Economic Valuation and Geographical Settlement Analysis of Protected Areas: Cases of Kafue and South Luangwa National Parks

Grant Simuchimba

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Declaration

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Abstract

The Kafue National Park (KNP) and the South Luangwa National Park (SLNP) are Zambia's two socio-ecologically important conservation areas which boast a high diversity of wildlife. Tourism potential is high in both national parks with significant impacts on the local economies in close proximity. Tourism activities in the local economies could be described in terms of 'effects' or 'impacts' experienced directly, indirectly, by businesses, or induced by households. In 2015, a total of 12,550 and 46,257 tourists visited the KNP and the SLNP respectively, with an average spending per night/day ranging between ZMW1,086 and ZMW4,442 for day/self-drive visitors and between ZMW5,479 and ZMW12,698 for top-end lodges.

The main objectives for this study included deriving multipliers that could be used for tourism economic impact assessments in rural area regions of Zambia, estimating the economic impacts of tourism on local areas, estimating the tourism economic leakage from local areas, and developing an understanding of the influence of geographies of settlements around the KNP and the SLNP. Tourism multipliers were derived from the Zambia's Input-Output tables, available at the national level, which was rescaled to rural area level. A series of on-site intercept survey for visitors' daily expenditures was conducted at randomly selected tourism facilities. To evaluate the total tourism economic impacts and leakage of tourism impacts, the Money Generation Model 2 (MGM2), adapted for country specific multipliers, was applied. The statistical analyses were conducted by using R package. The data was analysed using bivariate analyses, multiple linear regression analyses and the Principal Component Analysis (PCA) on household consumption of natural resources, geographical locations, and well-being of locals as variables from both the KNP and the SLNP data.

The derived rural area multipliers for tourism related sectors, and the averages for type I and type II multipliers, respectively are: 1.019 and 1.024 for output, 0.2152 and 0.2157 for income, 15.73 and 15.76 for employment and 0.606 and 0.610 for value-added. The total tourism economic impact generated by visitor spending in the local areas fell within the range of ZMW28.08 million and ZMW135.91 million for the KNP and ZMW120.66 million and ZMW547.64 million for the SLNP. The total tourism economic value was estimated at ZMW275 million for the KNP and ZMW1,031 million for the SLNP.

The total value of visitor spending impact that escaped as internal and external economic leakage was equalled to ZMW37.92 – 167.25 million and ZMW103.30 – 422.45 million for Kafue and South Luangwa respectively. Similarly, the number of new jobs supported by the visitor spending, but which escaped the local regions as economic leakage, was equalled to 60 – 197 and 141 – 442 for the KNP and the SLNP respectively. About 57 – 59% of visitor spending impact and 62 – 69% of visitor spending which supported new jobs escaped as internal and external economic leakage from local areas around Kafue.

The results of this dissertation also showed that the main perceived positive social impacts in the KNP were accesses to natural resources and fertile land while in the SLNP it was the available employment opportunities in the tourism industry for the locals. There were no important negative social impacts in the KNP, but in the SLNP they included the damage of crops and killing of people and livestock by wild animals. In both aforementioned national parks, households consumed, on average, between ZMW708.64 and ZMW2,263.87 of natural resources annually, with the highest rate going to firewood, then food and medicines and in the last instance material and fibre. Natural resources consumption was found to be radially influenced by geographic settlements in the KNP, while proxies of well-being for households in settlements near the SLNP were found to be circumferentially influenced by their geographical locations. Ultimately, although settlements located closer to PAs – especially to areas where there is high tourism activity – experienced high incidences of human-wildlife conflict, they consumed fewer natural resources, obtained more benefits from tourism and their well-being was better than settlements further away from these areas.

Keywords: *Input-output tables, multipliers, Kafue National Park, South Luangwa National Park, Money Generation Model, Geographical settlement, natural resources, Game Management Areas, Open Areas*

Opsomming

Die Kafue Nasionale Park (KNP) en die Suid Luangwa Nasionale Park (SLNP), in Zambië, is twee van Afrika se belangrikste sosio-ekologiese bewaringsgebiede wat met 'n omvangryke verskeidenheid natuurlewe spog. Toerismepotensiaal is groot in albei nasionale parke met 'n beduidende invloed op plaaslike en nie-plaaslike ekonomieë wat om hulle geleë is. Toerisme-aktiwiteite in plaaslike ekonomieë kan beskryf word in terme van 'gevolge' of 'impakte' wat direk, indirek, deur ondernemings, of deur huishoudings, te weeg gebring word. In 2015 het 'n totaal van 12,550 en 46,257 toeriste onderskeidelik die KNP en SLNP besoek, wat meegebring het dat ’n totaal van 8,42 miljoen dollar en 28,99 miljoen dollar onderskeidelik in plaaslike ekonomieë gestort is. Die hoofdoelstellings vir hierdie studie het ingesluit die verkryging van vermenigvuldigers wat aangewend kon word vir toerisme-ekonomiese impakstudies in landelike gebiede van Zambië, vir die bepaling van die ekonomiese impakte van toerisme op plaaslike gebiede, vir die vasstelling van die toerisme-ekonomiese lekkasie uit plaaslike gebiede, en vir die ontwikkeling van 'n begrip rakende die invloed op geografiese gebiede deur nedersettings wat rondom die KNP en SLNP geleë is. Toerisme-vermenigvuldigers is afgelei van die invoer-uitset-tabelle (I-O) van Zambië – tabelle wat die interafhanklikheid van nywerhede in 'n ekonomie ontleed. Die beskikbare publikasie vir I-O-tabelle in Zambië was op ‘n nasionale vlak en die afgeleide direkte koëffisiënte moes na streeksvlak van die landelike gebied herskaal word om vermenigvuldigers te produseer – dit was ‘n poging om die eienaardighede van 'n landelike gebied te weerspieël, of om die impak op plaaslike ekonomieë te kwantifiseer.

Metodologieë van sowel kwalitatiewe as kwantitatiewe aard is in hierdie proefskrif toegepas om die impak van besoekersbesteding op plaaslike ekonomieë te beraam. 'n Reeks onderskep-opnames, gemik op besoekers se daaglikse uitgawes, is lukraak by geselekteerde toerismefasiliteite uitgevoer. Monsters is geneem van toerismebesighede wat vir onderhoude oorweeg is in die nasionale parke, die omliggende GMA's en oop gebiede. Om die algehele impak van toeriste se ekonomiese impak en die lekkasie van toerisme-impakte te evalueer, is die Money Generation Model 2 (MGM2) vir landspesifieke vermenigvuldigers, toegepas. Die statistiese ontledings is uitgevoer met behulp van die R-pakket. Die data is geanaliseer met behulp van tweeledige ontledings, veelvuldige lineêre regressie-analises en die Principal

Component Analysis (PCA) op huishoudelike verbruik van natuurlike hulpbronne, geografiese liggings en welstand van die inwoners as veranderlikes van KNP- en SLNP-data.

Hierdie verhandeling het sy oorsprong in vermenigvuldigers in landelike gebiede vir toerisme-verwante sektore, en die gemiddeldes vir tipe I- en tipe II-vermenigvuldigers is onderskeidelik: 1.019 en 1.024 vir uitset, 0.2152 en 0.2157 vir inkomste, 15.73 en 15.76 vir indiensneming en 0.606 en 0.610 vir toegevoegde waarde. Die besoekersgroepe se gemiddeldes per nag vir albei nasionale parke het gewissel van US $265,14 vir besoekers wat deel was van dag- en selfritte tot 1,109,02 US $ vir besoekers wat van die voorste herberg gebruik gemaak het. Die totale ekonomiese waarde wat in plaaslike gebiede gegenereer is, was $7,06 miljoen vir KNP en $32,11 miljoen vir SLNP. Die aantal poste wat deur hierdie industrie ondersteun is, was onderskeidelik 70 en 307 vir KNP en SLNP. Die totale waarde van toerisme-inkomste, wat as interne en eksterne ekonomiese lekkasie ontsnap het, was onderskeidelik US $9,62 miljoen (66%) en US $27,20 miljoen (54%) vir onderskeidelik KNP en SLNP. Die aantal werkgeleenthede wat deur die toerismebedryf gesteun word, was net so, maar het die plaaslike streek vrygespring omdat ekonomiese lekkasie onderskeidelik op 87 (55%) en 226 (42%) gestaan het.

Die resultate van hierdie proefskrif het ook getoon dat die belangrikste waarneembare positiewe sosiale gevolge in KNP toegang tot natuurlike hulpbronne en vrugbare grond was, terwyl dit in SLNP die beskikbare werksgeleenthede in die toerismebedryf vir die inwoners was. Daar was geen belangrike negatiewe sosiale gevolge in KNP nie, maar in SLNP het dit die skade van gewasse, die dood van mense en vee deur wilde diere ingesluit. In KNP sowel as SLNP het huishoudings gemiddeld tussen US $82 en $262 se natuurlike hulpbronne per jaar verbruik, met die hoogste uitgawe vir brandhout, gevolg deur voedsel en medisyne, en laastens vir materiaal en vesel. Daar is bevind dat die verbruik van natuurlike hulpbronne radikaal beïnvloed is deur geografiese nedersettings in KNP, terwyl vasgestel is dat volmag van welsyn vir huishoudings in nedersettings naby SLNP omtreksgewys deur hulle geografiese liggings beïnvloed is.

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Dedication

To

Caroline Tembo,

Dalitso Simuchimba, Witu Namuchimba, Tionge Namuchimba and Asher Simuchimba

'For the loneliness you endured while I was away from you or busy working on this study'.

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Acronyms

AMU	Area Management Unit
CBD	Central Business District
CBNRM	Community-Based Natural Resources Management
CBOs	Community-Based Organisations
CPP	Community Partnership Park
CRBs	Community Resource Boards
CSO	Central Statistics Office
DNPW	Department of National Parks and Wildlife
GMAs	Game Management Areas
HWC	Human-Wildlife Conflict
I-O	Input-Output
IUCN	International Union for Conservation of Nature
KNP	Kafue National Park
MCC	Millennium Challenge Corporation
MGM2	Money Generation Model 2
MoTA	Ministry of Tourism and Arts
Norad	Norwegian Agency for Development Cooperation
NORHED	Norwegian Programme for Capacity Development in Higher Education and Research for Development
NPs	National Parks
NTFPs	Non-timber forest products
OAs	Open Areas
ODK	Open Data Kit
OPAs	Other Protected Areas
PAs	Protected Areas

PCA	Principal Component Analysis
PPP	Public Private Partnership
SAM	Social Accounting Matrix
SAPA	Social Assessments of Protected Areas
SLAMU	South Luangwa Area Management Unit
SLNP	South Luangwa National Park
SNA	System National Accounts
TCA	Tourism Concession Agreement
VAGs	Village Action Groups
WWF	World-Wide Fund for Nature
ZAWA	Zambia Wildlife Authority

Chapter 1 GENERAL INTRODUCTION AND LITERATURE REVIEW

1.1 Introduction

1.1.1 Background and rationale

Zambia's tourism industry is oriented towards nature-based tourism with the Victoria Falls receiving the largest number of visitors, followed by the national parks. Zambia is home to 20 national parks (NPs), with most of them surrounded by Game Management Areas (GMAs) and Open Areas (OAs) in some places. The Zambia's NPs and the 34 GMAs together cover a total of over 22.4 million hectares (ZAWA, 2011b). In Zambia and the southern Africa region, the GMAs were established as buffer-zones around the NPs where trophy hunting tourism has primarily been conducted in recent years. Apparently human settlement is permitted in GMAs and in many of them there are already large numbers of rural human settlements (Lindsey et al., 2014).The Kafue National Park (KNP) and the South Luangwa National Park (SLNP) are two of Zambia's socio-ecologically important conservation areas boasting a high diversity of wildlife (ZAWA, 2011b). Both of these NPs are important for the protection of large amounts of intact forests and as sources of water for the country and the southern Africa region, and at the same time they can offer a variety of tourism products that services all geographical, price and interest source markets in Zambia (Lindsey et al., 2014; ZAWA, 2011b). Given these fundamental endowments, unfortunately, the country's tourism performance in relation to regional tourism performances has been underperforming in terms of tourism visitation, length of stay and visitor spending among many other issues since the early 2000 (Chemonics, 2011; Lindsey et al., 2014). The country accounts for a small share of the regional and global tourism markets which is strongly oriented towards nature tourism. However, the largest tourism market in the Southern African Development Community (SADC) region is South Africa followed by other major competitors in the region that include Botswana, Tanzania and Namibia. Several tourism operators present in KNP and SLNP are both small and medium sized and according to Morris (2011) most of them are largely reliant upon overseas providers for services such as representation, marketing and flights (MORRIS, 2011). Large international hotel chains/franchises are also present in Zambia in addition to several small luxury lodges (mostly foreign-owned) and many small, informal enterprises (mostly Zambian-owned).

The wildlife tourism industry provides a wildlife resource that can fuel economic growth with creation of employment opportunities in nearby settlements, as can be seen on some private land in South Africa and Namibia and in well-managed CBNRM programmes in Botswana, Zimbabwe and Zambia (Chemonics, 2011). However, most of the GMAs generally have low agricultural potential and the rural communities in them have comparatively fewer options of livelihood opportunities. They are dependent upon their respective NPs for most of their economic activities, especially the GMAs located in the gateway areas of the NPs, such as Mumbwa GMA in Mumbwa district and Lupande GMA in Mambwe district (Milupi, Somers, & Ferguson, 2017). A significant portion of the rural population, especially those living in settlements near PAs, depend on natural resources such as the Non Timber Forest Products (NTFPs) from which they derive incomes, for medicinal use and food use (MORRIS, 2011). However, unless the value of wildlife and forests, as captured by local people, is estimated and known, the value of this resource will not be appreciated by the locals and policy makers and the resource would easily be replaced by low-value land use options that do not ultimately benefit people.

The KNP maintains a large Miombo woodland, has major waterways in the Kafue river and Lake Itezhi-Tezhi, and has a greater diversity of habitats and wildlife species (Chemonics, 2011). The park's ecotourism may have a competitive advantage because of its large size (22,480km^2) but it is not yet as established in the international and regional ecotourism source markets as the SLNP. The SLNP has a comparatively elaborate network of game viewing loops, and it is among the most developed and publicised national parks in southern Africa (Alston & Bowles, 2003; Balakrishnan & Ndhlovu, 1992; Jachmann & Billiouw, 1997; Milupi et al., 2017). The KNP is Zambia's largest national park, representing nine percent of the total land mass of the country, but it has not been performing well in tourism for many years now. The park has been receiving very low numbers of tourist visits for many years and data from the Ministry of Tourism and Arts (MoTA) for 2015 indicated that total visitor number to Kafue national park was 12,960 compared to 43,653 to South Luangwa national park (MoTA, 2015).

There are human communities settled in the GMAs and the OAs around the national parks and most of them are involved in the extraction of natural resources for their livelihoods. The communities in GMAs, through the Community Resource Boards (CRBs) operating under the Community-Based Natural Resources Management (CBNRM) programmes, participate in both non-consumptive and consumptive tourism, such as the awarding of safari-hunting concessions to tourism operators. Income from tourism is normally directed towards community development initiatives and payment of salaries for village scouts, who are involved in resource protection. In view of the aforementioned, there is need to understand how tourism in NPs contributes to local economies in settlements near NPs and how the livelihoods of local people are affected by their geographical locations. Apparently, the NPs' consumptive and non-consumptive outputs and their contributions to socio-economic impacts are often grossly underestimated or ignored. Often financial analyses that ignore the larger contribution of a PA to a regional economy, mislead the public and policy makers by focussing on visitation as a major source of income. And NPs able to cover their own costs (financial viability) seldom reflect the economic benefits when measured at societal level. One of the reasons could be that the evaluation methods for the tourism economic footprint are not well developed. Usually only the direct economic returns from protection have been the basis for much of the economic assessment (Lindsey et al., 2014). This study focused on the economic valuations of PAs as outlined under the objectives and research questions of the study section below.

1.1.2 Objectives and research questions of the study

Overall objective

The overall objectives of the study are to measure the relative economic impacts of tourism on locals living in settlements near the Kafue and the South Luangwa national parks, and to develop an understanding of how the settlements' geographical locations influence the resource consumption and affect the positive and negative social impacts.

Specific objectives and related questions

Four specific objectives have been formulated with their related questions.

Specific objective 1:

To derive estimates of wildlife-based tourism multipliers that can be used for economic impact assessments of rural areas or regions of Zambia.

Related question

How can estimates of multipliers for tourism in the rural area economy of Zambia be derived from input-output tables for the following:

a) Output or sales?
b) Income?
c) Employment or jobs? and
d) Value-added in tourism?

Specific objective 2:

To estimate the economic significance and impact of tourism on the Kafue and the South Luangwa national parks.

Related questions

a) What is the estimated local visitor spending in both Kafue and South Luangwa national parks?
b) What is the economic impact /effect of park tourist visitor spending on local economies near Kafue and South Luangwa national parks?

Specific objective 3:

To evaluate the economic value of tourism leakage from local areas around Kafue and South Luangwa national parks and the impact of this on local human communities.

Related question

What is the economic leakage of declining tourism from local economies around Kafue national park compared to that of South Luangwa national park?

Specific objective 4:

To develop an understanding of the influence of geographies of settlements (circumferential or radial) around Kafue and South Luangwa national parks through the positive/negative impacts of the protected areas and the consumption of natural resources by the locals.

Related questions

a) How are settlements near the national parks affected by the main positive and negative social impacts related to the parks?
b) How does location of settlements near parks influence the consumption of natural resources?
c) How does the location of settlements near parks influence the well-being of locals?

1.2 Scope of the study

This study was implemented in the local settlements near the Kafue and the South Luangwa national parks to look at the economic significance of tourism and the impacts of visitor spending and of geographies of settlements on the locals living in those areas. The economic significance stands for the generated gross economic activities which are captured, in the regional economy around protected areas, by all visitors, while the economic impact refers to estimates of the net changes generated by new money brought into the local economy by non-local visitors (Crompton, Jeong, & Dudensing, 2016; Snyman & Bricker, 2019; Spenceley, Snyman, & Rylance, 2019). The analysis and description of the distribution of buildings where people have attached themselves to the land was considered under settlement geography (Beattie, 2008; Harte, 2010; Stone, 1965). The examination of the location of settlements or households near the park focused on how resources are accessed. The value of the natural resources and the extent to which those resources impact on the livelihoods of the rural poor were also assessed based on geographical locations. Estimates of wildlife-based tourism multipliers were derived and re-scaled to a rural area level, so that they reflected the peculiarities of that region.

1.3 Conceptual framework

A GMA is a buffer zone around a National Park (NP), established for use by both human communities and wildlife, and is also used for trophy hunting. An OA also falls into the category of a GMA but is not classified as such by the Department of National Parks and Wildlife (DNPW). Indeed, human settlement inside NPs is not permitted, but in both GMAs and OAs where rural human communities are in large numbers (Lindsey et al., 2014). Economically the NP is managed as a non-extractive resource through photographic tourism, while PAs in GMAs and OAs are managed both as extractive and non-extractive resources through both trophy hunting and photographic tourism respectively. Local human communities living in GMAs, and OAs are free to extract natural resources from Protected Areas (PAs) in both GMAs and OAs, but they are not permitted to harvest anything from NPs. However, their livelihoods are generally dependent upon those NPs for most of their economic activities, especially the GMAs and OAs located in the gateway areas of the NPs.

