lower average WTP than those with lower sample sizes.

NON-PARAMETRIC: The model specification was considered an important determinant of WTP for wildlife species. Models based on estimating WTP from non-parametric methods such as the arithmetic mean or simple counting/aggregation are expected to produce lower WTP estimates than models based on parametric methods such as maximum likelihood or logistic regression. Tuan and Lindhjem (2008) found non-parametric estimates to be significantly lower than estimates from parametric methods. A negative relationship is thus expected for the variable NON-PARAMETRIC.

ZERO-BIDS: In designing a CVM or CM survey, and specifically, the bid values for willingness to pay, one has to think about starting point bias or anchoring effects. Starting point bias has been observed in CVM literature and it occurs when respondents perceive bid levels suggested in the CVM as acceptable answers (Mitchell & Carson, 1989). In CVM studies, it has been observed that initial bids offered by the study may be correlated with respondents' WTP (Herriges & Shogren, 1996; Lechner, Rozany & Laisney, 2003; Chien, Huang & Shaw, 2005; Flachaire & Hollard, 2007). Anchoring arises when respondents base their answers heavily on the attribute levels provided in the questionnaire, whereas they may actually prefer different attributes or different combinations of attributes than those offered by the study (Kragt & Bennett, 2008).

Depending on the processes prior to designing the final questionnaire, some studies include zero bids. For this research, about 32 percent of the studies included zero bids in the willingness to pay range. Because of possible starting point bias and anchoring effects detected in stated preference analysis, the inclusion of zero-bids in the computation of WTP estimates is expected to result in lower average WTP. Primary studies using both CVM and CM with bids starting at zero often establish whether zero bids are genuine, due to financial incapability, or are protest bids. Protest bids, if identified, are removed, whereas genuine zero-bids are included. Studies that

include zero-bids are thus expected to report lower WTP estimates than those that do not include zero-bids. Thus a negative sign is hypothesized for ZERO-BIDS.

TEV: The variable TEV indicates whether the primary studies captured the total economic value or just some component of it, such as use values or existence values. A positive sign is hypothesized for this explanatory variable as a higher WTP is assumed to be associated with more expected benefits.

GAIN: The variable GAIN was included to account for the different scenarios presented to the respondents. Generally, respondents had to either state their willingness to pay for the status quo or for an improvement in the form of increased sightings or increased chances of viewing wildlife. It can be expected that observations which propose an improvement will have higher willingness to pay; thus a positive sign is hypothesized for this variable.

3.6.1.2 GOOD CHARACTERISTICS

The following variables related to the characteristics of the non-market environmental good were included in the regression analysis:

LAND: Variation in WTP for enhanced wildlife-based recreation can be described by the characteristics of the wildlife species and/or its habitat. According to White, Bennett and Hayes (2001), willingness-to-pay for conservation is significantly greater for marine mammals than terrestrial ones. However, given that respondents may relate better to terrestrial wildlife that they are more likely to see, either in real life or media, than marine wildlife, for this study the variable LAND is thus expected to have a positive relationship with WTP.

SCOPE: Economic theory suggests that people's WTP should be scope sensitive and be responsive to the amount (size) of the good provided (Ahtiainen, 2009). For example, mammals

may be valued more highly than other taxonomic groups because of their higher level of charisma compared to lower profile species (Tuan & Lindhjem, 2008). A single wildlife species or habitat is expected to have a lower willingness to pay as compared to when a group of wildlife species or habitats are valued as a single good as WTP is scope sensitive (Ahtainen, 2009). White, Gregory, Lindley and Richards (1997) and White et al. (2001) report higher median WTP for mammal species in the UK when valued together compared to when the species are valued individually. A negative relationship is hypothesized for the variable SCOPE and WTP.

MEGAFAUNA: Whether the valuation study analyzed wildlife-based recreation values in relation to large wildlife animals or not is also expected to influence WTP. Given that megafauna are often charismatic and flagship wildlife species, a positive sign is hypothesized for the variable MEGAFAUNA.

3.6.1.3 SOCIO-ECONOMIC CHARACTERISTICS

An important socio-economic determinant of WTP for wildlife and natural habitat conservation is the respondent's income. However, it was not possible to include this variable because very few of the primary studies captured either mean annual household or individual income. Jacobsen and Hanley (2009) found that GDP per capita is a good proxy variable for household income. However, this could not be applied to this research as studies often did not specify the origin of the respondents. Most of the primary studies reported average WTP for respondents from various countries combined, and it was not possible to associate a WTP estimate with a specific respondent's country of origin. However, it can be expected that international tourists would pay more than local tourists, given that the tourists are often from developed countries that have a higher per capita income.

LOCAL: The variable LOCAL is thus used as a proxy for income. Empirical findings suggest that international tourists generally have a higher willing to pay for wildlife-based recreation than local tourists (Barnes et al., 1997; Ahmad, 2009). The variable LOCAL is thus expected to have a negative effect on WTP.

3.6.1.4 GEOGRAPHICAL CHARACTERISTICS

The geographical region where surveys are carried out may influence WTP estimates. It is expected that countries or regions that are economically and politically more stable and with higher national wealth will provide greater wildlife and natural habitat experience and hence a higher WTP is likely to be reported.

REGION: The variable REGION represents whether a study was conducted in southern Africa, eastern Africa or northern Africa. The variable is categorized into three (3), REGION1 for southern Africa, which is also the base category, REGION2 for eastern Africa and REGION3 for northern Africa. REGION2 and REGION3 are expected to have negative signs as WTP is expected to be lower for observations from other regions with less economic and political stability compared to southern Africa. The majority of the studies (86 percent) were conducted in countries in southern Africa. The other countries are Kenya, Morocco, Rwanda, Tanzania, and Uganda.

AREA: This variable was included to capture the country-level heterogeneity given that different countries most likely have different levels of significant wildlife and natural habitats tourism. This variable is expected to be positive, with countries with larger total area of land dedicated to wildlife and natural habitats associated with greater opportunities for wildlife and natural habitats viewing experiences and thus higher willingness to pay.

3.6.1.5 STUDY QUALITY CHARACTERISTICS

Other variables to be included are proxy variables for study quality, and these are whether the primary study is published or unpublished (dissertation, thesis, research report or working paper) and the year of study.

PUBLISHED: According to literature, published studies are likely to have a lower WTP as they have presumably undergone thorough methodological scrutiny resulting in conservative values reported (Tuan & Lindhjem, 2008). The variable PUBLISH is thus expected to have a negative sign as estimates from published primary studies are expected to have lower estimates than those from the grey literature.

AGE: It is expected that more recent studies will generate higher WTP as people become more knowledgeable about the importance of biodiversity and wildlife resources and problems associated with habitat loss, climate change and pollution become more pronounced. In addition, over time the demand for wildlife and natural habitats conservation is likely to increase with higher incomes and greater amounts of travel. Thus a negative sign is expected for the explanatory variable AGE. Similar results have been reported by Richardson and Loomis (2009) who found that newer studies reported a higher WTP.

3.7 ANALYSIS

3.7.1 META-REGRESSION MODEL

To analyze the impact of the explanatory variables on WTP, a meta-regression model that captures both study and measurement error is applied. These two types of error result because observations from the same primary study may share some of the same values, for example year of study and survey mode, while they vary in other aspects such as the type of respondent (local

or international). Given that i WTP estimates have been identified with $i = 1, \dots, Ij$, from each study, j , where $j = 1, \dots, J$ and the explanatory variables are defined as a set of n , with $n = 1, \dots, N$, then the meta-regression model can be defined as follows (Bijmolt and Pieters, 2001; Lindhjem, 2007):

$$WTP_{ij} = \alpha + \sum_{n=1}^N (\beta_n x_{n,ij}) + \varepsilon_{ij} + \mu_j \quad (17)$$

where

WTP_{ij} = WTP for the i^{th} observation from the j^{th} strata (study)

α = regression intercept (constant)

β_n = slope parameter

$X_{n,ij}$ = explanatory variables or regressors

μ_j = random error for the study level (normally distributed with mean zero and variance, σ_μ^2)

ε_{ij} = random error for the measurement level (normally distributed with mean zero and variance, σ_ε^2).

A number of approaches have been used to estimate this model. For example, Loomis and White (1996) and Rosenberger and Loomis (2000b) used simple ordinary least squares (OLS), which, according to Rosenberger and Loomis (2000c), works well in many cases. However, when using OLS, the best approach is to estimate the OLS regression model with the Huber-White robust variance estimation procedure to correct for potential heteroscedasticity and inter-cluster correlation (Jacobsen & Hanley, 2009; Smith & Osborne, 1996) which would otherwise make OLS estimates inefficient and inconsistent. Multilevel models have been applied in some studies (Bateman & Jones, 2003; Rosenberger & Loomis, 2000c) but have been found to make little improvement over the standard OLS model.

According to empirical literature, there is no precedent for choice of functional form when conducting MA (Rosenberger & Loomis, 2000c), but the most common functional forms are linear, semi-log, double-log and translog (Johnston et al., 2005). For this study, several functional forms were tested to get the best specification model based on the significance of the explanatory variables and the R^2 and adjusted R^2 statistics (Ahtainen, 2009; Richardson & Loomis, 2009). The linear OLS models were found to have heteroscedasticity and specification problems. The model fit was considerably improved and heteroscedasticity mitigated by using log-log models. The estimated log-log model was specified as:

$$Lnwtp = \alpha + Ln\beta_1\gamma_1 + Ln\beta_2\varphi_2 + Ln\beta_3\theta_3 + Ln\beta_4\rho_4 + Ln\beta_5\omega_5 + \varepsilon \quad (18)$$

where the dependent variable, $Lnwtp$, is the natural log of the reported willingness to pay estimate, α is the constant term, ε is a vector of residuals, and the β 's are the estimated coefficients on the respective explanatory variables. With the log-log model, continuous explanatory variables are converted to the natural logarithm.

To investigate the systematic effects of the explanatory variables on willingness to pay for wildlife-based recreation three datasets for MA were created. The first dataset included primary studies that valued wildlife species only, either single or multiple species ($N = 22$). The second dataset included studies that estimated WTP for both wildlife species and the natural habitats as a composite good such as a park ($N = 61$). The last dataset included the primary studies in the first and second datasets and added studies that considered only habitat ($N = 5$) giving a total of 88 observations.

Four models based on these datasets were analyzed. The first model (model WS) analyzed the first dataset with wildlife species. The second model (model WH) analyzed the second dataset, wildlife and habitat. For the third model (model WS_WH), the first and second datasets were

combined. Lastly, the fourth model (model WS_WH_H) analyzed all three datasets combined (wildlife species, wildlife and habitat, and habitat). The dependent variable in all the meta-regression models was the natural logarithm of the mean annual willingness to pay (LnWTP) per person per visit. All the explanatory variables, other than sample size, response rate, age of study and total area for national parks, were binary.

The model specification test using “linktest” command in STATA revealed that there is no specification error in the log-linear and log-log OLS models; hence the dependent variable is correctly specified as a logarithm. Statistical considerations such as multicollinearity, heteroscedasticity and autocorrelation were also tested for in all the models and the results are presented in the appendix.

Each model was tested to determine the degree of correlation between variables using a simple correlation matrix. Variables that are highly correlated (correlation coefficient of 0.8 or more according to Gujarati (2003) have similar explanatory power on WTP estimates and both were not included in the meta-regression analysis, as otherwise the regression specification will be inefficient and inconsistent in estimated parameters (Lindhjem, 2007). The variance inflation factor (VIF) was used to check for unacceptably high correlation between the explanatory variables. The variable that was not statistically significant and/or had a VIF more than 10 was omitted from the regression models.

The models were estimated with clustered robust standard errors to deal with heteroscedasticity and potential correlation among observations from a single study. According to UCLA Statistical Consulting Group (accessed June 19 2015), the robust option in STATA may effectively deal with minor concerns with normality and heteroscedasticity.

Since most studies report more than one WTP estimate within a single study, the data was treated as panel data to account for correlation between the errors of estimates from the same study (Nelson & Kennedy, 2009). To address intra-correlation arising from multiple observations from the same study, some researchers assume independence between estimates or adopt a weighting procedure such that each study counts equally towards the data (Barrio & Loureiro, 2010; Ahtiainen, 2009; Saloio, 2008; Rosenberger & Loomis, 2000a; Loomis & White, 1996). However, others argue against both approaches (Bateman & Jones, 2003) citing inefficient use of the data as neither approach incorporates potential nested structures within the data.

The Durbin-Watson test for autocorrelation was either inconclusive or indicated the presence of autocorrelation in the models, and the post-estimation cluster option was used to address this. According to Rosenberger and Loomis (2000a), multiple observations in a database from the same source may be cross-sectionally correlated resulting in heteroscedastic regressors. Econometric models for which data has not been corrected for panel effects may lead to inefficient and inconsistent parameter estimates, leading to invalid inferences from seemingly significant factor effects (Rosenberger & Loomis, 2000b). To address panel effects, data were stratified by study following the procedure proposed by UCLA Statistical Consulting Group (accessed June 19 2015).

3.8 RESULTS AND DISCUSSION

3.8.1 DESCRIPTIVE ANALYSIS

The valuation literature available on willingness to pay for wildlife and natural habitats in developing countries is still minimal compared to what is available in developed countries. As shown in Table 21 below, Rwanda had the highest average WTP of 164.29 2012 USD for wildlife-

based recreation, which was computed by summing all the estimates from the studies carried out in Rwanda and dividing by the number of estimates. The next highest mean WTP was for Kenya and Botswana at 99.30 and 60.46 2012 USD, respectively. The lowest mean WTP was for Morocco at 6.44 2012 USD. Namibia had the highest number of observations or WTP estimates (28), but the highest number of primary studies (six) included in the MA were conducted in South Africa.

Table 21: Mean WTP (2012 USD) by Country

Country	Mean WTP (USD 2012)	Std. Deviation	Frequency of WTP Estimates
Botswana	60.46	52.24	15
Kenya	99.30	0	1
Namibia	40.69	33.43	28
Morocco	6.44	0	1
Mozambique	43.97	16.17	3
Rwanda	164.29	0	1
South Africa	59.01	69.34	22
Tanzania	22.96	14.59	8
Uganda	59.8	0	1
Zambia	26.36	6.02	8

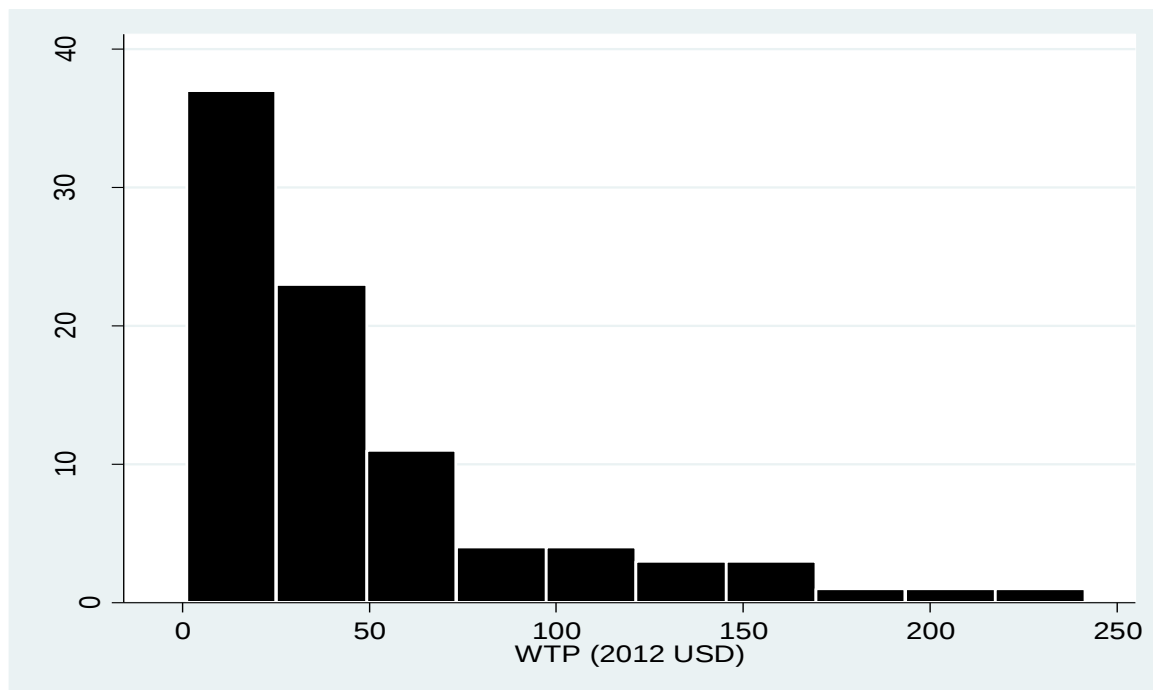
The highest mean willingness to pay among the three datasets was for habitats (N = 5), which was USD98.67 2012 USD, followed by the mean WTP for wildlife species which was USD59.01 2012 USD (N = 22). The mean willingness to pay for wildlife and habitats was 39.49 2012 USD (N=61). The mean WTP for all the studies in the sample was 47.73 in 2012 USD, with a minimum of 1.21 and a maximum of 241.59 2012 USD. The mean logarithm of the dependent variable, willingness to pay, was 3.46, with a minimum logarithm of WTP 0.973 and a maximum natural logarithm of 5.49.