Conceptually the establishment and management of a NP generates flows of benefits and costs into the GMAs and OAs (Pullin et al., 2013). The framework captures information on the effect of the geographical locations of settlements on the benefits and costs for locals in areas close to NPs. The NPs contribute several benefits to, and entail costs for, the well-being of the local human populations. The benefits are obtained through the available consumable natural resources in GMAs and OAs. Some of the costs experienced by locals include the negative socio-ecological impacts, such as human-wildlife conflicts and transmissible diseases from wild animals. Others are restrictions on resource extraction such as fishers denied the right to fish from fisheries in GMA and OAs. The impact of tourism activities due to the establishment of the NP is a major benefit contributor, as this is captured through the park visitors’ spending and the multiplier effects of tourism sales or output, generation of income from tourism, creation of new jobs and value-addition, impact positively on the livelihoods of locals. Unfortunately, economic leakage present in tourism sectors takes away most of those benefits from the local economies.

There are also other benefits coming through tourism-related investments in both the park and the local settlements (Figure 1.1).

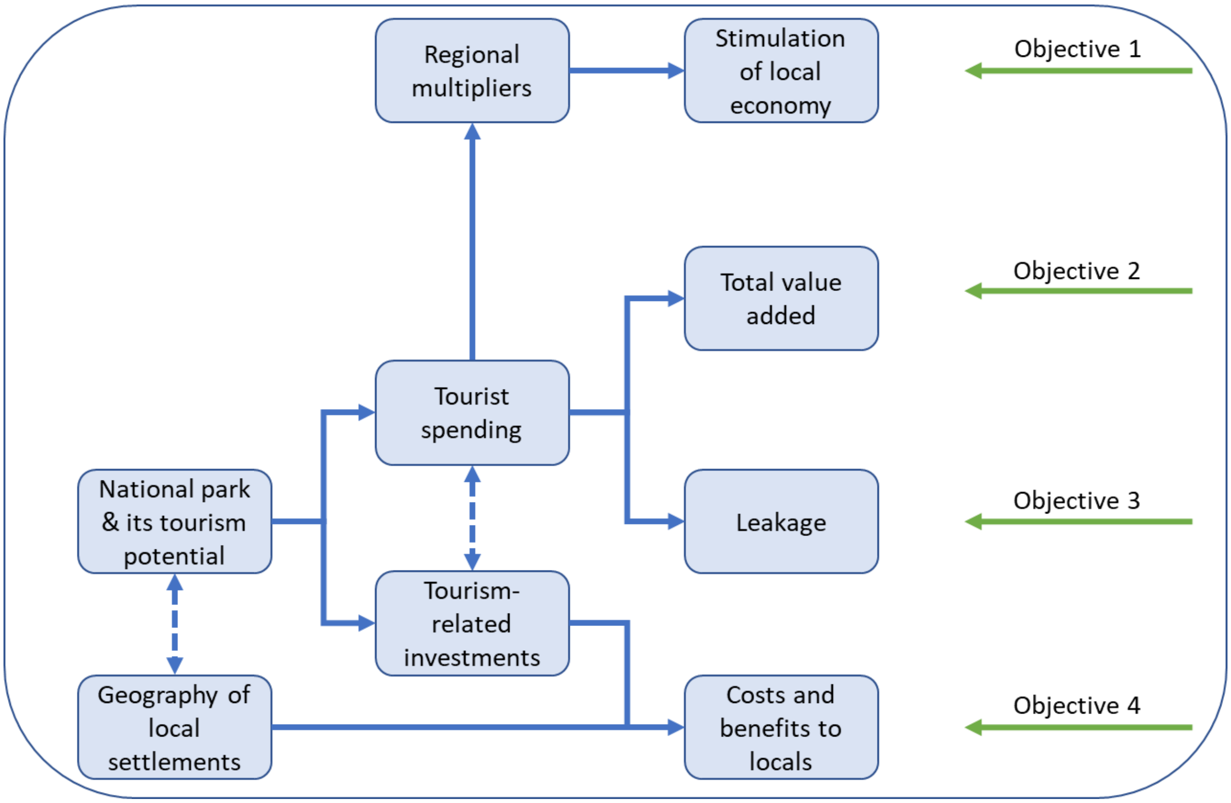

Figure 1.1: Conceptual framework for the assessment of national parks' impacts or influence on the surrounding local areas.

1.4 Overview of design and methodology

In this study a multiple case study design (Eisenhardt, 1991), consisting of the KNP and the SLNP as cases, was selected. More details on the study design are discussed later in Chapter 2. The multiple case study design was characterised by a focus on the dynamics of tourism income and the socio-economic benefits of locals in settlements near the two NPs. This study was delimited by a focus on impacts of visitor spending in local areas near the Kafue and South Luangwa national parks and the influence of those parks on nearby settlements. The economic impacts of these two largest national parks in Zambia on the local communities and the nation at large is not known and there may still be a problem for many people in understanding its relevance, evaluating its validity and interpreting the results (DR Vaughan, Farr, & Slee, 2000).

Although Kafue is more than twice the size of South Luangwa, it receives lower numbers of visitors and hence it is assumed to have less impact on local economies in terms direct output, income, employment and value addition. The influence of those parks on the livelihoods of locals living around the parks in the geographical areas must also be ascertained to understand their extents. Understanding the socio-economic and socio-ecological performance of the KNP was the driving motive behind this study. The idea was to compare it with another NP that was equally a flagship for wildlife-based tourism in southern Africa. The second selected PA, just like Kafue, had the same extent and diversity of wildlife, with rural communities also living in GMAs around it.

To determine the total economic effects of visitor spending in the two NPs by use of multipliers the direct, indirect and induced multipliers for tourism in the rural area economy of Zambia were estimated from the I-O tables. The I-O model was selected for this study because it can analyse the details of direct, indirect and induced effects of tourism output, income, employment and value-added in the local economy. The I-O table "represents the flows of economic activity between sectors in a region" (Supradist, 2004). The I-O table is a mathematical model and "captures what each business or sector has to purchase from every other sector in order to produce a dollar's worth of goods or services" (Stynes, 2005). With multipliers, direct impacts on sectors that produce goods and services purchased by park visitors are captured. Secondary effects – due to the circulating spending that occur within the gateway regions – are also captured. The rational of selecting this model was also motivated by the fact that it could be used to predict changes in the overall economic activity due to some changes with visitor spending in the local economy. Since the model can present an image of how the sector is performing, it would call for policy consideration. Sensitivity tests were conducted to determine the sensitivities of rural multipliers, and national multipliers, due to visitor spending in local areas.

In line with the above, the data collection in this study was focused exclusively on the two NPs. Series of on-site intercept surveys for visitors' daily expenditures was conducted at randomly selected tourism facilities – such as various accommodation facilities and park gates at both parks. At the same time, semi-structured interviews of approximately one hour duration were conducted with the mangers of selected tourism facilities which provided service to the tourists. Focus Group Discussions (FGD) or community workshops were conducted in the two selected

Village Action Groups (VAGs) from each chiefdom or CRB in KNP, and in two selected VAGs for the combined chiefdoms or CRBs in SLNP, to identify significant benefits and costs in the settlements. The FGDs generated some questions which were incorporated into the questionnaires that were later administered during household surveys that followed. The questionnaires in household surveys focused on the positive and negative social impacts and the consumption of natural resources by the locals living in villages near the parks. The geographical location of those settlements around parks was perceived to be affected in some way(s) by the nearby PA and/or other geographical areas nearby.

The data analysis of visitor spending was done by application of the Money Generation Model 2 (MGM2) to evaluate the economic impacts around the national parks (Stynes, Propst, Chang, & Sun, 2000). The interview recorded data was transcribed into excel and incorporated into the visitor spending data for analysis. The statistical analyses for household data on consumption were analysed using R statistical software. This was followed by within-case and cross-case analysis and comparison with the literature (Eisenhardt, 1989).

Ultimately the economic impact of visitor spending and the influence of the KNP on local areas were aimed at producing results which would allow for comparisons to be made with the SLNP based on the same data collection and analytical procedures. However, in some sections, only the full details for one of the case studies, the KNP, will be presented.

1.5 Dissertation structure

This dissertation is divided into seven chapters:

Chapter 1

The chapter outlines the development of ideas for the dissertation and the motivation for the study, the identification and articulation of study problem, research questions, the study design, the contents of the remaining chapters and the literature review. It begins by introducing the concepts of protected areas, methodology, tourism impact, tourism economic leakage and geographies of settlements, before stating the objectives and research questions of the study. A literature review on the areas mentioned was undertaken after giving a description of the scope of the study, the conceptual framework, the approaches to sampling design and the dissertation structure.

Chapter 2

This chapter covers the research methods of the study. It begins by describing the case design, with cases taken as the KNP and the SLNP, and then it goes on to describe the selected settlements under the selected GMAs and OAs, the sites for data collection. The chapter then continues by outlining the methodology for deriving tourism multipliers using I-O tables and then describes the derivation of different types of multipliers under the national and rural area multipliers. The methodology chapter follows and describes the quantitative methodology on how to analyse the visitor spending in the Kafue and the South Luangwa national parks before describing the quantitative methodologies for analysing tourism leakage. Then the qualitative and quantitative methodologies, for analysing the benefits and costs realised by the locals around the parks, are described through focus group discussions, household surveys and interviews conducted in settlements around Kafue and South Luangwa national parks, and three different statistical analyses of the collected data. To conclude, the methodologies on household data collection and analysis for the settlements around the Kafue and South Luangwa NPs, the natural resources consumption around NPs, the perceptions of social impacts on settlements around PAs, the effect of geographical location on natural resources consumption, and the effect of geographical location on well-being of households are described in greater detail concerning the two national parks.

Chapter 3

This chapter covers the estimation of output, income, employment and value-added multipliers for the tourism sector in Zambia. It begins by introducing the impact of tourism, the concept of multipliers and the I-O tables, before describing the results for deriving tourism multipliers using I-O tables. In conclusion, the discussion and conclusion for the derivation of different types of multipliers are presented in greater detail to show the differences between the national and rural area regional multipliers.

Chapter 4

This chapter describes the economic impact on local regions around national parks due to visitor spending (Khanal, 2011) for the cases of Kafue and South Luangwa national parks. It begins by introducing the concepts related to protected areas, policy, institutions and management of protected areas, tourism in Kafue and South Luangwa national parks, before describing the results that analysed the visitor spending in Kafue and South Luangwa national parks. To conclude, the visitor spending, local significance and impact of visitor spending and the relative impact of tourism to area size, are presented in greater detail to show the differences between the two national parks (Cui, Mahoney, & Herbowicz, 2013).

Chapter 5

This chapter estimates the impact of economic leakage of tourism from local areas around the national parks of Kafue and South Luangwa national parks. It begins by highlighting the concepts related to tourism in Kafue and South Luangwa national parks, tourism leakage from protected areas, policy, institutions, and management of protected areas, before describing the results that analysed tourism leakage. An account of interviews conducted with tourism business managers in both Kafue and South Luangwa national parks are also mentioned. In the final instance the visitor spending, tourism operators and their ownership, economic impacts of tourism, internal and external tourism leakage, and tourism leakage relative to area size, are presented in greater detail to show the differences between the two national parks.

Chapter 6

This chapter examines the links of geographical settlements around the national parks to the benefits and costs realised by the locals in the cases of Kafue and South Luangwa national parks. It begins by introducing the concepts related to human settlements around protected areas, natural resources consumption in settlements around protected areas, management of natural resources in settlements around protected areas, the relevant social impacts and well-being. Then, the results that analysed the benefits and costs realised by the locals around the parks, are reported. In conclusion, the settlements around Kafue and South Luangwa NPs, the natural resources consumption around NPs, the perceptions of social impacts on settlements around PAs, the effect of geographical location on natural resources consumption, and the effect of geographical location on well-being of households, are presented in greater detail to show the differences between the two national parks.

Chapter 7

This final chapter presents a synthesis of the findings and indicates how the study can provide policy options for enhancing the economic impacts of tourism and managing the effects of geographical location on locals in settlements around PAs. It begins by presenting a brief introduction to the economic valuation and geographical settlement analysis of protected areas in Kafue and South Luangwa national parks, before reviewing the findings on the estimation of output, income, employment and value-added multipliers for the tourism sector in Zambia, the economic impact of national park visitor spending on local economies, the impact of economic leakage of tourism from local areas around national parks, and linking the geographical settlements around the national park to the benefits and costs experienced by the locals. The chapter concludes with the overall findings for economic valuation and geographical settlement analysis of protected areas in both Kafue and South Luangwa National Parks.

Articles based on the chapters outlined above will be submitted to academic journals for publication after peer review.

1.6 Literature review

The literature review for this dissertation covers topics such as tourism economic impacts, tourism economic leakage, multipliers and the I-O model, among others. Chapters 3, 4 and 5 in this dissertation are all anchored on the mentioned topics and other overlapping topics. The structure of this dissertation was planned to have separate literature review sections in each chapter, however, to avoid repetition of topics in separate chapters, the literature review has been placed under chapter one as an integrated section for the entire document.

1.6.1 Tourism impacts around protected areas

Protected areas and tourism

The definition of tourism according to the United Nations World Tourism Organization (UNWTO) is when a person takes a trip for less than a year to a destination away from that person's usual environment for any purpose other than employment in the place visited (Keyser, 2009). In most cases, tourism is an activity of consumption and the consumer must travel some distance to a destination to consume what they have paid for (Cornelissen, 2005). Keyser (2009) identified three types of tourism namely: domestic tourism, of residents of the country, within that country; outbound tourism, of non-resident visitors within a country; and inbound tourism, of a resident visitor outside the country of reference. A protected area (PA) as defined by the International Union for Conservation of Nature (IUCN) and cited by several other researchers is "an area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means" (Cruz et al., 2014; IUCN, 1994; Muhumuza, 2014; Union, 1993). Many researchers have shown that most PAs have been successful in their protection of the habitats and the species in them which is part of the global attempts to preserve biodiversity (Liu et al., 2015; Palomo, 2013; Pfaff, Robalino, Lima, Sandoval, & Herrera, 2014; Watson, Dudley, Segan, & Hockings, 2014). A national park (NP) is among the IUCN's seven defined PAs and on the IUCN's list it is placed in category II, which is aimed at ecosystem conservation and recreation (Dudley, Groves, Redford, & Stolton, 2014; IUCN, 1994). An NP is one of the protected areas that can serve a wide range of functions and purposes, including conservation of biodiversity, supporting the subsistence lifestyles of indigenous peoples, providing opportunities for recreation and education and contributing towards local and regional level developments (Naranjo-Barrantes, 2007; Prato & Fagre, 2005). An important role in the management and conservation of natural resources in NPs can be played through sustainable use of ecosystems and biological resources (Kothari et al., 2015). Indeed, by ensuring that natural resource capital is maintained sustainably appropriate value for society is created from common-pool resources in the NPs (Child, 2013; Child & Dalal-Clayton, 2004). At local level the existence of NPs supports various socio-economic activities around them and contributes towards the surrounding areas' development (Naranjo-Barrantes, 2007).

Currently the worldwide network of PAs covers more than 12% of the terrestrial earth surface and this number is expected to grow to meet international targets (GEF, 2016). Protected areas are economically valuable albeit their income is often conflated with protected area gate fees and fails to include the total economic value of the much more complex tourism economy (lodges, food, beverage, transport, etc). This complex tourism economy often exceeds the value of gate fees by a factor of ten, with more complex economies also having higher upstream and downstream multipliers (Crompton et al., 2016; Crompton & Park, 2010; Souza, 2016). The direct income from gate fees, concession fees, resource royalties, etc generally constitute the financial reports for PA agencies which deal only with direct costs. Unfortunately, the wider scope of monetary value generated by PAs for local and other wider economies is normally never considered (Crompton et al., 2016; Souza, 2016; Souza Beraldo, 2017). Increasing support to PAs through raising budgets, building partnerships, and influencing local policies and planning decisions have been among the common objectives of tourism economic analyses of protected areas. Financial analyses can mislead decision makers and the public if the larger contribution of a PA to a regional economy is ignored. Normally this is because the focus of financial analyses in many PAs is on visitation as a major source of income (Souza Beraldo, 2017). These narrow financial analyses mislead the public and decision makers because the challenges of parks covering their own costs (financial viability) seldom reflect the high economic benefits relative to those costs when measured at the societal level. Visitor spending, economic development, construction activities and park operations impact the local economy in the region when induced by the presence of the park (Eagles, McCool, Haynes, & Phillips, 2002). On the other hand, the economic impacts of visitors' spending take place through three expenditure areas: payments of PA fees, payment for goods and services, which includes lodging, meals and transport, and multiplier effects. The economic multipliers circulate spending of people, within the local economy as expenditure, that they earn directly from tourism and businesses that provide upstream and downstream goods and services (Souza Beraldo, 2017; Stynes et al., 2000). The economic leakage of tourism revenue may be defined in various ways, but it is broadly concerned with the failure of tourist spending to remain in the destination economy (Narangajavana, Gonzalez-Cruz, Garrigos-Simon, & Cruz-Ros, 2016; Sandbrook, 2010).

Economic impacts of tourism

In recent decades, the global tourism market has experienced continual growth making it one of the world's fastest growing economic sectors with international tourist arrivals growing steadily from 25 million in 1950 to a total of 1.186 billion arrivals in 2015 (Glaesser, Kester, Paulose, Alizadeh, & Valentin, 2017). According to Child (2014), though PAs may be financially constrained, they are "economically highly profitable, with substantial societal benefits in the form of economic multipliers and other values provided they support a moderate level of tourism" (Child, 2014). Tourism involves people travelling for recreation, as well as for business, medical treatment, study and other non-leisure activities (Gretton, 2013). A PA that is popular with tourism has significant impacts on the local economy through provision of jobs and business opportunities at local and regional levels (Naidoo, Weaver, et al., 2016; Sandbrook & Adams, 2012; Stynes et al., 2000; Tumusiime & Sjaastad, 2014). Tourism consists of several interlinked service industries that may include accommodation, transport, food and beverages, entertainment, retail, etc (Melville Saayman & Saayman, 2006; Theron, 2011).

There are different types of taxes generated from tourism, based on what has been enacted in a country of reference, but may include taxes on tourism business earnings, taxes on goods and services bought by tourists, and taxes on bed-nights utilised by tourists (Theron, 2011). Studies have shown that the economy of an NP is said to be in the form of an inverted triangle, with park fees being a relatively small component of the total economic value associated with the park (Child, Musengezi, Parent, & Child, 2012). The economic impacts of visitors' spending on local economies are captured through payments of park fees and payment for goods and services, which includes lodging, meals and transport. All the visitors' spending contributes to the local region's gross economic activity, while that of non-local visitors impacts on the gross economic activity through the new money brought (Crompton & Park, 2010; Cullinane & Koontz, 2014). Economic impacts exclude spending by local visitors based on the assumption that if the non-local visitors decided not to visit the park, they would spend their money on another recreational activity elsewhere (Cullinane & Koontz, 2014). One of the ways to analyse tourism economic activity, as described in terms of 'effects' or 'impacts' (income, jobs, value added, taxes, etc.) and experienced directly or indirectly by businesses or induced by households in regional economies, is by using multipliers. The economic impact of tourism can broadly be looked at by the number of visits at the tourism destination, the visitor spending and consequently the jobs and income generated (Cornelissen, 2005). The methods used to measure economic impact of tourism vary from basic to complex mathematical equations (Surugiu, 2009), but mostly may include information such as: "visitor spending surveys; analyses of secondary data from government economic statistics; economic base models (e.g. the I-O models); and multipliers" (Stynes, Nelson, & Lynch, 1998). Detailed information on visitor spending, tourism goods and services costs, tax revenues, number of visitors, expenditures by other sectors, etc (Nedelea, Elmazi, & Totska, 2008). Stynes et al., (1998), in their study entitled 'State and Regional Economic Impacts of Snowmobiling in Michigan', proposed a model with the following equation:

*Impact = # of snowmobile days * average spending per snowmobile day * regional multiplier*

Generally, most other models on economic impact of tourism, including the Money Generation Model (MGM), are a variation of the above stated equation.

Tourism destinations are also vulnerable to fluctuation in tourism revenues due to factors such as "seasonality, economic recession, terrorism, extreme weather or the occurrence of natural disasters" (Nedelea et al., 2008; Theron, 2011). Although the focus of this study is not on environmental impacts of tourism and tourism activities, it is worthy to recognise that some of those impacts may include physical damage to environmental resources, depletion of environmental resources, loss of biodiversity, pollution of air, water or soil and loss of aesthetic qualities (Keyser, 2009). According to Theron (2011), tourism impacts on local areas are several, both positive and negative, and may include social, environmental, and economical. For example, some of the negative economic impacts include:

- An unstable source of income and employment due to several negative externalities attached to tourism (Cornelissen, 2005).
- Increased property prices due to increased competition (Krause, 2012).
- Loss of non-tourism industries due to the utilisation of land for tourism (Theron, 2011).
- Increased prices of goods due to increased demand from tourism (Krause, 2012).

Researchers have described the differences between economic contribution (significance) and economic impact analyses. The former is the analysis that captures gross economic activity generated in the regional economy by all visitors, while the latter is the analysis that estimates the net changes on the regional economy generated by non-local visitors to the PA (Cullinane & Koontz, 2014; Snyman & Bricker, 2019; Souza Beraldo, 2017). The direct effects are the changes in the local economy that are caused by visitor spending in businesses, that sell directly to visitors, such as lodges, restaurants, campgrounds, grocery stores, etc. (Cook, 2013; M Saayman, Rossouw, & Saayman, 2010; Stynes, 2001). The changes generated when directly affected businesses such as lodges buy goods and services from other businesses within the local region are referred to as indirect effects, while the changes generated through household spending of personal income by workers in directly or indirectly affected businesses are known as induced effects (Crompton & Park, 2010; Cullinane & Koontz, 2014; Snyman & Bricker, 2019). On the other hand, the sum of the indirect and the induced effects is referred to as the secondary effect, while the term total effects refers to the sum of direct, indirect, and induced effects of visitor spending (Crompton & Park, 2010). All the interactions between consumers and producers in a local or regional economy are captured by regional economic multipliers through the economic base models such as the I-O models (Crompton et al., 2016; Cui et al., 2013; Cullinane & Koontz, 2014; Snyman & Bricker, 2019; Stynes, 2005). Several researchers have defined multipliers as "ratios by which direct effects are multiplied to give secondary or total effects" (Crompton et al., 2016; Cui et al., 2013; Cullinane & Koontz, 2014; Stynes, 2005). The multiplier is derived from the Keynesian expenditure model, which measures the change in income/production due to an exogenous change in expenditure in a country/region. The way in which the multiplier is calculated also leads naturally to the next discussion, namely leakages. Since, per definition, the higher the leakages, the lower the multiplier.

1.6.2 Economic leakage of tourism from protected areas

Tourism development and leakage

The economic leakage of tourism revenue, as already defined above, is broadly concerned with the failure of tourist spending to remain in the destination economy (Narangajavana et al., 2016; Sandbrook, 2010). However, it should be noted that the economic leakage takes place in different forms, including local ownership. For instance, local ownership may reduce external leakage (through profit repatriation), but may experience internal leakage through importation of products and services (Chirenje, Chitotombe, Gukurume, Chazovachii, & Chitongo, 2013). Research has shown that often the revenue generated by the tourism sector in a local region is lost from the systems of local regions through several channels that may include paying for goods and services outside the region, taxes or salaries of executives that are not residents in the local region of tourism destination (Crompton & Park, 2010; Pao, 2005; Tourism, 1998). This loss of tourism revenue, which has already been defined as the failure of tourist spending to remain in the destination economy, is leakage. Tourism and rural economic development's relationship have been debated for several decades and researchers, in areas with touristic potential, have used sustainable tourism widely in development projects targeting poor people living in the areas (Chirenje et al., 2013; Gerosa, 2003; Mitchell & Ashley, 2006; Sandbrook, 2010). At the same time, in the tourism industry, research has correspondingly shown that there is a significant correlation between the leakage rate and the level of economic development (Chirenje et al., 2013; Meyer, 2013; Supradist, 2004).

Generally, small island countries, least developed countries and developing countries are more exposed to leakage than developed ones because of their local economies' dependence on a large number of imports (Krause, 2012; Supradist, 2004). According to Sandbrook (2010) and Chirenje et al., (2013), it has been widely argued that a high level of economic leakage is caused by the external control of tourism development, leaving tourism destinations with insignificant positive economic impacts. Theron (2011) states that the leakages are a lost opportunity for local areas where the tourism money was generated, but their local economies have been affected negatively. Tourism has grown to be one of the largest industries in the world, over the last decade, and has been used as a tool for foreign exchange earnings and economic development for many countries – especially the developing ones (Supradist, 2004). In the same vein, numerous international organisations, such as the World Travel and Tourism Council (WTTC) and the United Nations World Tourism Organisation (UNWTO) proposed tourism as key factor for driving socio-economic advancement, especially for developing countries (De Bruyn, 2018; Sandbrook, 2010; UNWTO, 2008; WTTC, 2017). However, if high economic leakage prevails over a region, at the backdrop of all those efforts from various stakeholders to promote sustainable development, it may slow down the local communities' ability to reach economic sustainability (Supradist, 2004). According to Hampton (1998) and Scheyvens (2002) in Sandbrook (2010) large-scale leakage is associated with externally controlled high-end, luxury tourism and mass tourism. This means that economic sustainability would hardly be achieved because the higher the leakage, the less a given region and its local people would benefit from the economic impacts created by tourist expenditures (Hampton, 2013). Studies have also shown that at national level, between 50% and 70% of tourism revenues to developing countries leak back to the developed world, while at the local level the reported rates are often much higher (Chirenje et al., 2013; Sandbrook, 2010). This is also supported by the United Nations Economic Commission for Africa (UNECA) that found that the average leakage for developing countries varied from 10%-20% to 40%-50% in diversified economies and smaller economies, respectively (Gerosa, 2003).

However, one of several ways that could reduce the level of leakage from the local economies would be by strengthening the local tourism supply. Maximising local linkages through buying local produce, from farmers and manufacturers, and also employing more local people than expatriates could decrease leakage (Krause, 2012). Other researchers also advocate to expand local economic linkages if tourism losses through leakage could be prevented (Ntibanyurwa, 2008; Melville Saayman & Saayman, 2006). However, it is important to mention that in order to expand tourism for the international market, some type of leakage may be inevitable because of certain tourism supplies not locally available.

Types of leakage

Researchers have categorised leakage into three groups: the external, the internal and the invisible leakages. *External or export leakage* is defined as the expenditure in tourism that is originally from non-local areas, but it is linked to local industries (WTO, 2001). The tourism's goods and services value proportion of the total market is rendered, but not actually captured by the local economy (Pérez-Ducy de Cuello, 2001). It is hard to measure external leakage because it is not accounted for locally. It also refers to a situation when a proportion of tourism expenditures and its linked domestic industries that originate outside of the tourism destination are not captured by the service-providing destination (Supradist, 2004; WTO, 2002). For example, this kind of leakage takes place when investors or foreign workers reap the profits from the investment and take them back to their home countries because of foreign investments such as tourism infrastructure development (Chirenje et al., 2013; Pérez-Ducy de Cuello, 2001; Supradist, 2004; WTO, 2001). *Internal or import leakage* is defined as the tourism costs or losses that originate locally and are paid and accounted for locally (Pérez-Ducy de Cuello, 2001). It is also referred to as 'import content' or 'import coefficient' of tourism because of the proportion of tourism goods and services needed to be imported into the local economy (Pérez-Ducy de Cuello, 2001). And finally, the *invisible leakage* is defined as the foreign exchange costs that originate in the tourism service providing destination, but are neither properly accounted for nor documented as a tourism sector cost (Pérez-Ducy de Cuello, 2001; Supradist, 2004; WTO, 2001). The economic leakage is not easy to measure. However, researchers recommend the use of economic base models such as the I-O table and Tourism Satellite Accounting (TSA) for measuring leakage from imported goods and services (Gollub, Hosier, & Woo, 2003; Wells, 1997 in Supradist, 2004). The definition and details of the I-O table are covered in the sections that follow, but it is "a mathematical table, or model, that represents the flows of economic activity between sectors within a region" (CSO, 2017). The I-O multipliers are the basis for the application of a Money Generation Model (MGM) in this study. On the other hand, the TSA was developed by the World Travel & Tourism Council (WTTC) and it allows the demand and supply sides of tourism to be examined within a balanced accounting system – the system that is able to describe the production and demand functions of the entire economy (Stynes, 2005; Supradist, 2004).

Local community ownership of tourism businesses

The external leakage can also be evaluated by the level of foreign proprietorship of tourism enterprises in the host destination. It is assumed that the level of external leakage may decline when local ownership is higher (though this is not always true) (Supradist, 2004). Nevertheless, it should be noted that the economic leakage takes place in different forms, even with local ownership. For instance, local ownership may reduce external leakage (through profit repatriation), but may experience internal leakage through importation of products and services (Chirenje et al., 2013). It should be emphasized here that, for meaningful economic growth to take place, non-local investment is absolutely an indispensable element, especially in an instance where the tourism destinations' capacity to invest by themselves is limited (Supradist, 2004).

Multipliers

It is very important to measure the economic impacts and leakage of tourism destinations because the economic benefits and related costs of tourism can assist by means of marketing, planning and other management areas that meet a variety of tourism objectives (Frechtling, 2006). The tourism economic impacts, captured through the payments of park fees, goods and services (Crompton & Park, 2010; Cullinane & Koontz, 2014), and the internal and external leakage of income, jobs, value added, taxes, etc. (Stynes et al., 2000) may be estimated by application of national or regional multipliers. The multipliers are derived from analytical modelling frameworks or economic base models such as the I-O model, the Computable General Equilibrium (CGE) model, the Keynesian multipliers model, the TSA model, the Social

Accounting Model (SAM), etc (Frechtling, 2010; Pao, 2005; Round, 2003; Viu, Fernández, & Caralt, 2008). By application of national or regional multipliers, through these analytical modelling frameworks, the economic impact in local areas can be captured as multiplier effect (Crompton et al., 2016; Cui et al., 2013; Cullinane & Koontz, 2014; Stynes, 2005). The concept of multipliers and descriptions of different types of multipliers are outlined under the 'concept of multipliers' section below.

1.6.3 Concept of multipliers

Economic multipliers

Multipliers have been defined as ratios by which direct effects are multiplied to indicate secondary or total effects (Crompton et al., 2016; Cui et al., 2013; Cullinane & Koontz, 2014; Stynes, 2005). In other words, they are factors that are applied to any given area in order to estimate the direct, indirect and induced economic impacts of tourism (Melville Saayman & Saayman, 2006). Further theories of multiplies are outlined under the section of I-O model of this chapter (Chapter 1); while the methodology for deriving national and rural multipliers from the I-O tables are discussed later under the research method chapter (Chapter 2). Multipliers, within a region's economy, characterise economic interdependencies between sectors. For example, if there is a change in sales to the final consumers of goods and services for a particular good (or referred to as an increase in final demand), it is also expected or can be assumed that an increase in the output of that commodity would take place, as producers react to meet the increased demand (this is referred to as the direct impact). Consequently, when the producers have increased their output, an increase in demand to their suppliers would follow and then similar demands would continue down the supply chain (this is referred to as the indirect impact) (SPICOSA, 2010). Generally there is considerable variation of multipliers from region to region and from sector to sector (Stynes, 1997a). The different kinds of multipliers, such as the ratio-type, can signify the type of secondary effects included and the measure of economic activity being applied such as the output, income or employment multipliers (Stynes, 1997a). The ratio-type multipliers measure the ratio of a total impact to the corresponding direct impact (Malviya, 2005). They retain the traditional notion of an amplified effect, in the sense that the numerator and the denominator of the ratio are of the same unit of measurement so that the multiplier itself is dimensionless (Fjeldsted, 1990). On the other hand, the regional impact multiplier is referred to as the ratio of the total effect to the size of the direct impact on a regional economy of some initial direct exogenous impact (Fjeldsted, 1990). The generally preferred approach among economists of calculating a multiplier is a ratio of income or employment to sales and this is sometimes called a Keynesian multiplier or response coefficient (Stynes, 1997a). According to Stynes (1997a) there are four basic factors that categorise the size of the multipliers:

(1) The overall size and economic diversity of the region's economy.

(2) The geographic extent of the region and its role within the broader region.

(3) The nature of the economic sectors under consideration.

(4) The year the data on economic activities under consideration is collected.

Generic multipliers

The other option of estimating the economic effects is the application of the sector-specific generic multipliers which are derived through economic studies in different regions. The generic multipliers refer to multipliers which are applied for economic impact analysis in certain areas where multipliers were not available. The generic multipliers were developed in the United States of America (USA) by consideration of different economic regions or areas with similar attributes. The US National Parks Service (NPS) first introduced the use of generic multipliers in areas where multipliers were not available. These generic multipliers are still available today and have been adopted in other countries with similar attributes to the USA, such as Finland (Chidakel, Chang, Gorsevski, & Secretariat, 2018). Generic multipliers could only be applied in cases where area multipliers are not yet developed because generic multipliers are less reliable than area multipliers. Generic multipliers calculation guidance was provided by Stynes et al., (2010) for estimating direct economic effects of developed economies. For example, to derive direct effect in the US, the total visitor spending is multiplied by output multipliers ranging between 0.8, 1.2, 1.4, 1.5 and 1.7 for small rural areas, large rural areas, moderate sized communities and state or metro areas, respectively (Crompton & Park, 2010).

Rural multipliers

There is an extraordinary amount of information on the multipliers, but an in-depth online search for rural multipliers, their derivative and their previous application in rural areas, proved difficult, especially for the southern Africa region. However, studies have shown that parks or tourism destinations that are in rural areas tend to have lower economic multipliers and higher job multipliers than those in more densely settled economic areas. Other studies have indicated that researchers have been forced to take short cuts or use approximations in estimating economic impacts of rural economies by applying the first round visitor expenditure as 'appropriate' rural multiplier (Stoeckl et al., 2010). Further Stoeckl et al. (2010) reviewed several studies that compared the effects of multipliers between 'small' or rural and 'large' or town/state regions on their economies. For example, to produce regional multipliers estimates of between 1.18 and 1.34 for rural Scotland, data was collected from 200 businesses (Crabtree, Leat, Santarossa, & Thomson, 1994). Another study conducted in Scotland produced regional multipliers, estimated between 1.1 and 1.4 and investigated the economic linkages between small and surrounding rural areas by using the Keynesian approach (Scotland, 2005). Stoeckl et al., (2010) found that tourism multipliers in 'small' and/or remote regions were generally quite small ranging between 1.1 and 1.5. Thereafter the researchers used that range of multipliers to generate lower- and upper-bound estimates of the regional economic impact of the industry being studied.

In a study entitled "Estimating the economic contribution of visitor spending in the Kruger National Park to the regional economy", Saayman, M., & Saayman, A. (2006) compensated for the lack of regional I-O model by weighting the indirect and induced impacts with the relative share of the industry that is 'produced' by the Mpumalanga province. Indeed, the method was obviously not the optimal solution, but provided a more realistic approach in a country with limited data and model resources. For this study, the method used by Saayman, M., & Saayman, A. (2006), together with the procedure provided by Milner & Blair (2009) on how to derive national technical coefficients from the national input-output tables, was applied. With application of supply or 'produced' percentages in this case, the derived coefficients are re-scaled and converted to regional or rural multipliers that quantify economic impacts of the economy being studied. The steps for deriving and rescaling multipliers into rural multipliers are outlined under the 'I-O model' section below.

1.6.4 Input-output model

Input-output tables

The I-O framework is used in an economy to translate the existing different linkages between economic sectors. The I-O tables, usually produced by government agencies, are used to calculate multipliers. The details of estimating the output, income, employment and value-added multipliers, from the national I-O tables, are described later in Chapter 3. In the late 1930s Professor Wassily Leontief developed an analytical framework known as I-O analysis used in inter-industry analysis (Miller & Blair, 2009). The fundamental purpose of the I-O framework in an economy is to analyse the interdependence of industries (McLennan, 2006). These relationships are presented in the form of a matrix (O'Connor and Henry, 1975). The I-O matrices in a specific region – just as with the SAM, the extended form of the I-O models, describe the interactions between producers and consumers in a quantitative way. The way industries trade with each other and produce flows of products and services are recorded by a representation of a national or regional economic accounting system in a given period, typically a year (McLennan, 2006; SPICOSA, 2010). According to Saayman and Saayman (2006) the I-O model has remained among the popular methods for calculating the total economic impact and it is also applied to estimate the indirect or induced impacts of tourism spending (Tyrrell & Johnston, 2001). They also provide more accurate estimates of secondary economic effects than the use of generic multipliers (Miller & Blair, 2009).

To estimate the amount of income, employment and production that is necessary to satisfy a certain level of tourism demand, the I-O analysis uses the matrix algebra (Keyser, 2009; Melville Saayman & Saayman, 2006). This is also widely accepted – and among common methodologies – for measuring the economic impacts of tourism among the family of methods called the SAMs (D'Hernoncourt, Cordier, & Hadley, 2011). The activity of a group of industries is that they produce goods (outputs) and also consume goods from other industries (inputs) thereby producing each industry's own output (Miller & Blair, 2009). The supply and use of the products of an entire economic system are described by the I-O tables which are able to provide a detailed dissection of intermediate transactions in an economy (D'Hernoncourt et al., 2011). The tables provide more comprehensive analysis of the productive system than do standard national income and expenditure accounts which are focussed on end-result of production rather than the intermediate flows (D'Hernoncourt et al., 2011). The observed economic data for a specific geographic region are generally used to construct basic Leontief I-O (Miller & Blair, 2009; SPICOSA, 2010). Detailed information on tourist expenditure and data on sectoral transactions are also required for I-O analysis (Nedelea et al., 2008).

An I-O model, in its most basic form, consists of a system of linear equations, each one of which describes the distribution of an industry's product throughout the economy. According to Miller & Blair (2009) and as depicted by Figure 1.1, the rows of the I-O table describe the distribution of a producer's output throughout the economy, while the columns describe the composition of inputs required by a particular industry to produce its output. The shaded portion of the table is constituted by the inter-industry exchanges of goods. The *Final Demand* columns, so labelled in the table, are additional columns which record the sales by each sector to final markets for their production, such as sales to the federal government and personal consumption purchases. For example, electricity can be sold to businesses in some sectors as an input to production (inter-industry transaction) and at the same time it can also be sold to residential consumers (final-demand sale). Other additional rows, which are labelled *Value Added*, account for labour, indirect business taxes, depreciation of capital and imports as other non-industrial inputs to production (D'Hernoncourt et al., 2011; Miller & Blair, 2009).