This value is relatively lower than the average willingness to pay for species and nature conservation in Asia and Oceania MA study (Tuan & Lindhjem, 2008) which was 133 in 2006 USD (151.57 in 2012 USD). It is also lower than the mean WTP for threatened and endangered wildlife species from primary studies carried out in United States (74.34 in 2007 USD or 81.21 in

2012 USD), in other countries other than United States (71.36 in 2007 USD or 79.02 in 2012 USD) and worldwide (73.20 in 2007 USD or 81.06 in 2012). In addition, Johnston et al. (2005) reported a mean logWTP (natural logarithm) for aquatic resource improvements in the United States at 4.43 in 2002 USD (5.53 in 2012 USD), and Borisova-Kidder (2006) reported a mean logWTP of 4.63 in 2002 USD (5.87 in 2012 USD) in the United States and Canada.

The relatively low average WTP in the current research can be an indication of the level of importance of wildlife and natural habitats in Africa to individual consumers. This may also be an indication of the need for improved investment in the conservation of wildlife and natural habitat by governments in African countries. However, it is also worth noting that the low average WTP may be a result of methodological procedures, and/or the fact that the studies were done in developing countries where the standard of living is relatively lower. The distribution of the WTP estimates was as given in Figure 21 below.

Figure 21: Distribution of the WTP in 2012 USD, N = 88



The WTP estimates were skewed to the left as in other meta-studies (Rosenberger & Loomis, 2000b; Lindhjem, 2007; Saloio, 2008), with a wide range of WTP estimates which is an indication of the heterogeneity in the scope of the primary studies used.

3.8.2 WILDLIFE SPECIES BASED RECREATION

3.8.2.1 DESCRIPTIVE STATISTICS

A total of 16 explanatory variables were included in the MA for all the models analyzed for wildlife species-based recreation. However, some of the explanatory variables were omitted from some from the regression models because of multicollinearity problems and due to lack of variability in the variables. For the WS model, REGION, LOCAL and PUBLISHED were excluded.

All of the studies were from southern Africa. The main reason may be lack of access to the primary studies in the northern and West Africa, especially unpublished research work, as well as language barriers as these countries are francophone countries. All of the observations came from primary studies that are published, and therefore we would expect these to be based on sound research methods.

Descriptive statistics for variables included in the final model are presented in Table 22 below. As shown in Table 22, the mean WTP for wildlife-species based recreation was estimated to be 59.01 2012 USD.

Table 22: Descriptive Statistics of the Meta-analytical Variables – Wildlife Dataset, N = 22

Variable	Mean	Standard Deviation	Minimum	Maximum
Dependent variable				
WTP	59.01	69.335	3.89	241.59
Lnwtp	3.46	1.16	1.36	5.49
Methodological Variables				
FACE2FACE	0.545	0.545	0	1
CVM	0.636	0.492	0	1
RESPRATE	91.551	17.355	35	100
SAMPLE-SIZE	242	119.348	29	605
NON-PARAMETRIC	0.636	0.492	0	1
ZERO-BIDS	0.276	0.456	0	1
TEV	0.364	0.508	0	1
Good Characteristics				
LAND	0.500	0.512	0	1
SCOPE	0.636	0.492	0	1
MEGAFAUNA	0.500	0.513	0	1
Geographic Characteristics				
AREA	48763.6	0	48763.6	48763.6
Study Quality				
AGE	4.818	4.113	2	12

About 64 percent of the WTP estimates were obtained through studies that used CVM. The majority of the primary studies (55 percent) used face-to-face interviews. The mean response rate was high at 92 percent. Only about 36 percent of the observations captured total economic values rather than just some component of the total economic value, and half of the reported willingness to pay estimates were for terrestrial (land) rather than marine wildlife species. About 50 percent of the primary studies analyzed WTP for megafauna.

3.8.2.2 DETERMINANTS OF WILLINGNESS TO PAY FOR WILDLIFE SPECIES-BASED RECREATION

A log-log model (Model WS) was adopted to explain the determinants of WTP for wildlife species based recreation. The regression results for the wildlife dataset are displayed in Table 23

below. Though all the model specifications tried fit the data well and explained more than three quarters of the variation in the data, only the results for the semi-logarithmic model with the cluster/ robust option are presented as this model had the highest R^2 value of 0.79, compared to the other specifications for this dataset. The coefficients for the binary variables, which are linear, measure the relative change in the dependent variable for a given absolute change in the value of the explanatory variable from zero to one. Due to the small sample size in this dataset, quite a number of variables (MEGAFAUNA, NON-PARAMETRIC, TEV, GAIN, SCOPE, AREA, AGE) were omitted from the final log-log model due to collinearity problems.

According to the results in Table 23 below, willingness to pay for wildlife species is influenced by the methodological variables CVM, FACE2FACE, SAMPLE-SIZE, ZERO-BIDS and RESPRATE).

Table 23: Meta-analytical Results: Determinants of WTP for Wildlife Species (N = 22)

Category	Variable	Coefficient	Robust Standard error
Methodological characteristics	CVM	2.239***	0.459
	FACE2FACE	-2.345***	0.087
	LnSAMPLE-SIZE	-0.996**	0.307
	ZERO-BIDS	3.384***	8.12×10^{-15}
	LnRESPRATE	-0.052	0.734
Good Characteristics	LAND	1.583***	0.030
	CONSTANT	7.152***	1.310
	N	22	
	R^2 (Adjusted R^2)	0.789 (0.705)	

, *: Significant at the 5 and 1 percent level of significance, respectively.

These results are comparable to the findings in other meta-analytical research which also reported higher average WTP estimates from CVM (Boxall et al., 1996; Adamowicz et al., 1998; Lockwood & Carberry, 1998). The coefficient for the variable FACE2FACE was negative indicating that WTP estimates from primary studies that used face-to-face interviews are lower

than for those that used other survey methods, contrary to expectation. The variable SAMPLE-SIZE had the expected negative sign, and according to the results, a one percent increase in the sample size would decrease the WTP value estimates by about one percent. Contrary to expectation, studies that include zero bids in the computation of the WTP estimates will have higher estimates. For this study, as in other empirical findings, WTP for marine wildlife species was found to be higher than for terrestrial animals by about 1.6 percent.

3.8.3 WILDLIFE-HABITAT BASED RECREATION

3.8.3.1 DESCRIPTIVE STATISTICS

Table 24 shows the descriptive statistics for the explanatory variables for WTP for wildlife-habitat based recreation. The mean WTP for wildlife-habitat based recreation was estimated to be 39.49 2012 USD.