		PRODUCERS AS CONSUMERS								FINAL DEMAND			
		Agric.	Mining	Const.	Manuf.	Trade	Transp.	Services	Other	Personal Consumption Expenditures	Gross Private Domestic Investment	Govt. Purchases of Goods & Services	Net Exports of Goods & Services
PRODUCERS	Agriculture												
	Mining												
	Construction												
	Manufacturing												
	Trade												
	Transportation												
	Services												
	Other industry												
VALUE ADDED	Employees	Employee compensation								GROSS DOMESTIC PRODUCT			
	Business Owners and Capital	Profit-type income and capital consumption allowances											
	Government	Indirect business taxes											

Figure 1.2: Input-Output Transactions table

Source: Miller and Blair, 2009

Descriptively and analytically the I-O models demonstrate the relative importance of an industry, business, or sector in an economy. Prescriptively the I-O models can predict the economic responses from alternative actions (Israilevich, Hewings, Schindler, & Mahidhara, 1996). Such a model stands out among economic analysis methods because of the seemingly straightforward results that can be provided. Another plus is that it uses multiplier effects to calculate the total impact, which yields far larger values than would be obtained by any direct 'head-count' method (Deller, Hoyt, Hueth, & Sundaram-Stukel, 2009). The important strength of I-O analysis is that it provides detailed information on the direct, indirect, and induced effects of tourism on the local economy. Although I-O model offers a much greater understanding of sectoral linkages, and it is appropriate for estimating tourism multipliers, it also presents some shortcomings. Some researchers caution that the I-O model has some rigidity in its assumptions and it should be used for relatively small changes in the economy; otherwise the standard multiplier analysis would be unable to take into account resource scarcity and the role of relative prices (McLennan, 2006). The model is also criticised that it is data-intensive, and it makes its use very expensive both in time and price. The I-O model is not always accurate at the level of detail required and the use of secondary data in the model is unsuitable because it can be misleading. Again, in most least developed countries the intersectoral transactions that are needed in the I-O model are rarely available.

Direct and total requirements coefficients

From the information contained in the basic inter-industry transactions table above, there are two derivatives of I-O tables which can be obtained, and they are analytically more useful than the constructed inter-industry transactions table. These two derivative tables may be expressed as the direct (technical) requirements coefficients and the total requirements coefficients. A direct coefficient may be described in dollars or other currencies (e.g. kwacha) as value of input required to produce $1 (or kwacha equivalent) worth of a particular output from sources within the region (D'Hernoncourt et al., 2011).

Direct requirements coefficients

The measure of the fixed relationships between a sector's output and its inputs is referred to as direct requirements (technical) coefficients (Fjeldsted, 1990). The direct requirements coefficients include requirements that can be purchased directly by the industrial sector under consideration only (D'Hernoncourt et al., 2011). They can be used directly to assess the added value of a given sector, calculation of investments in the sector and determination of the impact of the sector on the level of pollutant emitted, if the matrix is 'greened' (D'Hernoncourt et al., 2011; SPICOSA, 2010). According to D'Hernoncourt et al., (2011) the calculation of the direct requirements coefficients involves dividing each column entry by the total output of the industry represented by the column in the inter-industry transactions table of the I-O table above. In other words, direct requirements (technical) coefficients, as stated by Fjeldsted (1990), "describe the amount of input i needed by sector j to produce a unit of good j, such that, to produce a_j units of good j, one would require $a_{ij}x_j$ units of input i". The formula is therefore as follows:

$$a_{ij} = \frac{z_{ij}}{x_j}; \quad ij = 1,..., n$$

Where a_{ij} is the direct requirements coefficient, z_{ij} is the monetary value of the transactions between pairs of sectors from each sector i to each sector j and x_i is the total output of a given sector i (Cassar, 2015; D'Hernoncourt et al., 2011; Fjeldsted, 1990; Miller & Blair, 2009). The direct requirements coefficient (a_{ij}) represent the dollar (or kwacha equivalent) value of the input from sector i required to produce \$1 worth of the sector j output.

Total requirements coefficients

Total requirements include direct requirements and requirements generated through the purchases of primary suppliers from secondary suppliers and the requirements generated by the purchases of the secondary suppliers from tertiary suppliers. For example, in sectors such as tourism, the purchase of consumer goods and services from the trade and services sectors like retail shops and lodges are included in the requirements generated within the regional economy by employees of the sector under consideration, as well as employees of all the supplying sectors (D'Hernoncourt et al., 2011; Fjeldsted, 1990; McLennan, 2006).

In the calculation of the total requirements coefficients, the direct coefficients are used to form a system of linear equations. The total output x_i of a given sector i for each of these linear equations are equated to the output of the given sector required in production by other intermediate sectors plus output of the given sector delivered to final demand y_i as shown by the equation (Fjeldsted, 1990):

$$x_i = a_{ij} x_j + y_i$$

the entire system of equations, in matrix notation, for calculating the total requirements coefficients is expressed as the following equation:

$$x = Ax + y$$

where x is a column vector of total outputs, y is the vector of outputs, and A is a square matrix of direct requirements coefficients a_{ij}. The x is produced by each of the individual producing sectors while the y is delivered to final demand by each of the individual producing sectors. In a_{ij} the first subscript locates the row position and the second subscript the column position for each coefficient within the matrix (Fjeldsted, 1990).

These total requirements coefficients simply represent the elements of Leontief inverse matrix (D'Hernoncourt et al., 2011):

$$(I - A)^{-1}$$

Total requirements coefficients, or simply the Leontief inverse matrix, can have two derivative Leontief inverse matrices expressed as (1) type I coefficients and (2) type II coefficients, which are the basis for calculation of type I and type II multipliers, respectively.

Multipliers in the Input-Output Model

The methodology for deriving national and rural multipliers from the I-O tables are discussed later under the research method chapter (Chapter 2).

Type I multipliers

Type I multipliers represent both the direct and indirect effects on production which are caused by the exogenous changes to final demand. They ignore the notion that when there is increased production more labour input would be required which in turn would increase household income, further demand would increase and consequently production would also increase (Cassar, 2015;

Miller & Blair, 2009). Once the matrix of direct coefficients, or the open Leontief Inverse matrix, has been derived as below:

$$L = (I - A)^{-1} = [l_{ij}]$$

it is then possible to compute the solution to the (open) Leontief demand driven model, which is specified as:

$$X = (I - A)^{-1} Y$$

Type II multipliers

Type II multipliers reflect the direct and indirect effects, because of increased employment, leading to an increase in the level of household income throughout the economy. A share of this increased household income is respent on final goods and services within the economy which is called the *induced effect* (SPICOSA, 2010). In the direct requirements matrix an extra row and column are added for the compensation of employees and final consumption expenditure by households (D'Hernoncourt et al., 2011). A Leontief inverse matrix of dimension (n+1) x (n+1) in which each element captures the direct, indirect as well as the induced effects in output production is generated by the household augmented direct coefficients matrix due to an increase in exogenous final demand. The matrix is termed a closed Leontief inverse matrix, because it relates to the fact that the direct coefficients matrix is closed with respect to households (Cassar, 2015):

$$\widetilde{L} = (I_{n+1} - \widetilde{A})^{-1} = [\widetilde{l}_{ij}]$$

The corresponding closed Leontief inverse demand model is specified as:

$$\widetilde{X} = (I_{n+1} - \widetilde{A})^{-1} \widetilde{Y}$$

Rural areas coefficients

The derived national technical coefficients from the national I-O tables are rescaled to regional (rural area) level in order to produce multipliers that quantify impacts on the economy being studied (Rickman & Schwer, 1995). An associated rural area Leontief inverse matrix is first derived from rural area technical requirements coefficients before specified multipliers are obtained:

$$L^r = (I - A^r)^{-1}$$

These multipliers represent the inter-industry relationships within that economy and rely on the ‘A’ matrix, as well as the associated coefficients for income, employment, value-added, etc. for example, if sector i is agriculture and sector j is food processing, a_{ij} must represent the value of inputs of agricultural products produced within the economy per dollar’s (or kwacha equivalent) worth of output of the food-processing sector in the same economy (Miller & Blair, 2009).

Output or sales multiplier

Output multiplier is defined as the ratio of the change in total output required from all sectors of a regional economy to the direct change in the basic output of a sector of the economy (Stynes, 1997a, 1997b). Gross sale multiplier is defined as the effect of visitor spending on total economic activities within the host community (Crompton et al., 2016). The difference between the two is that the output multiplier considers real changes in the economy in terms of inventories (stocks) together with levels of sales while sales multiplier considers only levels of sales from visitor spending of both direct and indirect effect (Crompton et al., 2016). However, to avoid the conceptual and semantic confusion between those two indices the study adopted the output multiplier, but in other areas may use both interchangeably. In terms of tourism, the output multiplier captures the total sum of direct and indirect input requirements from all tourism-related sectors needed to supply 1 (one) dollar (or kwacha equivalent) worth of sector *j*'s sales to final demand (Cassar, 2015). Type I rural area output (or sales) multiplier, for any given sector (sector ‘j’), captures the total sum of direct and indirect input requirements from sectors needed to supply one unit’s worth of sector ‘j’s output to final demand. Type II output multipliers capture the direct, indirect and induced effects in an event that one unit increase in final demand of a specific sector will have on overall output production. Type I and type II output multipliers are found by summing the type I and type II rural area Leontief inverse matrices (total requirements coefficients) respectively as shown below:

$$O^{I}{}_{(j)} = \sum_{i=1}^{n} l_{ij} \qquad\qquad O^{II}{}_{(j)} = \sum_{i=1}^{n} \tilde{l}_{ij}$$

Income multiplier

The income multiplier according to Deller et al., (2009) represents a change in total income that includes employee compensation, proprietary income and other property income for every dollar (or kwacha equivalent) change in income in any given sector. The type I and type II income multipliers are obtained by the multiplication of the labour-input coefficients, in monetary terms, with the rural area total requirements coefficients (Leontief inverse matrix) as shown below:

$$a_{h,i} = \frac{h_j}{x_j} \qquad h^I{}_{(j)} = \sum_{i=1}^{n} a_{h,i}.l_{ij} \qquad h^{II}{}_{(j)} = \sum_{i=1}^{n} a_{h,i}.\tilde{l}_{ij}$$

where a_h represents row vector of labour-input coefficients such as salaries or wages which are earned per unit of output. The direct and indirect impacts are calculated using type I multipliers and type II multipliers (type II multipliers include induced effects in the economy) (SPICOSA, 2010).

Employment (jobs) multiplier

The employment multiplier according to Deller et al., (2009) measures the total change in employment because of one-unit change in the employed labour force of a particular sector. Employment multiplier specifically refers to the ratio of the change in total employment, in all sectors of the regional economy, to the change in employment directly engaged in the production of the basic output. The process of deriving employment multiplier in this study considered the effects of changes in the final demand for a sector on the physical number of jobs created (Miller & Blair, 2009). By multiplying the employment-output ratios with the Leontief inverse matrix the type I and type II employment or jobs multipliers are obtained as shown below (Cassar, 2015):

$$a_{e,i} = \frac{e_i}{x_j} x \ 1000{,}000 \qquad e^I{}_{(j)} = \sum_{i=1}^{n} a_{e,i}.l_{ij} \qquad e^{II}{}_{(j)} = \sum_{i=1}^{n} a_{e,i}.\tilde{l}_{ij}$$

where a_e represents row vector of employment-output ratios. These ratios were derived by dividing the number of people (average) in employment per sector over the year 2015[1] by the amount of gross output generated by the sector (Cassar, 2015; CSO, 2016b). The type I employment multiplier (e^I) which is obtained, illustrates the effect of an additional million dollar

[1] Labour-related data per sector for the year 2015 were provided by the Central Statistics Office (CSO) of Zambia.

(or kwacha equivalent) of the final demand for the output of sector *j*, when all the direct and indirect effects in the production process are converted into the physical number of jobs created in the economy. Similarly, a type II employment multiplier (e^{II}), for a sector *j*, was obtained and included the direct, indirect and induced effects (Cassar, 2015).

Value-added multiplier

Value-added is personal income and includes rents and profits, plus indirect business taxes (Stynes, 1997a). It is a commonly used measure of the contribution of an industry or region to gross national or gross state product. It measures the total change in value added to the economy because of a one-unit change in the value added by a particular sector. Specifically, it refers to the ratio of the change in total value added in all sectors of the regional economy to the change in value added directly related to the production of the basic output. The type I and type II value-added multipliers are obtained by the multiplication of the value-added coefficients with the Leontief inverse matrix as shown below:

$$a_{va,i} = \frac{va_j}{x_j} \qquad va^{I}{}_{(j)} = \sum_{i=1}^{n} a_{va,i}.l_{ij} \qquad va^{II}{}_{(j)} = \sum_{i=1}^{n} a_{va,i}.\tilde{l}_{ij}$$

where a_{va} represents row vector of value-added output ratios. By dividing the average value added per sector over the year 2015[2] by the total output generated by sector the value-added output ratios were derived (Cassar, 2015; CSO, 2016b). The type I value-added multiplier (va^{I}) obtained demonstrates the effect of an additional dollar or a kwacha equivalent of final demand for the output of sector *j*, when all the direct and indirect effects in the production process are converted into a dollar or kwacha equivalent estimate of value added in the economy. Similarly, a type II value-added multiplier (va^{II}) was obtained for a sector *j*, which included the direct, indirect and induced effects (Cassar, 2015).

Limitations of input-output multipliers

There are several limitations to the use of I-O-derived multipliers and a significant occurrence of any of them may be enough to invalidate their use for prediction purposes. For example, according to Gretton (2013), the I-O multiplier analysis assumes that:

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[2] The figures for the value added per sector for the year 2015 were provided by the Central Statistics Office (CSO) of Zambia.

- *no supply-side constraints* – but availability of appropriate labour, capital and other productive inputs.

- *fixed prices* – but affected by relative price changes.

- *fixed ratios for intermediate inputs to production and outputs from production* – but affected by changes in production technologies, including in the use of domestic and imported inputs and the mix of outputs.

- *no purchase allowance made for households' marginal responses to change* – but affected by income and relative price changes.

- *absence of budget constraints* – but would be budget constrained; and

- *fixed technology* – but new technology may be introduced.

The regional multipliers simply calculated directly from the national I-O tables, in addition to the above limitations, are not appropriate for use in the economic impact analysis of projects in small regions (Gretton, 2013).

Multipliers misuses and abuses

The abuse of multipliers primarily relates to overstating the economic importance of specific sectoral or regional activities. The applications of multipliers fail to consider the opportunity cost, particularly for both spending measures and alternative uses of resources, and may misinform policy makers (Barnes, Roose, Heap, & Turner, 2016; Gretton, 2013). Multipliers are frequently misappropriated and used to justify projects based on their private benefits alone. For example, income multipliers or employment multipliers can be used to estimate indirect and induced income and employment effects, respectively, but should not be used to predict the indirect and induced fiscal burdens of the project. What is indicated in such situations is cost-benefit analysis, which may incorporate the use of income and employment multipliers but goes beyond the scope of simple income and employment multiplier analysis to come up with a bottom-line net public benefit or net public burden for the project. The most common multiplier abuses, according to Fjeldsted (1990), are:

- to apply multipliers in situations where there is no change in export activity, or more generally, to situations in which there is no infusion of new external funding.

- to demonstrate the importance of a certain sector by some special interest group. A dubiously large multiplier is applied to non-basic activity, resulting in a very exaggerated claim.

Use of multiplier analysis

According to Gretton (2013) the conceptual limitations in the use of multiplier analysis is not constrained in its widespread use:

- to rally against perceived potentially adverse policy decisions,

- to highlight the broader economy's dependence on activities or regions; or

- to justify or support calls for injections of taxpayer funding.

1.6.5 Other analytical and modelling frameworks

Computable General Equilibrium model

Computable General Equilibrium (CGE) models originate from the I-O model and the aim of their development is to overcome shortfalls in the I-O model. The CGE models are more focused on the details and behaviour of economic agents unlike the I-O model which focuses on the sectors transactions (Pao, 2005). The CGE model can allow reactions from one sector to another and treats the entire economy. While analysing in detail the inter-industry it also considers the fluctuations in prices. The model construction involves setting up some markets in series, a sector for production and a household demand sector (Blake, 2008). For the purposes of analysing some development planning and issues to do with policy, the CGE models are the most appropriate. The CGE model is flexible and this gives it an advantage over other forms of modelling (Blake, 2008). The models are often applicable in environmental economics, international trade, economic development, agricultural economics and other related fields. It is only recently that the model has been introduced and applied in the field of tourism, particularly in Australia (Pao, 2005). Although, the models are seemingly better than other models, they are still rare in the tourism economics literature (Narayan, 2004). However, the CGE model is also criticised for being too restrictive and with unnecessary assumptions because it does not allow structural changes leading to data limitation (Kitwiwattanachai, Nelson, & Reed, 2010). Again, the model is not sensitive to inflation fluctuations unless it is a model through money illusion assumptions (Mcdonald, Reynolds, & Van Schoor, 2006). The model is also considered to be very expensive to construct and could require significant investments to generate accurate data needed for tourism impacts analysis. At the time of this study the CGE model was not available for the Zambian economy and that was the main reason why it was not selected for deriving multipliers.

Keynesian multipliers models

The Keynesian multiplier concept responds to an exogenous injection of spending on various macro-economic aggregates to the total effects it creates. It is based on the Keynesian model of aggregate demand theoretical found in an open economy (Viu et al., 2008). The model identifies the flows of income and employment that are generated in rounds of which these flows can diminish in geometric progression as a result of leakages at each round (WTO, 2001). Leakage may be there at each round of spending, but what is important is to understand that the direct effects, the indirect and the induced effects, are all equally important in tourism multipliers. The Keynesian model which is used in the estimation of tourism multipliers was formulated by Richard Khan in 1931 (Archer & Fletcher, 1996). In the model, the multiplier is determined by dividing a unit of tourist spending by the proportion of the spending that leaks from the economy because of savings and imports. Savings are also treated as leakages since, in short, they can limit income circulation leading to reduced size of income multiplier. In tourism, the Keynesian model is based on the propensity to consume by different visitors and the share of tourists spending that goes to other industries. If the propensity to import is high, then the resultant value of the multiplier will be lower and benefits to the local economy will also be lower. Keynesian multipliers are calculated based on leakages in the economic system (R. Cooper & John, 1988). The Keynesian models were not selected for this study because it is argued that they are unable to address the economic linkages among sectors by suggesting that the inter-sectoral relationship is unexaminable with the model (Patterson, Gulden, Cousins, & Kraev, 2004; Yusaku, 2002). The model gives a limited and partial picture of tourism multipliers because it is less rigorous than other models such as I-O model (R. Cooper & John, 1988). It is unable to address the nature of sectoral linkages because it focuses on aggregates (non-sectoral) pictures of tourism spending impacts. Before estimating the multiplier effects the Keynesian model does not consider leakages at the initial level though it is important for adjusting the injections downwards to allow for leakages. Ultimately, the Keynesian multipliers are less informative than the I-O multipliers since they have some restrictions in the model.

Tourism Satellite Account model

The Tourism Satellite Account (TSA) is one of the approaches that are used to measure tourism economic impacts. It is another extension from the I-O model, a system of national accounts, the reason word ‘satellite’ is applied (Frechtling, 2010). The TSA is a useful system which was developed by the World Travel and Tourism Council (WTTC), for estimating the overall economic impact of the tourism sector at the national level – in the 1990s. The reason the TSA model was not preferred over the I-O model for this study was because it has been criticised for failing to identify and define tourism products without taking into account tourism costs (Li, Li, Tang, & Wang, 2019). Also, the system does not allow the assessment of tourism economic impacts at local levels (WTTC, 2017). By this, the model is likely to lead to erroneous results that can under- or over-estimate the economic impacts of tourism. In short, the model is not applicable to local levels in the assessment of tourism impacts. The TSA model concentrates on measuring direct and indirect effects of tourist spending, leaving out the induced effect, that is of great importance in tourism multipliers, contrary to practice of other models. Consequently, the estimation of tourism effects with this model will either overestimate or underestimate the impacts.