Table 24: Descriptive Statistics of the Meta-analytical Variables – Wildlife-Habitat Dataset, N = 61

Variable	Mean	Standard Deviation	Minimum	Maximum
Dependent variable				
WTP	39.49	36.26	1.21	177.02
Lnwtp	3.36	0.888	0.19	5.18
Methodological Variables				
CVM	0.967	0.180	0	1
FACE2FACE	0.574	0.499	0	1
RESPRATE	73.66	21.11	41.14	100
SAMPLE-SIZE	273.26	278.24	7	1132
NON-PARAMETRIC	0.803	0.401	0	1
ZERO-BIDS	0.279	0.452	0	1
TEV	0.475	0.504	0	1
GAIN	0.279	0.452	0	1

Table 24 (cont'd)

Variable	Mean	Standard Deviation	Minimum	Maximum
Socio-economic Characteristics				
LOCAL	0.098	0.300	0	1
Good Characteristics				
LAND	0.902	0.300	0	1
SCOPE	0.016	0.128	0	1
Geographic Characteristics				
REGION2	0.180	0.388	0	1
REGION3	0.016	0.128	0	1
AREA	137032.7	62452.92	1995	225784.2
Study Quality				
PUBLISHED	0.311	0.467	0	1
AGE	12.52	5.02	1	21

Over 95 percent of the observations from primary studies that used CVM. The majority of the observations (57 percent) were based on surveys that used face-to-face interviews. Almost 50 percent of the observations captured total economic values, and not just some component of the total economic value. About 90 percent of the observations captured WTP for terrestrial wildlife-habitat based recreation. Only about 30 percent of the observations were based on an increase or an improvement of some non-market environmental good. The response rate was quite high with a minimum response rate of 22.38 percent and an average response rate of 74 percent. Parametric methods were less common and made up only about 20 percent of the total observations.

Observations valuing recreation based on marine wildlife and habitat represented only about 10 percent of total observations. The majority of the observations (80 percent) were from southern Africa with about 18 percent from eastern Africa and only about two percent from northern Africa. Only two percent of the observations captured WTP for a single species (habitat), with the majority of observations valuing the habitat and the wildlife within it as a composite good.

Only about 30 percent of the observations were obtained from published research, with the majority of them from the grey literature.

3.8.3.2 DETERMINANTS OF WILLINGNESS TO PAY FOR WILDLIFE-HABITAT BASED RECREATION

Table 25 below shows the results for Model WH (WILDLIFE and HABITAT). The log-log model with the cluster option was adopted as it explained a higher percentage of the variation in the dependent variable (50 percent). TEV was removed from the model as it was correlated with the variable FACE2FACE and had a high VIF, so that including it in the regression would present multicollinearity problems in the model.

Table 25: Meta-analytical Regression: Determinants of WTP for Wildlife & Habitat (N = 61)

Category	Variable	Coefficient	Robust Standard error
Methodological characteristics	CVM	2.744	1.799
	FACE2FACE	0.663**	0.289
	LnRESPRATE	0.424	0.584
	LnSAMPLE-SIZE	-0.025	0.062
	ZERO-BIDS	0.754*	0.399
	TEV	-0.110	0.448
	GAIN	0.165	0.214
Socio-economic Characteristics	LOCAL	-0.197	0.142
Good Characteristics	LAND	0.664	0.431
	SCOPE	-0.118	0.623
Geographic characteristics	REGION2	-1.673***	0.350
	REGION3	-8.067***	2.256
	LnAREA	-1.414**	0.486
Study quality	PUBLISHED	1.250***	0.372
	LnAGE	0.079	0.107
	CONSTANT	14.102	3.114
	N	61	
	R ² (Adjusted R ²)	0.442 (0.272)	

*, **, ***: Significant at the 10 percent, 5 percent and 1 percent level of significance, respectively.

The methodological explanatory variables found to influence willingness to pay for species and habitat were the survey mode (FACE2FACE) and inclusion of zero-bids (ZERO-BIDS). According to the results, WTP estimates from CVM studies that used face-to-face interviews to administer the surveys were higher than the WTP estimates from other survey modes. The coefficient for ZERO-BIDS was positive and significant at the 10 percent level, implying that observations that included zero bids when computing the mean WTP would result in higher WTP estimates, contrary to the hypothesized relationship.

Geographical characteristics were found to significantly influence WTP for wildlife and natural habitats. Observations sourced from primary studies in east Africa were found to have WTP estimates about 1.7 percent lower than for estimates from primary studies carried out in southern Africa. WTP estimates from northern Africa were up to eight percent lower than for estimates from southern Africa. Contrary to expectation, a percentage increase in the total area of national parks will result in a 1.4 percent decrease in the WTP for wildlife and natural habitats in Africa.

The variable PUBLISH was statistically significant at the 1 percent level though it did not have the hypothesized sign. According to the results, WTP estimates from published studies give WTP estimates that are 1.3 percent higher compared to studies that are in the grey literature.

3.8.4 DETERMINANTS OF WILLINGNESS TO PAY FOR WILDLIFE-BASED RECREATION (WILDLIFE AND HABITAT PLUS WILDLIFE)

3.8.4.1 DESCRIPTIVE STATISTICS

Table 26 below shows the descriptive statistics for the explanatory variables used to estimate WTP for wildlife species as well as wildlife and habitat (N = 83). The mean WTP in this

case was 44.67 2012 USD. About 88 percent of the observations were based on studies that used CVM. The majority of the observations were from studies that used face-to-face interviews. About 80 percent of the observations were for land or terrestrial wildlife and habitats. Only about two percent of the observations were based on mandatory or coerced payment options. About two percent of the observations were for flora versus fauna. About half of the observations were from published empirical works. Over 85 percent of the observations were from studies conducted in southern Africa.

Table 26: Descriptive Statistics of the Meta-analytical Variables – Wildlife Species and Wildlife-Habitat, N = 83

Variable	Mean	Standard Deviation	Minimum	Maximum
Dependent variable				
WTP	44.67	47.63	1.21	241.59
Lnwtp	3.39	0.960	0.191	5.49
Methodological Variables				
CVM	0.880	0.328	0	1
FACE2FACE	0.566	0.499	0	1
RESPRATE	78.40	21.59	35	100
SAMPLE-SIZE	264.98	245.95	7	1132
NON-PARAMETRIC	0.759	0.430	0	1
ZERO-BIDS	0.277	0.450	0	1
TEV	0.446	0.500	0	1
GAIN	0.349	0.480	0	1
Socio-economic Characteristics				
LOCAL	0.072	0.261	0	1
Good Characteristics				
LAND	0.795	0.406	0	1
SCOPE	0.181	0.387	0	1
Geographic Characteristics				
REGION2	0.133	0.341	0	1
REGION3	0.012	0.110	0	1
AREA	113636	66258.83	1195	225784.2
Study Quality				
PUBLISHED	0.494	0.503	0	1
AGE	10.482	5.873	1	21

3.8.4.2 DETERMINANTS OF WILLINGNESS TO PAY FOR WILDLIFE-BASED RECREATION (WILDLIFE AND HABITAT PLUS WILDLIFE)

A log-log model (Model WS_WH) was estimated for datasets one and two combined and the results are presented in Table 27 below. Eleven of the 16 variables were found to be statistically significant. As expected, estimates from studies that used CVM resulted in WTP estimates 2.7 percent higher than for CM studies. WTP value estimates were found to be 0.7 percent lower for studies carried out in the east Africa, and 8.5 percent lower for studies carried out in northern Africa compared to estimates from southern Africa.

Table 27: Meta-analytical Regression: Determinants of WTP for Wildlife and Habitat and Wildlife (N = 83)

Category	Variable	Coefficient	Robust Standard error
Methodological characteristics	CVM	2.677***	0.787
	FACE2FACE	-0.908**	0.356
	LnRESPRATE	-0.238	0.309
	LnSAMPLE-SIZE	-0.110	0.093
	NON-PARAMETRIC	2.274***	0.743
	ZERO-BIDS	2.002***	0.322
	GAIN	0.190	0.207
Socio-economic Characteristics	LOCAL	-0.280	0.168
Good Characteristics	LAND	1.224***	0.356
	SCOPE	-3.183***	0.841
Geographic characteristics	REGION2	-0.742*	0.418
	REGION3	-8.478***	1.712
	LnAREA	-1.691***	0.434
Study quality	PUBLISHED	2.698***	0.643
	LnAGE	-0.384***	0.115
	CONSTANT	19.361	4.783
	N	83	
	R ² (Adjusted R ²)	0.470 (0.351)	

*, **, ***: Significant at the 10 percent, 5 and 1 percent level of significance, respectively.

The variable SCOPE was statistically significant at the one percent level and had the expected sign, and the results indicate that studies that valued multiple species or habitats together

had WTP estimates that are about three percent higher than those that valued just a single species or habitat. The variable age was also highly significant with the hypothesized sign, implying that a one percent increase in the age of the study would result in a 0.4 percent decrease in the WTP estimate. The following variables were statistically significant but did not have the expected sign: FACE2FACE, NON-PARAMETRIC, ZERO-BIDS, AREA and PUBLISHED.