Social Accounting Matrix

A social accounting matrix (SAM) is defined by Round, (2003) as an organized matrix which represents all transactions and transfers between factors of production, institutions within the economy and different production activities and with respect to the rest of the world. The SAM is designed to characterise the structure of an economy. The SAM model generally reflects the annual economic transactions between sectors. In a SAM, a comprehensive accounting framework, the full circular flow of income from production to factor incomes, household income to household consumption, and back to production, is captured (Pyatt & Round, 1979).

The SAM is used for the presentation of all the transactions in the economy. It is presented as a square matrix with columns representing expenditures and rows representing receipts as accounts from different institutions, activities, factors and products (Taffesse & Ferede, 2004). The total or sum of each row should be equal to the total or sum of each corresponding column. An entry in row *i* and column *j* represents the receipts of account *i* from account *j*. The SAM is an extension of input-output (I-O) tables which is a widely used framework in the provision of detailed information on the flow of goods and services, also on the structure of production costs (Saluja & Yadav, 2006). All the activities of an economic system from production, consumption and accumulation to distribution, is covered by the SAM. The SAM also divides the accounts into endogenous and exogenous accounts (Round, 2003). Multipliers derived from the SAM model are generally higher than the ones from the I-O model. The SAM model presents some difficulties in identifying activities because there is some confusion with the commodity disaggregation. The activities in the SAM model are designed to represent a productive agent and with that the firms aggregated under each heading in a square matrix are expected to have the same production function with unique technology that present similar distribution of factor income (Round, 2003). At the time of this study, the SAM model was not available for the Zambian economy and that was the main reason why it was not selected for deriving multipliers.

Comparison of SAM and input-output multipliers

According to Miller and Blair (2009) the difference between a SAM framework and the I-O tables framework is that more detail for the capital, labour, households, and additional accounts is added to the I-O tables framework and this results in inter-industry income and output in the I-O table and the institutional income and expenditures associated with final-demand and value-added sectors provide a much more detailed picture of the economy. The framework can provide a complete accounting of the circular flow of income and expenditure – in an economy – in addition to the connection to and derivation from the system of national accounts (SNA). The SAM multipliers will generally be larger than the I-O multipliers since the SAM endogenizes transactions not previously included in the input–output inter-industry accounts. And with endogenized final demand as well, the multipliers will be larger still. However, the I-O multipliers and the SAM multipliers also have many similarities and seek to capture the same effects (Miller & Blair, 2009).

The examination of the effects of real shocks to the economy on the distribution of income across socio-economic groups of households, is the main outcome of SAM-based multiplier analysis. The SAM also lends itself easily to decomposition and in the process an extra degree of transparency – in understanding the nature of linkage in an economy – and the effects of exogenous shocks on distribution and poverty are added (Round, 2003). However, the results differ from I-O because additional multiplier effects induced by the circular flow of income between activities, factors and households, augment the I-O multipliers. The advantage of utilizing I-O methodology is that when there is an exogenous shock to one of the components of final demand, the resulting multipliers incorporate not only the direct effects, but also the indirect and the induced effects on the economy (Cassar, 2015).

Some applications of analytical and modelling frameworks

According to Miller and Blair (2009) there are some applications of SAMs which have been applied widely in the literature, especially in social accounting data reconciliation of Richard Stone's original conception, as well as in the work of many other authors. Again, works of several researchers on SAMs have also been applied to many other policy problems (Alarcón, Van Heemst, & Jong, 2000; Keuning, 1991; Miller & Blair, 2009; Pyatt, 1999; Round & Pyatt, 1985). The national or regional multipliers, derived through analytical and modelling framework, such as the I-O model, can be used to estimate the direct, the indirect and the induced effects of tourism activity in local economies around the NPs (Stynes, 1997a). The I-O multipliers are used in economic base models to estimate the local economic impacts of areas around PAs (Morgan, 1997). An example of an economic base model is the Money Generation Model (MGM) developed in 2000 at Michigan State University (Crompton et al., 2016). The summary of the MGM is outlined in the next section.

1.6.6 Money Generation Model

The Money Generation Model (MGM) (see Appendix 7.11) is an economic assessment tool used which is applied to gauge the economic impact of spending on local economies by national park visitors (Cui et al., 2013; Fish, 2009). It is not a complicated model, but essentially an economic base model that uses I-O multipliers. Just like other economic base models, it assumes that regional economic growth is dependent on income injected into the local economy from outside sources (Chidakel et al., 2018; Morgan, 1997; Souza Beraldo, 2017). The model was developed in 2000 at Michigan State University and has since been applied to estimate ‘direct’, ‘indirect’, and ‘induced’ effects of park visitor spending in the USA and few other countries (Crompton et al., 2016; Stynes, 2001, 2005). For example, the U.S. National Park Service (NPS) uses the MGM to estimate the economic impact of non-local visitors on gateway and adjacent communities of parks (Morgan, 1997). The basic equation applicable in the MGM2, which is applied for computing the economic impact due to visitor spending, is as follows:

Economic impacts = number of visitors × average spending (per visitor or party) × economic multipliers (Fish, 2009; Stynes et al., 2000).

In this study the Money Generation Model 2 (MGM2) (Stynes et al., 2000) was applied to evaluate the economic impacts of visitor spending around the national parks. The MGM2 was adapted to evaluate local economies around NPs and to include country specific multipliers.

Essentially most of the NPs in southern Africa are surrounded by the human settlements such as the GMAs and OAs where tourism activities and natural resource-use are part of the local economic activities. Those human settlements, distributed in different geographical areas around NPs, are dependent on the NPs for most of their economic activities. For example, some of the ‘direct’ benefits for human settlements around the PAs may include redistribution of tourism revenues or other social impacts through community development initiatives and access to use or extract park resources (Tumusiime & Sjaastad, 2014). And some of those geographies of settlements around the NPs conserve their wildlife resources to allow for annual harvesting and thus integrate wildlife management into the rural economy (Eltringham, 1993; Simasiku, Simwanza, Tembo, Bandyopadhyay, & Pavy, 2008). More details on geographies of human settlements around PAs are stated in the next section.

1.6.7 Protected areas and geographies of settlements

A national park (NP) is one of the protected areas (PAs) that can serve a wide range of functions and purposes, as outlined below in Table 1.1, including conservation of biodiversity, supporting the subsistence lifestyles of indigenous peoples, providing opportunities for recreation and education, and contributing towards local, regional and national level developments (Naranjo-Barrantes, 2007; Prato & Fagre, 2005). Indeed, by ensuring that conservation capital is improved or maintained sustainably, the parks can create appropriate value for society from common-pool resources (Child & Dalal-Clayton, 2004). However, these NPs can no longer be viewed in isolation and immune from the direct drivers of biodiversity decline such as invasive alien species, land-use changes, over-exploitation, etc. and from indirect drivers such as economic, socio-political and cultural impacts (Palomo, Martín-López, Potschin, Haines-Young, & Montes, 2013). At the same time, human population is projected to reach 10 billion by the end of this century (UN, 2015), with the greatest increases in tropical developing countries, especially in Africa (Laurance, Sayer, & Cassman, 2014). However, other studies have stated that more empirical studies are needed to elaborate on the relation of PAs to human well-being, otherwise their overall net impact remains ambiguous (Tumusiime & Sjaastad, 2014; Tweheyo, Tumusiime, Turyahabwe, Asiimwe, & Orikiriza, 2012).

Table 1.1: Categories of Protected Areas

Category	PA	Purpose
I	Scientific Reserve / Strict Nature Reserve	PA managed mainly for science or wilderness protection (I(a): Strict nature reserves, and I(b): wilderness areas
II	NP	PA managed mainly for ecosystem protection and recreation (NP).
III	Natural Monument / Natural Landmark	PA managed mainly for conservation of specific natural features (natural monument).
IV	Nature Conservation Reserve / Managed Nature Reserve / Wildlife Sanctuary	PA managed mainly for conservation through management intervention.
V	Protected Landscape	PA managed mainly for landscape/seascape conservation and recreation (protected landscape/seascape).
VI	Resource Reserve	PA managed mainly for the sustainable use of natural ecosystems (managed resource PA).

Source: Dudley, 2008

Most national parks in southern Africa are surrounded by game management areas (GMAs), as buffer zones, where human settlement is permitted unlike in the NPs. It was because of disruptive land use practices that the GMAs were originally planned as buffer zones (Eltringham, 1993). They were also instituted to conserve their wildlife resources, and to allow for annual harvesting, as optimum variety and abundance commensurate with other land uses on a sustained yield basis – thus to integrate wildlife management into the rural economy (Eltringham, 1993; Simasiku et al., 2008). However, they are also dependent on those NPs for most of their economic activities, especially the GMAs located in the gateway areas of the NPs. The 'direct' benefits for human settlements in GMAs may include redistribution of tax or tourist revenues or other social impacts through community development initiatives such as the erection of clinics and schools, direct investment assistance for local farms and businesses or limited permits to use or extract park resources (Tumusiime & Sjaastad, 2014). Settlement geography involves the analysis and description of the distribution of the buildings over the land where people have attached themselves (Beattie, 2008; Harte, 2010; Stone, 1965). Settlement geography should not only investigate the distribution, but even more the interactions between settlements and the local economy which produced them.

Tourism in Kafue and South Luangwa national parks

The Kafue National Park (KNP) has similarities with two other of Zambia's main national parks (Lower Zambezi and South Luangwa) and of course the competing Chobe National Park in Botswana, in terms of types of tourism packages offered (Chemonics, 2011). Although the KNP has a competitive advantage as an ecotourism destination because of its large size (22,480km^2) it is not yet established in the international and regional source markets. Unlike other parks in the region, it maintains a large Miombo forest, has major waterways in the Kafue River and Lake Itezhi-Tezhi and has a diversity of habitats and wildlife species. South Luangwa National Park (SLNP), on the other hand, has an advantage over KNP because it is already established in the international and regional source markets as a primary ecotourism destination. According to a Chemonics International report, there are potential opportunities to grow and sustain market preferences for KNP ecotourism as destination, provided basic entry requirements of access, affordability and product quality can be satisfied (Chemonics, 2011). Recent data from the Ministry of Tourism and Arts (MoTA) in Zambia indicate that in 2015 the total number of visitors to the KNP was 12,960 and to the SLNP it was 43,653 which represented 33.4% and 4% positive growths from 2014 respectively (MoTA, 2015). Other data drawn from the DNPW records show that recent trends in the KNP and SLNP tourist arrivals mirror the growth in arrivals to Zambia which suggest a growing market nationally and for both national parks (DNPW, 2016).

The source markets for the Zambian national parks consist of international (overseas or outside of Africa continent), regional and domestic groups of tourists or visitors. Those groups were further segmented into 'top-end', 'middle' and 'budget' based on price of accommodation preference. For the full details, analysis and segmentation of visitors to the park – see the section 'Park visits' under the 'Economic Impact of national park visitor spending on local economies: cases of Kafue and south Luangwa national parks' chapter (Chapter 4). Although the regional and domestic source markets maintain this price segmentation, the report by Chemonics International Inc showed that they prefer tourism services in the middle and budget market segments (Chemonics, 2011). According to the Ministry of Tourism and Arts 2015 report of all the visitors to Zambia only 8.4% of recorded visitors in those parks are from Southern Africa. In both parks the largest international tourist contributor to Zambia's market is the United Kingdom (U.K.) ranging between 8 and 24% followed by North American tourists between 4 and 13% of the tourism market in 2009. The continental Europe market comprising mainly Germany, the Netherlands, France and Italy, contributes about 14% to the main country source markets (MoTA, 2015). Tourists from the U.K. and North America display a strong preference for the South Luangwa (by a factor of approximately 10) to the KNP. The study also indicates that there are few international tourists from Asia, the Far East or Australia. For the domestic market the residents, including expatriates, who maintain official residency and are currently living in Zambia in addition to Zambia nationals, comprise 28.7% of total arrivals at the three main national parks in Zambia (Chemonics, 2011). Moreover, given the significant growth in Zambia's middle class (and its disposable income), the domestic market has the potential to increase significantly through development of services and marketing that targets this demographic group. The KNP and SLNP, such as any other PAs which are popular with tourists, have significant economic impacts on the local human communities living in close proximity, through provision of tourism income, jobs and business opportunities at local level as well as at international level (Chirenje, 2017; Naidoo, Fisher, Manica, & Balmford, 2016; Sandbrook & Adams, 2012; Stynes et al., 2000; Tumusiime & Sjaastad, 2014).

Policy, institutions and management of Kafue and South Luangwa national parks

The Kafue and South Luangwa National Parks are controlled, managed, protected, and administered by the Department of National Parks and Wildlife (DNPW) which is so mandated under the revised Zambia Wildlife Act, 2015 (No. 14 of 2015). The Wildlife Act provides the framework for the administration and management of the wildlife sector in Zambia. The revised National Parks and Wildlife Policy of 2018 and Wildlife Policy of 1998 – on which the Wildlife Act, 2015 (No. 14 of 2015) is based – also reflects Government's desire to create an enabling environment that would enhance biodiversity conservation and transform wildlife into an economic asset that would contribute to national economic development through promotion of nature-based tourism, creation of employment, as well as increased local community participation in wildlife management. It has also taken on board Sustainable Development Goals. Policy dictates that consumptive utilisation (apart from provision for extractions under exceptional and prescribed circumstances such as problem animal control) is prohibited in all National Parks, Community Partnership Parks, and Wildlife and Bird Sanctuaries, whilst in contrast, GMAs provide for sustainable consumptive utilisation of natural resources (DNPW, 2016). The private sector is made up mainly by private companies set up to control tourism enterprises, tour operators and travel agents, safari hunting operators and outfitters. Private sector operators purchase licenses for their various businesses and may enter contracts with DNPW to conduct their activities in National Parks, Community Participation Parks, Wildlife and Bird Sanctuaries and GMAs.

Currently, the DNPW and the CRBs share revenue accruing from utilization of natural resources, with the CRB share assisting local socio-economic development. The current Wildlife Act, 2015 (No. 14 of 2015) allows for devolution of the wildlife management authority to Community Resource Boards (CRBs), but the absolute ownership of every wild animal in Zambia is vested in the President on behalf of the Republic (DNPW, 2015; Vandome & Vines, 2018). However, the ownership of wildlife can be conferred to the landowner on private land via a certificate, but for communities in GMAs or OAs there is no such provision (Lindsey et al., 2014). On that basis, local communities have little in the way of formal legal rights to benefit from the management of wildlife resources that they can fully commercialise (DNPW, 2015). However, the government's policy of devolution and decentralization, and the revised Wildlife Act 2015 (No. 14 of 2015), provide the legislative framework for 'active' participation of local communities in the management of the wildlife estate (DNPW, 2016). The local people are the direct stewards of wildlife resources and directly dependent on them for tourism, hunting, breeding, and personal enjoyment.

In support of the Government's policy of devolution and decentralization, the revised Wildlife Act, 2015 (No. 14 of 2015) provides for the legislative framework for local communities to obtain more powers over their own wildlife resource as one of their main opportunities for raising living standards and for wealth creation. This would be possible through the support for active participation of local communities in the management of the wildlife estate (DNPW, 2015). In the GMAs and OAs the local human communities are made up of customary groupings of chiefdoms, within the political and administrative frameworks of district councils and provincial authorities. The local human communities are principally represented by CRBs as provided for under DNPW's Community-Based Natural Resources Management (CBNRM) Programme (DNPW, 2016). However, various Trusts, Associations and CBOs representing local communities' interests, have recently been emerging as conservation and development partners (DNPW, 2016). CRBs are DNPW's co-management and natural resource management partners in GMAs. The current Wildlife Act, 2015 (No. 14 of 2015) provides for the establishment of Community Resource Boards (CRBs) as the institutions through which communities could work with the Department of National Parks and Wildlife (DNPW) of Zambia (Lindsey et al., 2013). The CRBs and the DNPW co-manage natural resources in the GMAs as partners and currently share the revenue accrued from the utilization of natural resources (mainly from hunting concessions). CRBs share of revenue assist in local socio-economic development and it is also used for the recruitment of village scouts to assist DNPW with law enforcement (Chemonics, 2011; Lindsey et al., 2014). The private sector operators, on the other hand, purchase licenses for their various businesses and may enter contracts with DNPW, and sometimes with CRBs, to conduct their activities in national parks, community participation parks, wildlife and bird sanctuaries, as well as GMAs. The private sector is made up mainly of private companies set up to carry out tourism enterprises, tour and travel agency operations, safari hunting and outfitter operations, etc. in and around protected areas (Chemonics, 2011).

The current Wildlife Act, 2015 (No. 14 of 2015) also provides for the establishment of Community Partnership Parks (CPP) in areas with the following stated conditions: "Environmental, ecological or scientific value or significance for environmental education and recreation or for the purpose of conserving, preserving and restoring genes, species or biological diversity and natural amenities and their underlying ecological structure" (DNPW, 2016). CPPs are Public-Private (or Community) Partnerships between the DNPW and the local community, person, institution or organisation for managing natural resource conservation and recreation, and the sharing of the revenue accrued henceforth. A Public-Private Partnership (PPP), according to Nshimbi & Vinya (2014), broadly refers to an agreement, between the private sector and the Government, which typically is medium to long term. In this agreement the private partners' service delivery and profit objectives are expected to be in line with the Government objectives and where the effectiveness of the alignment depends on the sufficient transfer of risk to private partners (Nshimbi & Vinya, 2014).

However, according to Simasiku et al., (2008), the encroachment of Zambia's GMAs is said to be induced by claims for land by traditional authorities or could be due to uncoordinated planning by government departments which has led to an accelerated loss of habitats. On the other hand, the DNPW is legally powerless to control human settlement and habitat degradation in the GMAs even though it has authority over wildlife (Simasiku et al., 2008). Generally, CRBs' share of revenue assists in local socio-economic development and is also used for the recruitment of village scouts to assist DNPW with law enforcement (Chemonics, 2011; Lindsey et al., 2014).

Social impacts, costs, and benefits in settlements around parks

Social impact is said to be the effect an organization's actions have on the well-being of the community. However, it is much more than that as it can include the health and well-being of family members and small business owners, access to education, loss of income and changes in work roles (Alston & Kent, 2004). In terms of social impact assessments, researchers consider important factors such as the cultural and psychological effects or the meanings attached to those changes by the people most affected, while others argue that the social impact of an entire community can be gauged through the assessment of their well-being (Hallebone, Townsend, & Mahoney, 2000). The assessment of social impacts focuses more on perceptions and for the purposes of this study a broader definition of social impacts – according to Vanclay, (2002) – is adopted which states that "social impacts include all social and cultural consequences to human populations of any public or private actions that alter the ways in which people live, work, play, relate to one another, organise to meet their needs, and generally cope as members of society" (Vanclay, 2002). The term 'social impact' can also refer to the impacts of a project, programme, policy or another initiative that directly affects the locals' well-being (Franks, Booker, & Roe, 2018). Well-being of locals, according to Franks et al., (2018), is not just the inverse of poverty or another term for livelihood, but a broader way of looking at the quality of human life which includes relational, material and subjective well-being. Perceptions focus on the potential of PAs as economic bases that can provide elements for improving locals' quality of life such as restaurants, lodges, employment opportunities, outdoor recreation opportunities, tax revenues and other economic diversity (Andereck, Valentine, Knopf, & Vogt, 2005). Social and physical impacts in human communities consist of intangibles or features that cannot be compared to another reference, while economic impacts of tourism can be analysed numerically. Therefore, benefit sharing of incomes generated through tourism activities – viewed from a social perspective – is seldom shared equally among local communities (Krause, 2012). A study in South Africa demonstrated that there is always a compromise in community-focused tourism projects due to shortage of capital, skills and other resources (Cornelissen, 2005). Some of the positive and negative social impacts studied by Franks et al., (2018) from four selected countries in Africa include the following:

- Positive impacts:
    - Ecosystem service benefits.
    - Improved security (from PA law enforcement).
    - PA-supported development projects.
    - PA-related employment.
    - Reduced human-wildlife conflict (resulting from interventions by PA management).
- Negative impacts:
    - Reduced/lost access to resources.
    - Unjustified arrest.
    - Unfair distribution of benefits.
    - Transaction and management costs.
    - Human-wildlife conflict.