3.8.5 WILLINGNESS TO PAY FOR WILDLIFE BASED RECREATION (FULL DATASET)

3.8.5.1 DESCRIPTIVE STATISTICS

Table 28 below shows the descriptive statistics for the variables for the entire dataset (N = 88). The mean WTP for wildlife-based recreation was estimated as 47.73 2012 USD. CVM was the more commonly used valuation method as over 88 percent of the observations were from CVM-based primary studies.

Table 28: Descriptive Statistics of the Meta-analytical Variables – Wildlife Species, Wildlife-Habitat, and Habitat N = 88

Variable	Mean	Standard Deviation	Minimum	Maximum
Dependent variable				
WTP	47.73	48.53	1.21	241.59
Lnwtp	3.46	0.973	0.191	5.49
Methodological Variables				
CVM	0.886	0.319	0	1
FACE2FACE	0.591	0.494	0	1
RESRATE	76.77	22.88	23.56	100
SAMPLE-SIZE	255.11	242.50	7	1132
NON-PARAMETRIC	0.773	0.421	0	1
ZERO-BIDS	0.318	0.468	0	1
TEV	0.477	0.502	0	1
GAIN	0.330	0.473	0	1
Socio-economic Characteristics				
LOCAL	0.068	0.254	0	1

Table 28 (cont'd)

Variable	Mean	Standard Deviation	Minimum	Maximum
Good Characteristics				
LAND	0.807	0.397	0	1
SCOPE	0.170	0.378	0	1
Geographic Characteristics				
REGION2	0.125	0.333	0	1
REGION3	0.011	0.107	0	1
AREA	119109	68123.85	1995	225784.2
Study Quality				
PUBLISHED	0.523	0.502	0	1
AGE	10.57	5.71	1	21

About 60 percent of the observations were from studies that used face-to-face interviews; mean response rate was 77 percent. The sample size was also quite high with a maximum of 1158 and an average of 255. International tourists made up the majority of observation at 93 percent. Over 80 percent of the estimates were for land versus marine resources. Only about 14 percent of the observations were not from southern Africa. The majority of the observations (52 percent) were from published literature.

3.8.5.2 DETRMINANTS OF WILLINGNESS TO PAY FOR WILDLIFE BASED RECREATION

Table 29 below shows the results of the log-log meta-regression model for Model WS_WH_H (full dataset). The double-log OLS model with the cluster option and robust standard errors was adopted as it had more explanatory power than the simple linear model and also mitigated against the heteroscedasticity which was noted in the simple OLS model and the semi-log models. The variable TEV was dropped from the model as it was highly correlated with FACE2FACE.

Table 29: Meta-analytical Regression Results for Wildlife Resources (ALL) N = 88

Category	Variable	Coefficient	Standard error
Methodological characteristics	CVM	2.905***	0.478
	FACE2FACE	-0.499	0.322
	LnRESPRATE	-0.273	0.310
	LnSAMPLE-SIZE	-0.019	0.098
	NON-PARAMETRIC	1.189**	0.521
	ZERO-BIDS	1.130***	0.305
	GAIN	0.214	0.285
Socio-economic Characteristics	LOCAL	-0.268	0.388
Good Characteristics	LAND	0.777**	0.310
	SCOPE	-2.466***	0.718
Geographic characteristics	REGION2	-1.152*	0.608
	REGION3	-8.217***	1.994
	LnAREA	-1.650***	0.446
Study quality	PUBLISHED	1.651***	0.344
	LnAGE	-0.339**	0.149
	CONSTANT	19.839	4.657
	N	88	
	R ² (Adjusted R ²)	0.465 (0.353)	

*, **, ***: Significant at the 10, 5 percent and 1 percent level of significance, respectively.

The model explained almost 46 percent of the variation in WTP for wildlife-based recreation. Only five covariates were found not to influence WTP for wildlife-based recreation. These were FACE2FACE, RESPRATE, SAMPLE-SIZE, GAIN and LOCAL. The following explanatory variables were statistically significant and had the expected sign: CVM, LAND, REGION2 and REGION3 and AGE. According to the results, studies based on contingent valuation method are expected to produce higher WTP estimates compared to those that used choice modelling. The negative sign for the variable LAND confirmed the expectation that WTP estimates from studies that valued terrestrial wildlife and natural habitats result in higher WTP estimates relative to marine wildlife and natural habitats. Estimates for terrestrial resources were found to be almost 0.8 percent higher for land resources than for marine resources.

WTP estimates from studies in both eastern and northern Africa were found to be significantly lower than estimates from studies from southern Africa. WTP estimates from studies carried out in east and northern Africa are expected to be 1.2 and 8.2 percent lower, respectively, than estimates from studies done in southern Africa. The age of the study was found to be statistically significant at the 10 percent level and negatively related to WTP estimates as expected with older studies likely to yield lower WTP estimates. This can be attributed to improvements in the quality of CVM in African countries, giving more conservative estimates that are more reflective of consumer preferences for non-market environmental goods.

Some similarities and differences across the four models emerge, which makes varying the scope of the meta-analysis important. CVM was found to statistically influence WTP for wildlife species-based recreation in model WS, wildlife species, and wildlife and habitat (model WS_WH), and also in model WS_WH_H, but not wildlife and habitat-based recreation (model WH). The variable had the expected positive sign in all the models. WTP for wildlife species was found to be influenced mainly by methodological characteristics – FACE2FACE, SAMPLE-SIZE and ZERO-BIDS. The variable SAMPLE-SIZE had the expected negative sign for all the models confirming the hypothesis that estimates from studies with large sample size will be lower. The country effects as captured by the variables REGION and AREA were found to be statistically significant in all the models in which they were included, though AREA did not have the hypothesized positive sign.

Whether the primary estimates are from published or grey literature statistically influences WTP estimates. For all the models in which it was included, this variable was statistically significant though it did not have the hypothesized negative sign, implying that contrary to expectation estimates from published primary studies are likely to be higher than those from the

grey literature. The variable AGE was statistically significant and had the expected negative sign for models WS_WH and WS_WH_H. Among the four models, model WS_WH explains 47 percent of the variation in WTP estimates, compared to only 44 percent for model WH. However, the results from models WS-WH and WS_WH_H are fairly similar. Though model WS has a high R^2 , the low number of observations makes the model inferior to the other three models. Given that Model WS_WH may have relatively more homogenous studies compared to model WS_WH_H and a sufficiently large number of observations compared to model WS, this would make it the best model out of the four.

3.9 CONCLUSIONS AND RECOMMENDATIONS

This study has taken stock of stated preference research valuing wildlife resources in Africa by the use of meta-analysis. The research first summarizes the valuation literature available on WTP for wildlife and natural habitats. The valuation literature available on willingness to pay for wildlife and natural habitats in developing countries, and in Africa in particular, is still relatively minimal compared to what is available in developed countries, and more research in this area, employing sound methodological procedures, would significantly improve the synthesis of new knowledge on valuation of wildlife resources using MA. Limited access to available primary studies, especially in the grey literature, may be why meta-studies from developing countries are still relatively scarce, and researchers should attempt to make research outputs more available to grow literature and knowledge of valuation of wildlife and natural habitats in developing countries.

Second, the research summarized the willingness to pay values for wildlife resources in African countries and for Africa. From the primary studies available for the MA, a mean willingness to pay for wildlife and natural habitats in African countries was estimated at 47.73

2012 USD (59.01 2012 USD for wildlife species and 39.49 2012 USD for wildlife and habitats). Though this value is relatively low compared to WTP estimates from other meta-studies, it is comparatively high considering that the studies were from developing countries only. Other meta-analyses have included studies from developed countries with higher per capita GDP. The mean WTP estimate is also relatively high compared to what tourists are paying to access these wildlife resources and may be an indication that African countries may be under-pricing their wildlife resources.