Research has shown that the costs to local people from NPs are many and varied (Balmford et al., 2002; Dixon & Sherman, 1991; Tumusiime & Sjaastad, 2014). The most important cost associated with protected areas – apart from loss of dwellings, farmland and access to wild resources – is the damage to crops, livestock, people and infrastructure caused by wild animals

(Mackenzie & Ahabyona, 2012; Tweheyo et al., 2012; Vedeld, Jumane, Wapalila, & Songorwa, 2012). Studies have shown that due to the presence of a park there is normally a drastic reduction in local people's access to wild resources and a subsequent reduction in incomes (Brockington & Igoe, 2006; Geisler & De Sousa, 2001; Tumusiime, Vedeld, & Gombya-Ssembajjwe, 2011). The location of settlements or households near the park also influences the way that resources are accessed, but the impact on local people may be varied (Mackenzie & Ahabyona, 2012). According to Miriki (2016), in some cases, the village leadership is ignored by park rangers, who try to handle matters themselves whenever they apprehend someone inside the park. Locals also perceive PA staff as their enemy and sometimes they oppose conservation goals by increasing illegal activities and go to the extent of collaborating with poachers.

Today policies and institutions that enhance biodiversity conservation and prioritising increased levels of local community participation in wildlife management are being supported on many fora for conservation (Nyirenda, 2015). In the GMAs, communities are principally represented by CRBs as provided for under DNPW's CBNRM programme, although various trusts, associations and CBOs, representing local communities' interests, have recently been emerging as conservation and development partners. Community projects funded by either the government or non-governmental organisations (NGOs), or sometimes by individuals, are normally handled by the CRBs. Generally, CRBs' share of revenue from safari hunting or other sources assists in local socio-economic development and in the recruitment of village scouts to assist DNPW with law enforcement (Chemonics, 2011; Lindsey et al., 2014; Namukonde & Kachali, 2015).

Literature also suggests that those communities are less educated on average because they typically live further away from main roads and incur significant wildlife costs at the same time (Lindsey et al., 2013; Lindsey et al., 2014). The 'local community membership' is also generally not well defined in GMAs making it easy for outsiders to freely move in and exploit natural resources thereby diminishing the wildlife benefits due to locals. According to available data on Zambia's GMAs trophy hunting, the gross earnings per km^2 are lower than all but one other southern African country (USD1,028/km^2 in Zimbabwe, USD474/km^2 in Tanzania, USD378/km^2 in Namibia, USD291/km^2, and c.f. USD130/km^2 in Mozambique) (Lindsey et al., 2013; Lindsey et al., 2014). There have been reports of significant livelihood improvements, in some GMAs from the Bangweulu system and the Luangwa Valley, associated with revenues from trophy hunting (Bandyopadhyay & Tembo, 2010; Lindsey et al., 2014). In this case, conservation of biodiversity in its natural landscape and preservation of endangered species are a high priority, otherwise PAs may be transformed to agricultural land or urban landscape which would not be suitable for sustaining wildlife and their habitat. In other advanced wildlife economies, competitive market environments where game ranchers strive to produce their products at lowest possible cost, have been facilitated through institutional arrangements that enable private ownership of the land and the wildlife resource (Musengezi, 2010). There are many methods and indicators that could be used to assess the extent to which the PAs or NPs have met their responsibilities to the local communities (Cumming, 2004). One of the ways is to measure benefits and costs realised by locals in nearby settlements and estimate the effect of their geographical location in accessing natural resources. The complexity of the relationships between resource consumption and well-being of locals in settlements near PAs and the households' geographical locations, could be understood by performing the multiple linear regression analysis and the principal components analysis (PCA). The next section offers more details on the multiple linear regression analysis and the PC and other statistical tests that includes the Sample Selection Bias and the Heckman Model, the Multicollinearity Testing and the Heteroscedasticity Transformations.

1.6.8 Data selection and analysis

Multiple linear regression analysis

The Multiple linear regression is a method used in statistics to model relationships between a scalar response (dependent variable) and one or more explanatory variables (independent variables). It is a useful tool in statistics for predicting a quantitative response. The independent variables have linear or curvilinear relationships with the dependent variables, or their relationships may depend on the values of other independent variables. The correlation between two or more variables having cause-effect relations can be determined by performing a regression analysis. Normally, the statistical analysis of linear regression can be applied when both the response variable and the explanatory variable in the model are continuous variables (Crawley, 2012). When linear regression has one explanatory (predictor) variable it is known as simple or univariant linear regression, but when there are more than one it is known as multiple or multivariant linear regression (James, Witten, Hastie, & Tibshirani, 2013). The multivariant regression analysis assumes that the data should be normally distributed with linearity, having no multiple ties between independent variables and having freedom from extreme values (Uyanık & Güler, 2013).

In multivariant or multiple regression analysis, the relationships between a collection of independent variables and a single dependent variable can be examined. The dependent variable of most of the multiple regression models has continuous data, such as weights, temperatures, heights or volumes, while the independent variables could either be in the form of quantitative or categorical measures. Quantitative data may include measures such as abilities, income or personality traits while categorical data may include measures such as gender, ethnic group and other experimental treatment conditions. The relationship between the dependent variable and the independent variables is modelled from the linear predictor functions by estimating unknown parameters from the data (Aiken, West, Pitts, Baraldi, & Wurpts, 2012). The basic ideas of multiple regression can be extended to consider other types of dependent variables such as categories or counts (Coxe, West, & Aiken, 2009), or even multiple dependent variables. The Multiple linear regression model is used to predict the value of a dependent variable for each subject where two or more independent variables have been taken into consideration simultaneously (Crawley, 2012; Gollub, Hosier, & Woo, 2003).

Principal component analysis

Principal component analysis (PCA) is a process of computing principal component analysis components and then use them to understand the data (James et al., 2013). The principal components (PC) can perform some analysis that summarises large sets of correlated variables with smaller numbers representing variables that can collectively explain most of the variability in the original set. The analysis brings out strong patterns from complex and large datasets and it also acts as a tool for data visualisation (Wold, Esbensen, & Geladi, 1987). In other words, it represents important information from the table as a set of new orthogonal variables called principal components and then displays a pattern of similarity of the variables and of the observations as points in maps (Abdi & Williams, 2010). In most cases, researchers are only interested in extracting important information from a data matrix. To do this, the number of components needed must be considered (Jolliffe & Cadima, 2016). The procedure is to first plot the ‘scree’ plot or the eigenvalues with respect to their sizes and to observe for the ‘kink’ or ‘elbow’ in the graph (a point where the slope of the graph goes from ‘steep’ to ‘flat’) and then only the components which are before the elbow should be kept (Jolliffe & Cadima, 2016; Peres-Neto, Jackson, & Somers, 2005). Other methods require keeping only the components with eigenvalue which is larger than the average. If PCA is suitable for analysing a dataset, the first 2 or 3 PC can provide most of the information on the variability of the data. PCA extracts important information from a data table and represents it as a set of new orthogonal variables called principal components. The principal components are displayed in a pattern of similarity of the observations and of the variables as points in maps (Abdi & Williams, 2010; Shlens, 2014).

Heckman model, multicollinearity testing and heteroscedasticity transformations

Sample selection bias and Heckman model

In this study samples were used instead of a population – a process which most likely contributes to biases when testing the hypothesis. Particularly in this case, the dependent variables were missing some values, due to other processes, which could be counted as one of the causes of sample selection bias (Certo, Busenbark, Woo, & Semadeni, 2016). The heckit or Heckman two-stage correction model, named after James Heckman, winner of the Nobel Prize, is one of the statistical methods appropriate in analysing the underlying regression models and predicting the values of the dependent variables that are observed in the absence of selection (Heckman, 1976; Wooldridge, 2010). In this case, the method employs the probit equation in the first stage where the estimates of the selection process for participants in the natural resource consumption is done. In the second stage, the results from the first equation are applied as variables in the consumption equations to capture the selection effects. These variables that are intended to correct the sample selection bias are known as the Inverse Mills Ratios (IMRs) (Maddala, 1983). In the two stages of the model, an unmeasured variable (omitted variable) creates a correlation between the error terms. Biased coefficient estimates may be reported by some of the traditional techniques such as the ordinary least squares (OLS) regression. However, the Heckman model, is able to resolve this potential bias. In the model, the correlation of the error terms or the consistent estimators of the individual parameters ρ and the variances of the error terms of the regression equation σ are constructed for the estimation of the model parameters (Toomet & Henningsen, 2008). Specifically, the study used the Heckman selection model to provide evidence of the estimation of consumption rate of natural resources, while tackling the missing samples for households located near Kafue and South Luangwa national parks. The two-step procedure – for the Heckman selection model – has some advantages when compared with the probit and the logistic-tobit models because it accommodates endogenous and heterogeneous effects by incorporating, in this particular case, the households' natural resource consumption and their distances from selected different physical features around PAs (Winship & Mare, 1992).

Multicollinearity testing

Multicollinearity or collinearity is when two or more independent variables (X_1, X_2, X_3 …etc.) are collinear when they are correlated to each other in a multiple regression model:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \varepsilon$$

This is on the backdrop that in a multiple regression study, it is assumed that the X-variables are independent of each other. It is also assumed that each X-variable contains a unique piece of information about Y. The effects of multicollinearity include inflated variances (and standard errors) of regression coefficient estimators (i.e., the b_i), the signs of b_i may be the opposite of what is expected. The methods applied in testing multicollinearity include the tolerance calculation and the Variance Inflation Factor (VIF) calculation.

Heteroscedasticity

Method of ordinary least squares (OLS) as such as a simplified model below:

$$Y = \beta_0 + \beta_1 X_1 + \varepsilon_i$$

assumes ε_i has homoscedasticity (equal/constant variance: σ_i) across all observations. When the case is otherwise, then there is a problem of heteroscedasticity (unequal variance) of error term. Heteroscedasticity is often a by-product of other violations of assumptions such as the mis-specified model. It is typically encountered in cross—sectional data (data collected by observing outcomes at the same time). The result of heteroscedasticity would be an unbiased estimator that is inefficient. In this study, the variance stabilizing transformations of the dependent variables (Y) were performed that helped to correct the problem of heteroscedasticity and made them homoscedasticity.

Stratified purposeful sampling

The stratified purposeful sampling is described as samples within samples and gives a suggestion that purposeful samples can be stratified by selecting units that vary according to a key dimension (Patton, 2008). A purposive sample is a non-probability sample that is selected based on characteristics of a population and the objective of the study. The tourism facilities, which were generally accommodation facilities, such as safari lodges and bush camps, were later segmented according to the cost of accommodation into Top End, Upper Middle, Lower Middle and Budget/Self-catering categories, as outlined under the section of 'national park visits' in Chapter 4 (Crompton & Park, 2010; Cullinane & Koontz, 2014; Souza, 2016; ZAWA, 2011b).

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Chapter 2 RESEARCH METHODS

2.1 Study design

The design of this study was a multiple case study (Eisenhardt, 1991; Yin, 2009) for the Kafue National Park (KNP) case and the South Luangwa National Park (SLNP) case with focus on understanding their economic valuation and the geographical human settlement analysis. The analysed tourism economic values and the understanding of the influence of geographical settlements, on resource-use and human well-being in settlements near the NPs, presented an opportunity to compare the two NPs since case studies permits for cross-case analysis (Perry, 1998). The use of case studies to build theory is considered advantageous to the development of novel theory that is valid and testable, and particularly relevant to situations in which current perspectives are inadequate or conflicting (Eisenhardt, 1989). The past poor tourism performance of the KNP and the need to understand its socio-economic impact on local economies was the driving motive behind this study. The SLNP was purposefully selected to compare with the KNP because of the SLNP's similarity in size, its the extent and diversity of wildlife and having several human settlements around it such as the KNP. The idea was to compare the KNP with another NP with similar physical lateral magnitude and equally similar wildlife-based tourism products in the country or the region for easy comparison. The methodology applied in this study to estimate the impacts of visitor spending on local economies and to understand the influence of the Kafue and the South Luangwa NPs on local settlements was quantitative (Babbie & Mouton, 2001).

2.2 Study site selection

The KNP and SLNP are among the flagship parks for wildlife-based tourism destinations in Zambia. Economically these national parks (NPs), together with their game management areas (GMAs), are often managed as non-extractive and extractive resources respectively. The study focused on local areas bordering and lying within 50 to 60km of the Kafue and South Luangwa national parks. Those study sites were also purposively selected among the tourism destinations in the local economies (Alston & Bowles, 2003; Bless, Higson-Smith, & Sithole, 2013). The sites are either GMAs or open areas (OAs) and are also part of the districts where the national parks are located. In KNP the districts which form part of park include Mumbwa, Kasempa, Mufumbwe, Kazungula, Kalomo, Namwala, Ithezi-Tezhi and the newly established Nkeyema and Luampa districts, while in SLNP they include Mambwe, Petauke, Lundazi, Mpika and the newly established Chitambo district.

The focus of tourism impact analysis was on local areas in the districts that are in the gateway areas of the national parks such as the Mumbwa and Itezhi-Tezhi districts for Kafue and the Mambwe district for South Luangwa. Apart from being in gateway regions, Mumbwa GMA and Namwala GMA in Mumbwa and Itezhi-Tezhi districts, respectively, and Lupande GMA in Mambwe district, have high potential for tourism due to their wildlife natural resource base and tourism opportunities. For geographical settlements' influence analysis, the settlements selected near Kafue NP were Kabulwebulwe CRB, or chiefdom, in Mumbwa GMA and Kaindu CRB, or chiefdom, in Mumbwa open area. In South Luangwa NP four CRBs (Kakumbi, Malama, Mnkhanya and Nsefu) in Lupande GMA and one CRB (Mwanya) in Lumimba GMA were also selected.

1. The study sites (villages/settlements) selected for data collection in the effects of geographical locations on the livelihoods and well-being of locals were:
    - perceived to be affected in some way(s) by the presence of the national park.
    - within the GMAs or OAs and were also part of the districts where the national parks are located.
2. Geographical or physical features considered in the analyses were those characteristics assumed to be common to both national parks and could be used as point of reference. These features include:
    - National parks boundaries.
    - 'Other' protected areas (PAs).
    - Park entrance gates.
    - All-weather roads nearby.
    - Centres of Village Action Groups (VAGs) or market centres.
    - Central Business Districts (CBDs).
    - Park regional area management units (AMUs).
    - Main fisheries nearby (local river(s)).

The collection of household data on livelihoods from both Kafue and South Luangwa national parks was undertaken with the support of international organisations:

1. Kafue national park household data on livelihoods were collected with support from the Norwegian Programme for Capacity Development in Higher Education and Research for Development (NORHED), which operates under the Norwegian Agency for Development Cooperation (Norad); and

2. South Luangwa national park household data on livelihoods were collected with support from the Scientific and Technical Advisory Panel (STAP), which operates under the Global Environmental Fund (GEF). The Social Assessments of Protected Areas (SAPA) process was followed during data collection. However, local multipliers were first derived from input-output tables before analysis of visitor spending was performed.

2.2.1 Kafue National Park

The Kafue National Park (KNP) is Zambia's largest park covering 22,480 km^2 and it represents nine percent of the total land mass of Zambia (Figure 2.1). In 1950 it was the first national park to be proclaimed in Zambia as a park (IUCN Category II). The park lies between 14˚000–16˚ 400S and 25˚150–26˚450E in western Zambia (Midlane, O'Riain, Balme, Robinson, & Hunter, 2014). If its nine surrounding game management areas (GMAs), Mumbwa, Lunga-Luswishi, Kasonso-Busanga, Mufunta, Mulobezi, Bilili, Sichifulo, Nkala and Namwala, are also considered, the Greater Kafue National Park (GKNP) area extends approximately 68,000 km^2 (Figure 2.1) (Milupi et al., 2017; Mwima, 2001; Namukonde & Kachali, 2015; ZAWA, 2011b).

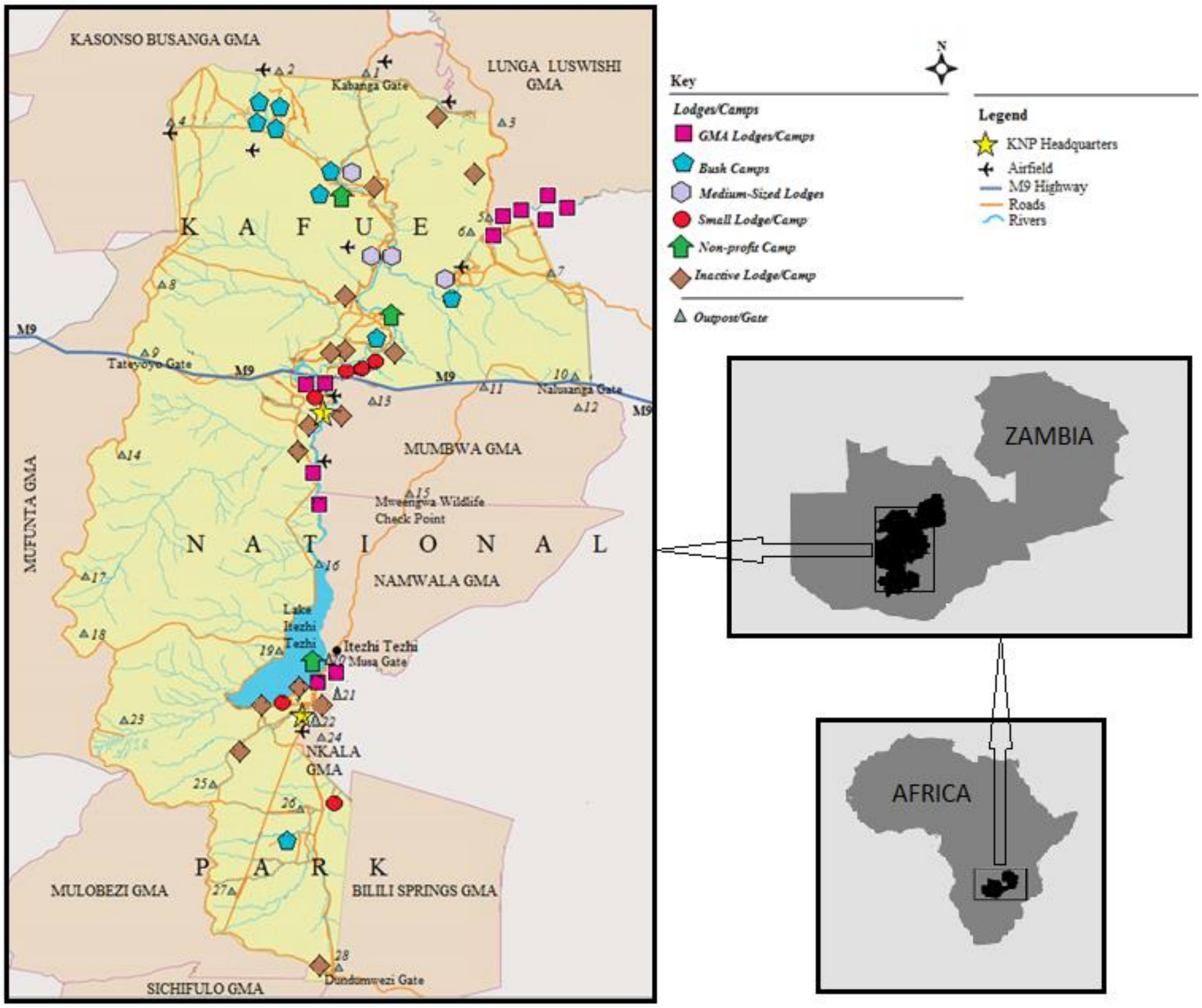

Figure 2.1: Kafue National Park and the surrounding game management areas.
Source: Adapted from ZAWA, 2012

The three main rivers which run the length of the park are the Lufupa, Lunga and Kafue. A major regional paved road, the M9, splits the park into northern (10,958 km^2) and southern (11,361 km^2) sectors (Midlane et al., 2014; Mwima, 2001). From December to early May the park is largely inaccessible by vehicles during and just after the rainy season (Midlane et al., 2014). And during the time of this study, the available updated information on the revenue for the Kafue national park that could be accessed was a 2010 report from the Department of National Parks & Wildlife (DNPW), which is responsible for managing all national parks in Zambia. According to the report, the park generated an estimated US$6.8 million in direct tourism revenues, a further US$2.4 million in hunting sector outfitter client stay revenues, thus representing a yield of approximately US$9.2 million, or US$1.35/ha. The report further estimated that US$1.84 million (20%) of the revenue returned to nearby communities and the wider economy as labour payments, US$3.0 million (33%) as payments for goods and services and US$1.5 as taxation (ZAWA, 2011b). In the same report, it was stated that the park had 22 lodges and campsites clustered inside the park with a total operational tourism bed space of about 288 (338 if society and education organizations were included), (ZAWA, 2011b). There were a further 358 total operational bed spaces in the GMAs, translating into 696 commercial usable beds in the GKNP area. Those bed spaces generated a potential 121,560 bed nights during the dry season and an additional 39,300 bed nights during the rainy season. The mean occupancy rate of performing facilities in KNP was 32.9% with 3 to 5 nights as an average length of stay of tourists (Chemonics, 2011; ZAWA, 2011b). From the data collected, the total annual tourist arrivals at the park for the year 2015 was 12,550.

Kabulwebulwe and Kaindu chiefdoms

There are about 200,000 people living in the GMAs and OAs around the Kafue National Park (Table 2.1). In recent times, many more settlers have moved into those areas hoping to find land to cultivate. The land-use in the GMAs – together with large OAs (between the Lunga-Luswishi and Mumbwa GMA and between Nkala GMA and Bilili Springs) – consists of both non-consumptive and consumptive wildlife utilisation, forestry, fisheries, agriculture, mining, and human settlements. Agricultural activities occur increasingly at both subsistence and commercial levels in the GMAs and OAs. Charcoal burning is also quite rampant in those areas among the locals, but requires a permit issued by the Forest Department under the Forests Act, 2015 (No. 4 of 2015). Communities generally reside in traditional villages, but in some areas numerous small-scale farms have been established, especially in the Mufunta, Mumbwa, Namwala and Bilili Springs GMAs. The Itezhi-Tezhi township, which is in the Namwala GMA and the origin of which is linked to the construction of the Itezhi-Tezhi dam in 1976, has expanded and is now the seat of an autonomous district (ZAWA, 2012).

The livelihoods of the people in GMAs are mainly based on fishing, hunting, gathering of forest products and small-scale agriculture (Mupeta-Muyamwa, 2012). Farming is primarily done at the subsistence level with minor local sale of surpluses, even though farming, fishing, and harvesting of forest products are rapidly becoming commercialised. Subsistence agriculture consists mainly of maize, sorghum, and vegetables, while commercial agriculture includes maize, cotton, tobacco, and horticultural crops. Small-scale livestock farming occurs in most villages, and includes chickens, pigs, goats and cattle where trypanosomiasis is not prevalent (ZAWA, 2012). Traditional cattle pastoralism predominates along the south-eastern boundary that may be considered as commercial livestock production. However, community resource boards (CRBs), on behalf of their local communities, also receive a proportion of GMA tourism revenues collected by DNPW. Forestry is mostly practised in the communities for local use and for commercial harvesting. Timber logging is common in all GMAs surrounding the park and is extensively accompanied by widespread illegal charcoal production. Other non-timber forest products obtained from the GMAs include fruits, fibres, medicines, dyes, mushrooms, grass, and firewood. Collection of natural honey is also an important activity that is entering the cash economy and beekeeping is being promoted by the Department of Forestry for income generation (ZAWA, 2012).

Table 2.1: Game Management Areas (sizes) around Kafue National Parks

National Park/GMA	Km^2	People
Mulobezi	3,570	9,004
Sichifulo	3,600	13,000
Nkala	194	19,787
Bbilili	3,080	22,831
Mumbwa	3,370	33,526
Namwala	3,600	35,232
Mufunta	5,417	40,021
Kasonso Busanga	7,780	12,890
Lunga Luswishi	13,340	7,149
GMAs total	43,951	193,440
Park	22,480	
Park & GMAs total	66,431	193,440

Source: GEF-UNDP, 2011

Kabulwebulwe chiefdom and a Community Resource Board (CRB) for GMA is one of the three CRBs that form Mumbwa GMA. Mumbwa GMA is on the eastern boundary of the Kafue NP and covers 3,370 km^2 with an estimated population of 33,176 (Namukonde & Kachali, 2015; ZAWA, 2012). The vegetation is generally Munga and Miombo woodlands and may harbour good to low densities of wildlife such as buffalo, elephant, kudu, eland, Burchell's zebra and Defassa waterbuck in addition to Lichtenstein's hartebeest, sable and roan (Simasiku et al., 2008). Kabulwebulwe chiefdom is bordered by the KNP to the north-west, Mulendema chiefdom to both the west and the east, and Chibuluma chiefdom to the south. It is located on the eastern side of the KNP between 15.093°S – – 14.806°S and 26.661 – – 26.852°E. It is a chiefdom for the Nkoya people with a population of approximately between 10,000 and 12,000, based on 2010 census population density (CSO, 2010). It is divided into five village action groups (VAGs) namely: Nalusanga, Chikanda, Chona, Lukanga and Lungobe.

Kaindu CRB and a chiefdom for the Kaonde people are in the northern part of the Mumbwa district. It lies between latitudes -14.16 to -14.77 south and longitudes 26.75 and 27.20 degrees east in what is known as the open area or non-GMA area. It covers an area of approximately 2,287 km^2 (228,724 hectares), which is about 11% of the Mumbwa District's total area, with an estimated population of between 23,000 and 25,000, based on the 2010 census population density (CSO, 2010). It is bordered by the KNP to the west, with private conservancies and a community game ranch between the park and the settlements, Chitanda chiefdom is to the east, and to the south there is Mumba chiefdom and Mumbwa central business district (CBD). The most significant water resource in the chiefdom is the Kafue River, which is perennial. The Kaindu Natural Resources Trust (KNRT) and Kaindu Community Resource Board (CRB) – the natural resources-based organisations (NRBOs) in the area – are divided into five village action groups (VAGs) namely: Kamilambo, Kalyanyembe, Misamba, Mpusu and Kafwikamo. Farming is the dominant livelihood strategy, with maize being the main crop followed by groundnuts. Other cash crops grown include soya beans and cotton. However, an important potential economic activity is tourism, which includes hunting (wildlife), visiting their habitats and photographic tourism (Ruralnet, 2016).

2.2.2 South Luangwa National Park

The South Luangwa National Park (SLNP), covering an area of approximately 9,050 km^2, is the second largest of the 20 national parks in Zambia (Child & Dalal-Clayton, 2004) (Figure 2.2). It was established in 1971 and declared a national park in 1972. It is located in the middle reaches of the Luangwa valley. The five game management areas (GMAs) surrounding the park are Lumimba and Lupande in the east, Munyamadzi in the north, Chisomo in the southwest and Sandwe in the southeast (Figure 2.2) (Child & Dalal-Clayton, 2004; Dalal-Clayton & Child, 2003; Musumali, Larsen, & Kaltenborn, 2007; Nyirenda, Chansa, Myburgh, & Reilly, 2011; ZAWA, 2011).

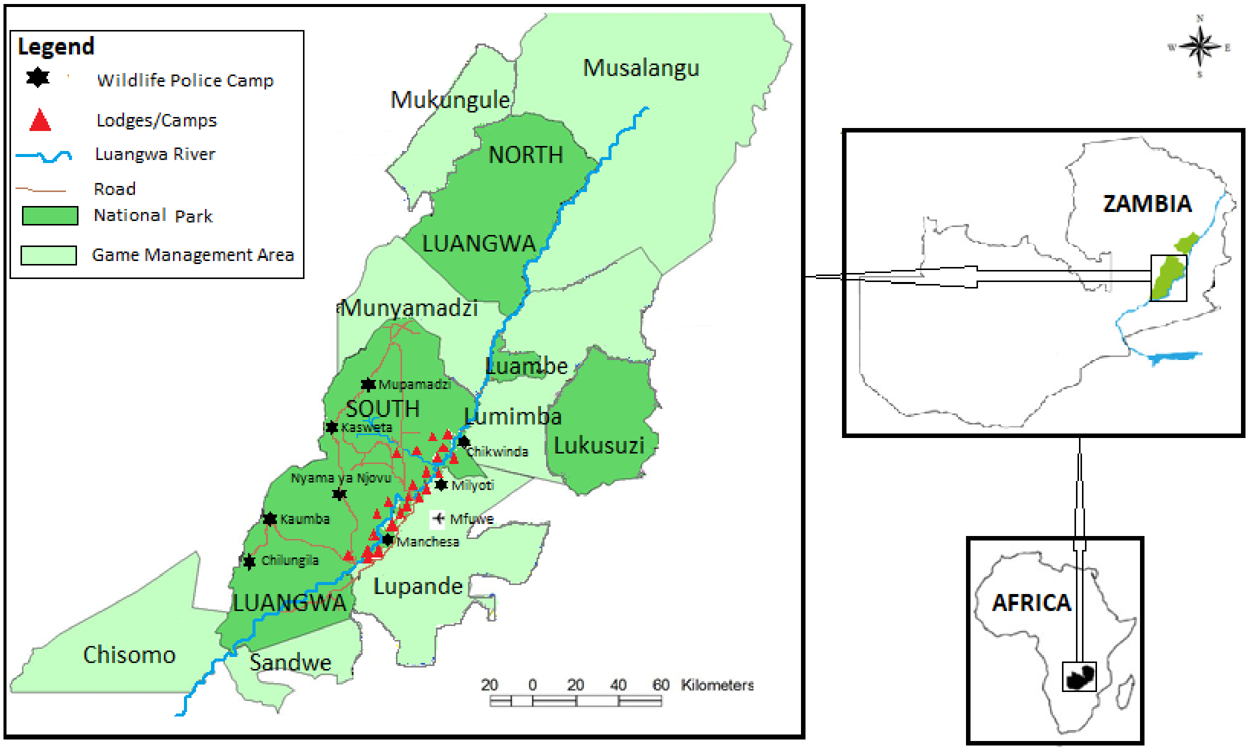

Figure 2.2: South Luangwa National Park and the surrounding game management areas and other national parks
Source: Adapted from ZAWA, 2011

In the early 1970s the Zambian government, with donor support from FAO/UNDP and Norway, made a substantial investment of US$10 million (value of about US$60 million in 2015) in roads and an airport for South Luangwa National Park. Tourism has since been increasing steadily and today the total arrivals of visitors are reaching more than 30,000 per annum, while tourism beds, clustered around the park gate, are about 600 (ZAWA, 2011b). SLNP is presently among the most developed and publicised national parks in the country with an elaborate network of game viewing loops (Balakrishnan & Ndhlovu, 1992; Jachmann & Billiouw, 1997; Milupi et al., 2017). However, there is only one major access road into the park, the Chipata – Mfuwe road, and only a few other seasonal access roads such as Mfuwe – Mwanya road, Mfuwe – Ntunta road and Mfuwe – Petauke road. The Mfuwe International Airport, which is located 25km from the main park gate and operates throughout the year, is one of the most important access routes for international visitors (ZAWA, 2011). During the Luangwa Integrated Resource Development Project (LIRDP), between 1995 and 1998, the initial projections in the Lupande game management area were estimated at between US$0.1 and US$1 million for annual revenue from safari hunting. The total annual revenue from all kinds of wildlife utilization in the area were estimated at between US$5.7 and 7.5 million (Dalal-Clayton, 1991; Dalal-Clayton & Child, 2003). However, from a turnover of between US$15 and US$25m on some 600 tourism beds, the park is recently estimated to earn between US$1.5 and US$2.5 million from both inside the park and the GMAs (Dalal-Clayton & Child, 2003; ZAWA, 2011).

Kakumbi, Malama, Mnkhanya, Nsefu and Mwanya chiefdoms

Lupande game management area which is about 4,840 km^2 is located at 12°57’00’S to 13°49’05’S and 31°32’00’E to 32°23’23’E in the Luangwa Valley of eastern Zambia (Nyirenda, Nkhata, Tembo, & Siamundele, 2018). South Luangwa National Park (SLNP) which is surrounded by five GMAs is in the middle reaches of the Luangwa Valley (Child & Dalal-Clayton, 2004; Dalal-Clayton & Child, 2003; Musumali et al., 2007; Nyirenda et al., 2011; Pope, 2005; ZAWA, 2011). The most important values of the SLNP and the neighbouring GMAs are their abundant and diverse wildlife, exceptional scenic beauty compounded by wilderness nature, ecotourism and recreation, carbon regulation through some 14,500km^2 of forest and woodland, and fibre and fuel for local communities practicing subsistence agriculture (ZAWA, 2011). Most of the common large ungulates, including the main population of Thornicroft’s giraffe, are supported high densities within the GMA, especially in the alluvial part between the escarpment and the river (Simasiku et al., 2008). The 2010 census reported that the human population inhabiting the Lupande GMA, in 13,196 households, was estimated at some 68,918 (Table 2.2), with an average of 3.8% as an annual population increase rate (CSO, 2014; Nyirenda et al., 2018).

Table 2.2: Sizes of game management areas in South Luangwa National Park

National Park/GMA	Km^2	People
Lupande	4,840	68,918
Munyamadzi	2,675	
Lumimba	4,149	
Sandwe	1,299	
Chisomo	3,016	
GMAs total	15,979	
Park	9,050	
Park & GMAs total	25,029	

Source: ZAWA, 2011

There are six chiefdoms in Lupande GMA which include Nsefu, Malama, Jumbe, Mnkhanya, Msoro and Kakumbi (Nyirenda et al., 2018). The ethnic group of people in Lupande GMA are predominantly Kunda tribes. Others which are smaller include the Chewa, Senga and the Bisa ethnic groups (Mvula, 2001). The mainstay of the people in the Luangwa Valley is subsistence agriculture which is a source of revenue and food. Photographic tourism and safari hunting businesses, timber harvesting and charcoal production constitute the other economic activities in the Luangwa Valley (Nyirenda, Myburgh, Reilly, Phiri, & Chabwela, 2013). Although food insecurity in the area may be heightened being located in agro-ecological zone III, which normally experiences frequent severe droughts and may result in crop failures, the staple food is Maize (Zea-mays) (Nyirenda et al., 2018). Five chiefdoms were selected for this study and included Kakumbi, Malama, Mnkhanya and Nsefu from Lupande GMA and Mwanya from Lumimba GMA. Those chiefdoms, which also have established CRBs by the same chiefdom name, were selected because of their natural resource base, tourism opportunities and availabilities of alternative livelihood opportunities. Subsistence agriculture is the mainstay of the people, in these chiefdoms, as a source of revenue and food (Dalal-Clayton & Child, 2003; Nyirenda et al., 2011).

2.3 Data collection

2.3.1 Economic multipliers

The concept of multipliers and the multipliers in the I-O model theories were earlier outlined under the literature review chapter (Chapter 1). One of the objectives of this study was to estimate direct, indirect, and induced multipliers for tourism in the rural area economy of Zambia and later use these multipliers to determine the total economic effects of visitor spending in parks. The national multipliers were derived from the Zambia's Input-Output Tables for 2010, which are published by the Central Statistics Office (CSO) of Zambia (CSO, 2017) and rescaled to rural area level. The I-O table is a mathematical model and "captures what each business or sector has to purchase from every other sector in order to produce a dollar's worth of goods or services" (Stynes, 2005). To derive the national and rural multipliers the I-O table was used to derive the technical requirements coefficients as outlined below.

Technical requirements coefficients

The technical or direct coefficients were derived from the I-O tables. To do this, the total output was divided into each column entry, in the inter-industry transactions section, of the table for the industry represented by the column in the I-O table (Fjeldsted, 1990). As a result of this a matrix of national technical coefficients (referred to as 'matrix A') was formed which represented the structure of production of Zambia's economy. The production functions of each productive tourism-related sector within the economy are represented by columns of the technical coefficients matrix (Cassar, 2015).

Total requirements coefficients

To calculate the total requirements coefficients, the technical coefficients – a system of linear equations – were formed first, each one equating the total output of a given sector. The total output, plus output of the given sector delivered to final demand, are required in production by other intermediate sectors (Fjeldsted, 1990). In matrix notation it was then possible to compute the solution to the total requirements coefficients once the matrix of direct coefficients was derived, through inverse matrix conversion, and is known as type I coefficients or the open Leontief Inverse Matrix (Cassar, 2015). The type II coefficients, or closed Leontief Inverse Matrix, were calculated with an extra row and column added into the direct requirements matrix for 'compensation of employees' and 'final consumption expenditure by households' respectively, but in the same way as the type I inverse matrix (SPICOSA, 2010). To calculate the various kinds of multipliers (output, income, employment and value added), a spatial dimension was acquired by using the elements of A^r and its associated Leontief inverse models (Miller & Blair, 2009) below:

$$L^r = (I - A^r)^{-1} = [l_{ij}] \qquad \widetilde{L}^r = (I_{n+1} - \widetilde{A}^r)^{-1} = [\widetilde{l}_{ij}]$$

Rescaling of national coefficients to rural coefficients

The derived national technical coefficients were rescaled to rural area level (regional) in order to produce multipliers that quantify impacts on the economy under study using *supply percentages* (Miller & Blair, 2009). Supply percentages were not apparently available for rural areas of Zambia; however, *production contribution* (Melville Saayman & Saayman, 2006) percentages were instead used. Essentially what was needed was a matrix showing inputs from production in the rural region or firms in that region, but only the Zambian (national) direct coefficients or matrix 'A' was available. To derive the needed matrix, one can assume, that local producers use the same production recipes as shown in the national coefficients table, in the absence of evidence to the contrary, meaning that the technology of production in each sector in region r is the same as in the nation as a whole. Nonetheless, the national coefficients matrix was modified to produce A^{rr} (locally produced goods in local production) in order to translate regional (rural area) final demands into outputs of regional (rural area) firms (x^r), (Miller & Blair, 2009). A a subscript i denoted 'sector I was used in the same way of superscript r to designate 'region r' (Miller & Blair, 2009).

$$A^r = \hat{p}^r A \qquad p_i^{\,r} = \frac{locally\_produced_i^{\,r}}{total\_available_i^{\,r}}$$

Where A^r is the regional (rural) direct coefficients, $\hat{p}^r$ is proportion of the total amount of good i available in region r that was produced in r (the regional supply proportion of good i). In the formula the numerator represents the locally produced amount of i that is available to purchasers in r, while the denominator represents the total amount of i available in r, which is either produced locally or imported (Miller & Blair, 2009).