Given the minimal investment in wildlife and natural habitats due to limited government funds, African governments can explore pricing mechanisms to maximize benefits from wildlife and natural habitat resources by capturing consumers' maximum willingness to pay for access to these resources. These funds can in turn be invested back into the development of wildlife and natural resources to increase consumers' utility and thus ensure sustainable use and financing of conservation efforts. A MA including studies for a homogenous good, for example only wildlife species, would make the results more meaningful for policy development regarding the type and even the species of wildlife to invest in, so as to maximize returns from wildlife and natural habitats.

Finally, a meta-regression analysis was conducted to explain the variation in WTP for wildlife resources resulting from differences in survey methodology, good characteristics, and geographic characteristics and study quality. A number of explanatory variables were identified as the source of systematic variation in willingness to pay estimates for wildlife and natural habitats in African countries. The type of stated preference method used was found to influence willingness to pay for wildlife and natural habitats. It was statistically significant in all the models except WH, and the results indicate that contingent valuation method estimates are higher than choice modeling

estimates for wildlife and natural habitats. The type of elicitation method was statistically significant in all the models except WS_WH_H. However, it did not have the hypothesized sign. Whether or not the primary study is published (PUBLISHED) had an effect on the WTP for wildlife and natural habitats and was significant in all the models except WS, though it did not have the hypothesized negative sign. The age of the study (AGE) was also statistically significant in models WS-WH and WS_WH_H and had the expected negative sign.

This is the first MA that attempts to summarize the valuation literature on wildlife and natural habitats in Africa, and there were a number of limitations. First, accessing wildlife-based recreation literature from developing countries is still a major challenge. A lot of research work that is carried out in developing countries is either not published and/or not readily available for other researchers to access. Second, though there are guidelines on how to carry out stated preference valuation methods to ensure more or less a standard practice, there is considerable variation in the processes of developing and implementing surveys and in the type of data that is captured in these primary studies, which makes MA such as this very challenging. For example, though the primary studies used all analyzed WTP for wildlife-based recreation, they did not follow the standard practice of valuing a percentage change in the quality or quantity of an environmental good. Heterogeneity in the type of data captured by primary studies, the type of wildlife good valued, the valuation methods used, and socio-economic, cultural, and geographic characteristics of the different countries included limit the application of the results from the current research for benefit transfer.

Heterogeneity in the valuation method was overcome by using only stated preference methods. As more wildlife-based recreation valuation literature appears, perhaps an improved MA, building on the current primary studies included in this research but using a single

valuation method and or a relatively homogenous type of good, would give more insights into the recreational value of wildlife and the determinants of WTP for wildlife-based recreation in Africa and perhaps present possibilities for use of MA for benefit-transfer.

CHAPTER 4: GENERAL CONCLUSIONS AND RECOMMENDATIONS

This study was motivated by the apparent gap in the knowledge of economic values for wildlife and nature based tourism in developing African countries. Filling that gap offers the opportunity for such economic values to be captured by countries with abundant wildlife and natural habitats through public funding to aid preservation and conservation strategies at the country and regional level for African countries. Additional objectives of this study were to link these economic values with the potential for the tourism industry in developing African countries to drive economic activity and propel economic growth, thus reducing poverty, and to show the importance of public investment in the tourism industry. Knowledge of economic values of wildlife and natural resources may also aid efficient pricing to optimize financial returns from such assets.

The conclusions drawn from this research concur with other empirical findings that parks and natural sites in Africa are under-priced and are not optimally priced to capture consumers' maximum willingness to pay. Tourists' estimated willingness to pay for park entry fees, given the status quo and with park improvements, are relatively high compared to actual fees charged, which is an indication that African countries can derive considerable direct use values from its wildlife and natural resources. However, non-use values are also of considerable importance as tourists' willingness to pay is also influenced by the socio-economic importance of wildlife and natural resources to the locals. These non-use values may be captured through establishment of conservation funds with mechanisms developed to source donations or levies from tourists, where these are not in place. It is therefore recommended that park prices should be raised to market levels to capture as much of the consumer surplus as possible.

Price differentials for the different parks offering different wildlife and natural resources indicate that use and non-use values can be further captured by introducing and/or continuing to charge park fees based on differential pricing such that different categories of visitors such as citizen, non-citizen and non-resident tourists are charged different prices. This pricing strategy with differentiated entrance fees will ensure that all potential tourists are encouraged to participate in the tourism market so that maximum consumer surplus is captured. International tourists may be charged as much as the average willingness to pay, however, local and regional tourists' fees should be subsidized to encourage their participation in the tourism market. Given that park entry fees constitute a small percentage of the total costs of tourism activities, accommodation and transport costs should also be subsidized for local tourists for equitable access.

Differential pricing based on the demand for the tourism activities or the levels of visitation at the different parks and natural sites would also ensure maximum returns from tourism activities as well as development of sites offering a variety of environmental goods. Relatively high fees can be charged at internationally well-known parks or natural sites such as the Victoria Falls and those that have large numbers of charismatic wildlife species such as lions, elephants and primates. This pricing strategy may also be used to alleviate or prevent congestion problems at heavily visited sites which would otherwise result in reduced satisfaction for tourists as well as increased risk of resource degradation. Another strategy to address potential congestion issues, which would also increase the visitation length and therefore tourism revenue, is to offer packaged tours within the country and use bundling pricing strategy. Tourists can be offered packages that include visiting both popular and less popular sites at a lower price than if visitors visit the sites outside the package offer.

The results from this research are indicative of the great potential of the tourism industry in Africa as one of the best prospects for funding for tourism investment, economic diversification and growth. The mean willingness to pay for wildlife and natural sites in both studies are relatively lower than empirical findings from other countries. For example, the Galapagos National Park in Ecuador charges international tourists over the age of 12 100 USD per visit whereas parks in Africa still charge as little as 6.44 USD. This suggests that park entry fees per person per day could be increased by up to 50 percent, especially for parks that are highly popular, are accessible and are offering a unique experience to the tourists.

APPENDICES

APPENDIX A: VALUATION SECTION FOR ZAMBIA VISITOR SURVEY

IF THE TOURIST HAS EVER VISITED LIVINGSTONE, THEN PROCEED
IF NOT SKIP TO THE SOUTH LUANGWA NATIONAL PARK SUB SECTION

LIVINGSTONE SUB SECTION

Identify and circle entry fee paid by

Entry fee/person/day	Citizens	Residents	Non-residents
Victoria Falls and Mosi-Oa-Tunya	K 40,140	K 50,220	US\$ 15

While staying in Livingstone, you can see the Victoria Falls, watch wildlife in Mosi-Oa-Tunya, and cruise at sunset on the Zambezi River. The current price charged to access this site is (*see table*). I am going to ask you several questions related to how much this experience is worth to you.

First imagine the following situation. While you were planning your trip to Livingstone you learned that the entry fee had increased. What is the maximum fee you personally would be prepared to pay to visit Livingstone (***Show the payment card***)? This is the amount above which you would choose not to visit this park at all.

Please do not agree to pay an amount that you cannot afford, that you are unsure about, or that you feel would be better spent in other things. Please also assume you would not change the duration of your visit.

Record the fee	Currency

Currency

- Dollar = 1
- Euro = 2
- Pound = 3
- Rand = 4
- Kwacha = 5
- Other = 6

Please specify:

IF THE AMOUNT INDICATED IS MORE THAN THE CURRENT FEE: GO TO THE NEXT SECTION.

What are the main reasons why you are not willing to pay any more than the current fee to visit Livingstone?

--

Now imagine another situation. There have been proposals to improve the quality of the visit to Livingstone for tourists and raise more revenue for natural resources management. These include:

- i. Increasing the abundance of animals in Mosi-oa-Tunya National Park; the visitors will be then sure to see elephants, zebras, giraffes, antelopes and monkeys during each visit they make. The number of big cats will also be increased, so that people can expect to see at least one of them during a week stay.
- ii. Enhancing the beauty of Victoria Falls and Zambezi River. The path to the Victoria Falls will be better paved and rest places will be built. The government will also limit the use of water for electricity production purposes. The falls will then look more like that (*Show the picture*) than what you can currently see.

What is the maximum fee you personally would be prepared to pay to visit Livingstone in this case? (*Show payment card*). Please assume you would not change the duration of your visit. Please do not agree to pay an amount that you cannot afford, that you are unsure about, or that you feel would be better spent in other things.

Record the fee	Currency

Currency

Dollar = 1

Euro = 2

Pound = 3

Rand = 4

Kwacha = 5

Other = 6

Please specify:

IF THE AMOUNT INDICATED IS MORE THAN THE PREVIOUS MAXIMUM WILLINGNESS TO PAY, GO TO NEXT PARK VISITED

What are the main reasons why you are not willing to pay any more to visit Livingstone if the changes described had been implemented?

--

SOUTH LUANGWA NATIONAL PARK SUB SECTION

IF THE TOURIST HAS EVER VISITED SOUTH LUANGWA NATIONAL PARK, THEN PROCEED

IF NOT SKIP TO THE LOWER ZAMBEZI NATIONAL PARK SUB SECTION

Identify and circle entry fee paid by

Entry fee/person/day	Citizens	Residents	Non-residents
South Luangwa National Park	K 25,020	K 31,320	US\$ 20

The South Luangwa National Park is acknowledged as one of the greatest wildlife sanctuaries. The concentration of game there is among the most intense in Africa. Whilst staying in South Luangwa National Park, you can experience a walking safari, that allows you to get as close as possible to elephants, hippos or even lions. The current price charged to access this site is (*see table*). I am going to ask you several questions related to how much this experience is worth to you.

First imagine the following situation. While you were planning your trip to South Luangwa National Park you learned that the entry fee had increased. What would be the maximum fee you personally are prepared to pay to visit South Luangwa National Park (*Show the payment card*)? This is the amount above which you would choose not to visit this park at all.

Please do not agree to pay an amount that you cannot afford, that you are unsure about, or that you feel would be better spent in other things. Please also assume you would not change the duration of your visit.

Record the fee	Currency

Currency

Dollar = 1

Euro = 2

Pound = 3

Rand = 4

Kwacha = 5

Other = 6

Please specify:

IF THE AMOUNT INDICATED IS MORE THAN THE CURRENT FEE: GO TO THE NEXT SECTION.

What are the main reasons why you are not willing to pay any more than the current fee to visit South Luangwa National Park?

--

Now imagine another situation. There have been proposals to improve the quality of the visit to South Luangwa National Park for tourists and raise more revenue for natural resources management. These include:

Increasing the abundance of animals in South Luangwa National Park. The visitors will be then sure to see elephants, zebras, giraffes, antelopes and monkeys during each visit they make. The number of big cats will also be increased, so that people can expect to see at least one of them during a week stay.

What would be the maximum fee you personally are prepared to pay to visit South Luangwa National Park in this case? (*Show payment card*). Please assume you would not change the duration of your visit. Please do not agree to pay an amount that you cannot afford, that you are unsure about, or that you feel would be better spent in other things.

Record the fee	Currency

Currency

Dollar = 1

Euro = 2

Pound = 3

Rand = 4

Kwacha = 5

Other = 6

Please specify:

IF THE AMOUNT INDICATED IS MORE THAN THE PREVIOUS MAXIMUM WILLINGNESS TO PAY, GO TO NEXT PARK VISITED

What are the main reasons why you are not willing to pay any more to visit South Luangwa National Park if the changes described had been implemented?

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LOWER ZAMBEZI NATIONAL PARK SUB SECTION

IF THE TOURIST HAS EVER VISITED LOWER ZAMBEZI NATIONAL PARK, THEN PROCEED

IF NOT SKIP TO THE KAFUE NATIONAL PARK SUB SECTION

Identify and circle entry fee paid by

Entry fee/person/day	Citizens	Residents	Non-residents
Lower Zambezi National Park	K 25,020 K	K 31,320	US\$ 20

The Lower Zambezi National Park is one of the most spectacular park in Africa where you can get close to game that wanders around. You can see enormous herds of elephants, lions and leopards amongst a profusion of birdlife. The current price charged to access this site is (*see table*). I am now going to ask you several questions related to how much this experience is worth to you.

First imagine the following situation. While you were planning your trip to Lower Zambezi National Park you learned that the entry fee had increased. What would be the maximum fee you personally are prepared to pay to visit Lower Zambezi National Park (*Show the payment card*)? This is the amount above which you would choose not to visit this park at all.

Please do not agree to pay an amount that you cannot afford, that you are unsure about, or that you feel would be better spent in other things. Please also assume you would not change the duration of your visit.

Please assume you would not change the duration of your visit. Please do not agree to pay an amount that you cannot afford, that you are unsure about, or that you feel would be better spent in other things.

Record the fee	Currency

Currency

Dollar = 1

Euro = 2

Pound = 3

Rand = 4

Kwacha = 5

Other = 6

Please specify:

IF THE AMOUNT INDICATED IS MORE THAN THE CURRENT FEE: GO TO THE NEXT SECTION.

What are the main reasons why you are not willing to pay any more than the current fee to visit Lower Zambezi National Park?

Now imagine another situation. There have been proposals to improve the quality of the visit to Lower Zambezi National Park for tourists and raise more revenue for natural resources management. These include:

Road improvement (*show the pictures*) and increase in the number of lodges.

Increasing the abundance of animals in Lower Zambezi National Park; The visitors will be then sure to see elephants, zebras, giraffes, antelopes and monkeys during each visit they make. The number of big cats will also be increased, so that people can expect to see at least one of them during a week stay.

What would be the maximum fee you personally are prepared to pay to visit Lower Zambezi National Park in this case? (*Show payment card*). Please assume you would not change the duration of your visit. Please do not agree to pay an amount that you cannot afford, that you are unsure about, or that you feel would be better spent in other things.

Record the fee	Currency

Currency

Dollar = 1

Euro = 2

Pound = 3

Rand = 4

Kwacha = 5

Other = 6

Please specify:

IF THE AMOUNT INDICATED IS MORE THAN THE PREVIOUS MAXIMUM WILLINGNESS TO PAY, GO TO NEXT PARK VISITED.

What are the main reasons why you are not willing to pay any more to visit Lower Zambezi National Park if the changes described had been implemented?

--

KAFUE NATIONAL PARK SUB SECTION

IF THE TOURIST HAS EVER VISITED KAFUE NATIONAL PARK, THEN PROCEED
IF NOT SKIP TO THE NEXT SECTION.

Identify and circle entry fee paid by

Entry fee/person/day	Citizens	Residents	Non-residents
Lower Zambezi National Park	K 20,160	K 25,200	US\$ 15

The Kafue National Park is the second largest national park in the world, and about the size of Wales. You have seen really rare antelopes like Sable and Roan, you did probably photograph zebras, thousand of red Lechwes. The wealth of game on the plains is also a big attraction for predators, leopards, cheetahs and up to 20 lions. The current price charged to access this site is (*see table*). I am now going to ask you several questions related to how much this experience is worth to you.

First imagine the following situation. While you were planning your trip to Kafue National Park you learned that the entry fee had increased. What would be the maximum fee you personally are

prepared to pay to visit Kafue National Park (*Show the payment card*)? This is the amount above which you would choose not to visit this park at all.

Please do not agree to pay an amount that you cannot afford, that you are unsure about, or that you feel would be better spent in other things. Please also assume you would not change the duration of your visit.

Record the fee	Currency

Currency

Dollar = 1

Euro = 2

Pound = 3

Rand = 4

Kwacha = 5

Other = 6

Please specify:

IF THE AMOUNT INDICATED IS MORE THAN THE CURRENT FEE: SKIP TO THE NEXT SECTION.

What are the main reasons why you are not willing to pay any more than the current fee to visit Kafue National Park?

--

Now imagine another situation. There have been proposals to improve the quality of the visit to Kafue National Park for tourists and raise more revenue for natural resources management. These include:

Improve the accommodation supply with more bush camps

Open new areas for tourist visit that will allow you see different landscapes and more wildlife.

What would be the maximum fee you personally are prepared to pay to visit Kafue National Park in this case? (*Show payment card*). Please assume you would not change the duration of your visit. Please do not agree to pay an amount that you cannot afford, that you are unsure about, or that you feel would be better spent in other things.

Record the fee	Currency

Currency

Dollar = 1

Euro = 2

Pound = 3

Rand = 4
Kwacha = 5
Other = 6

Please specify:

IF THE AMOUNT INDICATED IS MORE THAN THE PREVIOUS MAXIMUM WILLINGNESS TO PAY, SKIP THE NEXT SECTION.

What are the main reasons why you are not willing to pay any more to visit Kafue National Park if the changes described had been implemented?

APPENDIX B: SIMPLE CORRELATION MATRIX – WTP FOR PARK ENTRY FEES

```
. corr gender age2 region2 member edu2 job1 incml kids park_visits reason1 diver1 abun1 conge1 land_scape1 cons_imp2 vic_falls
(obs=1,204)
```

	gender	age2	region2	member	edu2	job1	incml	kids	park_v~s	reason1	diver1	abun1	conge1	land_s~1
gender	1.0000													
age2	0.0880	1.0000												
region2	-0.0357	0.0939	1.0000											
member	-0.0009	0.1303	0.0375	1.0000										
edu2	0.0349	0.0580	0.0804	0.0217	1.0000									
job1	0.0293	-0.3314	-0.0800	-0.0358	0.0782	1.0000								
incml	0.1197	0.1437	0.0875	0.0089	0.1884	0.1063	1.0000							
kids	0.0689	0.4883	-0.0114	0.0738	0.0438	-0.1228	0.0975	1.0000						
park_visits	0.0225	0.0383	0.0962	0.0859	0.0434	-0.0223	0.0378	-0.0851	1.0000					
reason1	0.0823	0.1014	0.0335	-0.0462	-0.0090	-0.0511	0.0659	0.0419	-0.0186	1.0000				
diver1	-0.0030	-0.0290	0.0134	0.0271	-0.0438	0.0376	0.0237	-0.0423	0.0160	-0.0014	1.0000			
abun1	-0.0117	-0.0284	0.0461	0.0454	-0.0353	0.0618	0.0471	-0.0647	0.0233	0.0149	0.7929	1.0000		
conge1	-0.0070	0.0421	0.0122	-0.0326	0.0102	0.0326	0.0214	0.0153	-0.0149	0.0725	0.2702	0.2742	1.0000	
land_scape1	-0.0115	-0.0069	0.0077	0.0331	0.0281	0.1144	0.0523	-0.0646	0.0256	0.0087	0.2926	0.2744	0.4374	1.0000
cons_imp2	-0.0282	0.0433	-0.0336	0.0014	0.0159	-0.0055	0.0063	0.0302	-0.0344	0.0122	0.0456	0.0460	0.0753	0.0638
vic_falls	0.0717	-0.0503	-0.0356	-0.0259	0.0347	0.0450	-0.0150	-0.0210	0.0106	-0.0444	-0.0377	-0.0176	0.0399	0.0354
	cons_i~2 vic_fa~s													
cons_imp2	1.0000													
vic_falls	0.0317	1.0000												

APPENDIX C: VARIANCE INFLATION FACTORS

. vif

Variable	VIF	1/VIF
gender	1.05	0.955383
age2		
2	5.38	0.185782
3	6.16	0.162369
4	5.72	0.174967
5	5.06	0.197799
6	3.56	0.281083
region2		
2	1.23	0.814366
3	1.79	0.559803
4	3.00	0.333109
5	2.52	0.397223
member	1.04	0.961817
edu2	1.08	0.930097
job1	1.43	0.697550
incm1	1.11	0.897133
kids	1.36	0.733028
park_visits	1.04	0.958527
reason1	1.04	0.958843
diver1	2.56	0.389920
abun1	2.56	0.389956
conge1	1.14	0.875773
land_scape1	1.17	0.853628
cons_imp2		
2	3.78	0.264250
3	3.78	0.264834
vic_falls	1.03	0.973116
Mean VIF	2.48	

APPENDIX D: LINKTEST FOR MODEL SPECIFICATION – WTP PARK ENTRY (STATUS QUO)

. linktest

Source	SS	df	MS	Number of obs	=	1,189
Model	12013.1463	2	6006.57313	F(2, 1186)	=	26.84
Residual	265368.056	1,186	223.750469	Prob > F	=	0.0000
				R-squared	=	0.0433
				Adj R-squared	=	0.0417
Total	277381.203	1,188	233.485861	Root MSE	=	14.958

wtp_entry_fl	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
_hat	.2918123	.8690359	0.34	0.737	-1.413207	1.996831
_hatsq	.019849	.0240511	0.83	0.409	-.0273385	.0670365
_cons	6.103654	7.841712	0.78	0.437	-9.28152	21.48883

APPENDIX E: BREUSCH-PAGAN/ COOK-WEISBERG TEST FOR HETEROSCEDASTICITY – WTP PARK ENTRY (STATUS QUO)

```
. hettest
```

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
```

```
Ho: Constant variance
```

```
Variables: fitted values of wtp_entry_f1
```

```
chi2(1)      =      2.18
```

```
Prob > chi2   =    0.1402
```

**APPENDIX F: LINKTEST FOR MODEL SPECIFICATION – WTP PARK ENTRY
(WITH PARK IMPROVEMENTS)**

. linktest

Source	SS	df	MS	Number of obs	=	1,187
				F(2, 1184)	=	31.51
Model	14329.5163	2	7164.75813	Prob > F	=	0.0000
Residual	269246.726	1,184	227.40433	R-squared	=	0.0505
				Adj R-squared	=	0.0489
Total	283576.243	1,186	239.103071	Root MSE	=	15.08

wtp_imp_f1	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
_hat	3.544453	1.189455	2.98	0.003	1.210779	5.878127
_hatsq	-.0506311	.0235248	-2.15	0.032	-.096786	-.0044762
_cons	-31.35401	14.96943	-2.09	0.036	-60.72358	-1.984444

**APPENDIX G: BREUSCH-PAGAN/ COOK-WEISBERG TEST FOR
HETEROSCEDASTICITY – WTP PARK ENTRY (WITH PARK IMPROVEMENTS)**

```
. hettest
```

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
```

```
Ho: Constant variance
```

```
Variables: fitted values of wtp_imp_f1
```

```
chi2(1)          =      0.08
```

```
Prob > chi2      =    0.7790
```

APPENDIX H: SIMPLE CORRELATION MATRIX – WTP FOR WILDLIFE-BASED RECREATION

```
. corr FACE2FACE CVM SCOPE SAMPLE_SIZE NON_PARAMETRIC ZERO_BIDS GAIN LAND TEV LOCAL RESPRATE PUBLISH AGE area region
(obs=88)
```

	FACE2F~E	CVM	SCOPE	SAMPLE~E	NON_PA~C	ZERO_B~S	GAIN	LAND	TEV	LOCAL	RESPRATE	PUBLISH	AGE	area
FACE2FACE	1.0000													
CVM	-0.1523	1.0000												
SCOPE	-0.2989	0.0671	1.0000											
SAMPLE_SIZE	0.0504	0.0164	0.0947	1.0000										
NON_PARAMETRIC	0.1554	0.6602	0.1737	0.1105	1.0000									
ZERO_BIDS	0.5188	-0.2935	-0.2448	0.0829	-0.0953	1.0000								
GAIN	0.2883	-0.5107	0.0037	0.0506	-0.4851	0.1439	1.0000							
LAND	-0.1144	0.3690	-0.1609	0.0241	0.1467	-0.0365	-0.3918	1.0000						
TEV	0.7951	-0.2313	-0.4331	0.0929	0.0839	0.6172	0.2013	-0.2240	1.0000					
LOCAL	-0.1417	0.0969	-0.1226	-0.2088	0.1467	-0.1848	-0.0937	0.0182	-0.1682	1.0000				
RESPRATE	-0.1120	-0.2393	0.2995	0.0826	0.0117	-0.1382	-0.0066	-0.1915	-0.3137	0.0927	1.0000			
PUBLISH	-0.0547	-0.2705	0.3726	-0.1473	-0.4639	-0.1288	0.4279	-0.4676	-0.1346	-0.1928	-0.0491	1.0000		
AGE	0.0425	0.2816	-0.4656	-0.0482	0.2691	-0.0769	-0.1467	0.2820	0.0967	0.1317	-0.3178	-0.3049	1.0000	
area	0.0399	0.4191	-0.4916	-0.1074	0.1012	0.2635	-0.1184	0.3011	0.1309	0.0229	-0.4447	-0.1408	0.3329	1.0000
region	0.1390	-0.0485	-0.0953	0.2774	-0.1439	-0.0719	-0.0178	0.1875	0.1060	-0.1037	0.1074	-0.1650	-0.0695	-0.4467
	region													
region	1.0000													

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