Deriving multipliers

In Chapter 1, under the literature review section, the steps in deriving type I and type II multipliers from direct requirements coefficients table are outlined. In this section, the final tabulation of type I or type II multipliers (output, income, employment or value added) made it necessary – in the direct requirements coefficients table (type I or type II) to take the first quadrant rows and columns and form the 'A' matrix. Again, with all its diagonal elements equal to 1 and all its other elements equal to zero, a matrix 'I' of the same number of rows and columns as the 'A' matrix was set up, and a new matrix (I – A) was calculated (Khanal, 2011; Raabová, 2014). Then the matrix inversion function was applied to calculate the Leontief Inverse Matrix $(I - A)^{-1}$ (in Appendices 7.2 and 7.3). The required output multipliers were calculated from the column totals (Raabová, 2014).

Output multiplier

The A-matrices of direct requirement coefficients, derived from national I-O table, for both Type I and Type II multipliers, were inverted to produce the Open and Closed Leontief Inverse Matrices or the national Type I and Type II total requirement coefficients. The national total requirements coefficients estimate for Type I and Type II indicate the extra demands needed from sectors in the national economy for every additional unit change worth of final demand of any respective sector. The calculation of the national Type I and Type II Total requirement coefficients, similar to rural area multipliers, was based on the Leontief Inverse matrix model, i.e., open and closed (truncated) models. The sum of each column in the Type I and Type II total requirement coefficient matrices produces the output multiplier for each respective sector (Type I and Type II output multipliers). The procedure of calculation for the national output multiplier is the same as the one outlined under the rural area output multiplier's section.

As already highlighted under the literature review of Chapter 1, the Type I output multipliers were found by summing up the Type I technical coefficients across the rows in the total requirement coefficients (Leontief Inverse) Matrix:

$$O^{I}{}_{(j)} = \sum_{i=1}^{n} l_{ij}$$

The Open Leontief Inverse matrix model was the basis for deriving the Type I multipliers:

$$L^r = (I - A^r)^{-1} = [l_{ij}]$$

As already highlighted under the literature review in Chapter 1, the Type II output multipliers were found by summing up the Type II technical coefficients across the rows in the total requirement coefficients (Leontief Inverse) Matrix:

$$O^{II}{}_{(j)} = \sum_{i=1}^{n} \tilde{l}_{ij}$$

The basis for deriving the Type II output multipliers was the closed Leontief Inverse Matrix Model:

$$\tilde{L}^r = (I_{n+1} - \tilde{A}^r)^{-1} = [\tilde{l}_{ij}]$$

Income multiplier

As already described in the literature review of Chapter 1, the type I and type II income multipliers were obtained by the multiplication of the labour-input coefficients – in monetary terms – with the rural area total requirements coefficients (Leontief Inverse Matrix) as shown below:

$$a_{h,i} = \frac{h_j}{x_j} \qquad h^I{}_{(j)} = \sum_{i=1}^{n} a_{h,i}.l_{ij} \qquad h^{II}{}_{(j)} = \sum_{i=1}^{n} a_{h,i}.\tilde{l}_{ij}$$

where a_h represents row vector of labour-input coefficients such as salaries or wages which are earned per unit of output. The direct and indirect impacts are calculated using type I and type II multipliers (type II multipliers include induced effects in the economy) (SPICOSA, 2010). Type II multipliers for sector 'j' was obtained using the row vector of labour-input coefficients a_h and truncated household endogenized direct requirements coefficient matrix. The elements of the vector of labour-input coefficient a_h, reflect the initial direct effect on labour income which is generated in response to an additional kwacha of final demand for each sector (Cassar, 2015; CSO, 2016b). The Type I and Type II income multipliers were decomposed into direct, indirect and induced effects by, initially, an assumption that the elements of the vector of labour-input coefficient a_h reflect the initial direct effect on labour income which is generated due to additional kwacha of final demand for sector 'j'. Secondly, the indirect effect was estimated by calculating the difference between Type I income multiplier and the labour-input coefficient which represents the initial direct effect. And finally, the induced effect was estimated by calculating the difference between Type I and Type II income multipliers.

Employment (jobs) multiplier

The assumption to obtain the physical employment-output multipliers was that the levels of employment within a sector were correlated to its gross output generated. As already described in the literature review of Chapter 1, by multiplying the employment-output ratios with the type I and type II Leontief inverse matrices, the employment or jobs multipliers were obtained as shown below (Cassar, 2015):

$$a_{e,i} = \frac{e_i}{x_j} \, x \; 1000{,}000 \qquad e^{I}{}_{(j)} = \sum_{i=1}^{n} a_{e,i} . l_{ij} \qquad e^{II}{}_{(j)} = \sum_{i=1}^{n} a_{e,i} . \tilde{l}_{ij}$$

where a_e represents row vector of employment-output ratios. These ratios were derived by dividing the number of people (average) in employment per sector during the year of 2015[3] by the amount of gross output generated by the sector (Cassar, 2015; CSO, 2016b). The Type I employment multiplier (e^I) which was obtained illustrated the effect of an additional million kwacha of the final demand for the output of sector *j*, when all the direct and indirect effects in the production process are converted into physical number of jobs created in the economy. Similarly, a Type II employment multiplier (e^{II}), for sector *j*, was obtained and it included the direct, the indirect and the induced effects (Cassar, 2015). The employment multipliers were assessed in terms of new jobs created due to an additional million kwacha of final demand. Type I and Type II were decomposed into individual direct, indirect and induced effects in a similar way as was done for income multipliers, but with the view that the vector of employment-output ratio a_e reflect the initial direct effect for jobs created due to an additional million kwacha of final demand for each sector.

Value-added multiplier

As already described in the literature review of Chapter 1, the type I and type II value-added multipliers were obtained by the multiplication of the value-added coefficients with the Open and Closed Leontief Inverse Matrices shown below:

[3] Labour-related data per sector for the year 2015 were provided by the Central Statistics Office (CSO) of Zambia.

$$a_{va,i} = \frac{va_j}{x_j} \qquad va^{I}{}_{(j)} = \sum_{i=1}^{n} a_{va,i}.l_{ij} \qquad va^{II}{}_{(j)} = \sum_{i=1}^{n} a_{va,i}.\tilde{l}_{ij}$$

where a_{va} represents row vector of value-added output ratios. The value-added output ratios were derived by dividing the average value-added per sector during the year of 2015[4] by the total output generated (Cassar, 2015; CSO, 2016b). The results for Type I value-added multiplier (va^I) demonstrated the effect of an additional kwacha of final demand for the output of sector *j*, when all the direct and indirect effects in the production process are converted into kwacha estimate of value-added in the economy. Similarly, a type II value-added multiplier (va^{II}) was obtained for a sector *j*, which included not only the direct and the indirect effects, but also the induced effects and utilised the truncated household endogenized Leontief Inverse Matrix (Cassar, 2015). The direct, indirect and induced effects in the final result were disaggregated in a similar way as was done for income multipliers.

2.3.2 Visitor spending surveys and interviews

Visitor survey

We conducted two visitor intercept surveys during the study between June and November 2016, with one survey in the Kafue National Park and the other in the South Luangwa National Park. A series of on-site intercept surveys for visitors' daily expenditures was conducted at randomly selected tourism facilities – that is various accommodation facilities and park gates (Colt, Fay, & Hanna, 2013). The surveys were conducted through randomly distributed questionnaires to parties of willing visitors present at the tourism facilities, especially during their registration (Driml & McLennan, 2010; Huhtala, Kajala, & Vatanen, 2010; Whitelaw, King, & Tolkach, 2014). The questionnaires were submitted to the managers of the tourist facility, but the arrangements were that the visitors would fill them out in their own free time, during the period of their stay at the accommodation facilities and leave them with the manager when checking out. At the same time, additional information on visitors' expenditures and the tourism facilities' operations were collected through interviews conducted with managements of the selected facilities.

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[4] The figures for the value added per sector for the year 2015 were provided by the Central Statistics Office (CSO) of Zambia.

About 18 active safari lodges and safari bush camps, from both inside and outside the Kafue national park, were visited for the purpose of conducting a visitor survey and an interview with the manager or the proprietor of the facility. A list of all the available tourism facilities from KNP is attached (Appendix 7.22). However, most of the lodges and bush camps from the list could not be reached because of long distances and the bad state of the roads – only 12 of those visited were able to participate in the proposed survey and the interview. Similarly, in South Luangwa National Park 12 active safari lodges and safari bush camps from the more than 20 visited from both inside and outside the park, were able to participate in the proposed survey and the interview. A list of all the available tourism facilities from SLNP is attached (Appendix 7.23). Unlike KNP, most of the lodges and bush camps from SLNP are close to each other making it easier to visit them.

A total of only 48 questionnaires of 120 distributed, from 12 companies in Kafue were successfully completed. Similarly, in South Luangwa, only 33 questionnaires out of 120 distributed to 12 companies were successfully completed (sample of questionnaire in Appendix 7.15). The number of questionnaires distributed per company was ten, but the completed ones ranged between 1 and 8. Response rates of 40% and 28% from Kafue and South Luangwa respectively were achieved (Table 2.3). To minimise any errors that may have been, or could have been caused due to the low response rates experienced in the surveys, the visitor spending and economic impact figures were presented in range notation format (maximum and minimum) rather than point figure averages (Baruch, 1999; Ryu, Couper, & Marans, 2006).

Table 2.3: Parties that completed questionnaires and the response rates from KNP and SLNP

	Parties that completed questionnaires	Estimated visitors at 2.4 per party	Questionnaires distributed	Response rate
KNP	48	115	120	40%
SLNP	33	79	120	28%

1. The study sites selected for data collection of tourism impacts had the following characteristics:
   - they were among districts lying within 50 to – – 60km of the PAs with some of the villages situated in the gateway regions, and

- they had a natural resource base, tourism opportunities and alternative livelihoods opportunities (hunting, agriculture and timber and non-timber forestry) for the locals.

Questionnaire

The questionnaires were designed in a way that the first part was focused on obtaining information from all the visitors about their countries of origin, their mode of transport, whether they were alone or not and the type of accommodation booked in the area. The second part of the questionnaire was aimed at gathering information on costs of packaged tour plans for visitors travelling as such while the last part was for the independent travellers only, asking them in general, about their expenditure during their visit in the area. A total of 120 questionnaires were distributed to 12 different companies in Kafue and South Luangwa national parks.

The visitor's home expenses on durable goods such as fishing equipment, camping, specialised vehicles, hunting and other goods necessary for trips to PAs were excluded from the estimates (Cui et al., 2013). Other spending that occurred en route to the park, in other countries, including airfares, was also excluded. To avoid double counting or attributing indirectly related spending to park visit expenses incurred en route to the parks – that was part of multiple purpose trips and involved visiting other sites within the country or outside the country on the same trip – was not included (Cui et al., 2013).

Interviews

The interviews, containing semi-structured questions, for easy comparison, were conducted at all the selected active tourism facilities such as safari lodges, safari camps, bush camps and safari hunting outfitters. The tourism facilities considered for interviews were selected from inside the Kafue National Park, from the surrounding GMAs, that included Mumbwa, Namwala, Nkala, Bilili Springs, Lunga Luswishi and Kasonso Busanga, and the Open Area of Kaindu chiefdom. Similarly, the tourism facilities selected for interviews in the South Luangwa National Park were from inside the park and from the surrounding GMAs, that included Lupande and Lumimba. In each case, the interviews were conducted with either the proprietors or managers of the selected facilities. The semi-structured questions for the interviews included determining the total number of tourists received annually, the tourists' charges per night, the food supply linkages, the ownership (local/non-local) of the business facilities and the number of people employed fulltime or part-time, and whether the employees were from the local or non-local areas. The key informants, who included the managers for both Kafue and South Luangwa national parks and the executive committee leaders for selected Community Resource Boards, were also interviewed. The open-ended questions for the key informants included the numbers of visitors per year, the different types of tourism businesses available, the different types of fees charged, the employment status of the parks and the suppliers to the park. All the interviews were recorded using audio equipment and the recording was later transcribed into text for analysis.

Park visits (segmented count)

The annual visitor records were obtained from the DNPW for both the Kafue and South Luangwa national parks. Backed by expert[5] advice (managers for tourism facilities from each park), the annual visitor numbers were segmented into five categories of spending patterns based on the segmentation pattern from the survey conducted by MCC supply survey (Chemonics, 2011). The segmented counts and the spending patterns were later used to determine the spending averages of visitors. The accommodation facilities were also segmented in a similar pattern in line with the cost of accommodation they offered (Crompton & Park, 2010; Cullinane & Koontz, 2014; Souza, 2016; ZAWA, 2011b). A segment to cater for almost non-existent visitors, who self-drive to the park for a day's visit, was also added. The spending patterns included the top-end segment – for visitors staying at high-end lodges and camps, the upper and lower middle segments – for visitors staying at middle-end lodges and camps, the budget/self-catering segment – for visitors staying at self-catering camps and the day/self-drive segment – for self-drive visitors who do not stay in any of the lodges or camps but just visit the park for a day. Details on segmentation park visitors is outlined under the section of 'national park visits' in Chapter 4.

Spending categories

Each spending pattern consisted of categories that included accommodation, camping fees, meals, groceries, gas and oil, local transportation and admissions and fees. Others were activities

[5] Practitioners in the tourism business of a specific park e.g. park manager or tourism business manager

and guided tours, souvenirs and other gifts, animal fees[6] (license and permits), local dip pack taxidermy, gratuities and tips, and other expenses. In the Kafue National Park entry fees and 50% of the animal fees were excluded from the spending categories. These funds are handled by the park agency headquarters and are not – under normal circumstances – spent in the local region. The annual visitors' expenditure was ascertained by multiplying the averages of visitors' daily expenditures with the parks' overall visitation numbers (Cui et al., 2013; Stynes, 2005).

2.3.3 Selection of tourists' facilities

The selection of tourism accommodation facilities from the Kafue and the South Luangwa national parks to participate in the visitor spending surveys was done by stratified purposeful sampling with expert[7] advice. These facilities were selected from a list of established tourism companies operating in and around the two national parks (Appendices 7.22 and 7.23). The tourism facilities, which were generally accommodation facilities, such as safari lodges and bush camps, were later segmented according to the cost of accommodation into Top End, Upper Middle, Lower Middle and Budget/Self-catering categories as outlined in Chapter 4. The stratification was done in such a way that most of the tourism packages offered in each park and all the possible tourists' destination areas around the parks were represented in the sample. The selected facilities covered those from both inside the park and outside the park (GMAs and OAs). For example, in the KNP the GMAs and the OAs, where the tourism facilities were selected from, included Mumbwa, Namwala, Nkala, Bilili Springs, Lunga Luswishi, Kasonso Busanga and Kaindu. Similarly, in the SLNP the selected facilities from the GMAs were from both Lupande and Lumimba GMAs.

2.3.4 Selection of tourism operators and ownership analysis

Population census of active tourism companies or establishments operating from inside the parks and the surrounding areas (GMAs and OAs) was considered for operators and ownership analysis. The lists of established tourism companies operating in and around the two national parks (50 for KNP and 52 for SLNP) (see Appendices 7.22 and 7.23) were used to categorise tourism companies according to type of investment ownership. The selected companies or

[6] Fees for hunted animals based on the type of animal
[7] Practitioners in the tourism business of a specific park e.g. park manager or tourism business manager

establishments included safari lodges, safari camps, bush camps, camp sites and the safari hunting outfitters.

2.3.5 Estimation of the total leakage of visitor spending

Using the NPs' total visitor spending data obtained from the surveys, the total economic impacts of tourism were estimated by applying the MGM2 on visitor spending without excluding the costs of goods (and services) not manufactured locally. The captured economic impacts of visitor spending were also estimated by applying the MGM2 to visitor spending after excluding the costs of goods (and services) not made locally. The leakage of economic impacts for visitor spending was estimated by the difference between the total economic impacts of visitor spending and the captured economic impacts of visitor spending (Stynes & Sun, 2003).

2.3.6 Resource consumption and social impact surveys

Focus group discussions

Before the questionnaire could be formulated and the household survey be conducted, the Focus Group Discussions (FGDs), or community workshops, were conducted in two selected VAGs from each chiefdom, or CRB in KNP, and in two selected VAGs for combined chiefdoms or CRBs in SLNP to identify significant resources consumed and the benefits and costs in the settlements. This first part of scoping in the household survey process was represented by these FGD meetings in the sample communities. The meetings were important because they ensured that the assessment process was community-perspective driven, as fundamental step in the preparation of the follow-up questionnaire for the household surveys (Franks et al., 2018). The main purpose of the FGD was to identify the range of different types of impact that affected different types of communities within/around the PA. Four FGDs were conducted during the study between June and August 2016. In the KNP two FGDs were conducted with one in Kabulwebulwe chiefdom and one in Kaindu chiefdom – similarly, two FGDs were conducted in the SLNP with one in Lupande GMA and the other in Lumimba GMA.

The number of the FGDs that could be conducted depended on the level of variability in social impacts and social context across local communities. All four FGDs were successfully hosted with attendance ranging between 20 and 60 participants and gender balance was almost a 50:50

ratio. The minimum time the meetings took was about one hour and 30 minutes and the maximum time was almost three hours. Community members were invited to these meetings by requesting them to attend and share their knowledge on the type of natural resources consumed, as well as their views on social impacts of PAs (positive and negative) on the local people in order to help find ways of reducing negative impacts and increasing positive impacts. The invitations were translated into their respective local languages.

During the meetings, groups of women and men separately identified the natural resources consumed. Positive and negative impacts (socio-ecological or socio-economical) that had been of great significance to the livelihoods or well-being of people in settlements near the PAs, were also identified. It was vital that men and women separately did the identification exercise because the PAs impacted men differently from women and, as expected, their views on the significance of the impacts differed. At the end of each community meeting, groups of men and women generated lists of the PA-related natural resources consumed and the associated social impacts (negative and positive). The data from the focus group discussions, across all communities, was then analysed to identify the most important social impacts. The views of different communities and views of women and men, were treated as equally important, and they were subsequently included as questions in the questionnaires for each NP.

Questionnaire and household survey

The questionnaire focussed on the positive and negative impacts and the consumption of resources from primary sources in settlements near the KNP and the SLNP. During the household surveys people were asked about specific positive or negative impacts that had affected the well-being of their household over the last year of living near PAs. Questions on positive and negative impacts were measured in terms of reported ratings. In most cases, for each impact, four-point individual Likert-type items questions were put to the respondents to rate importance, for example, zero, low, medium or high with the scores as 0, 1, 2 and 3 respectively (Boone & Boone, 2012; Clason & Dormody, 1994; Norman, 2010). These were ordinal variables chosen and their scale provided nominal information and at the same time indicated direction in measurements. The analysis of the responses was reported in bar graphs as percentages of consumption or impact. Consumption from primary sources, constituting food and non-food, was measured in terms of household income. Well-being of households was also measured through asset-based measures of wealth and poverty (since income-based measures are often reported less accurately in surveys (Simasiku et al., 2008). To assess whether households in the study were able to understand the questions posed with ease, one pilot study per study area was carried out (two in total) (Creswell, 2003). These pilot studies helped to rephrase the questions and helped to estimate the time needed of completing one questionnaire. Ten households from each study area were selected for this pilot study and these same households were automatically excluded from the main survey to avoid biased responses. The difficulties encountered by respondents when conducting the pilot study, were related to the way questions were put to them. Some questions were removed or incorporated in other questions to save on time for administering the questionnaire.

The household survey for the positive and negative social impacts and the consumption of natural resources from primary sources, was focused on the locals living in villages near the parks and whose geographical location was perceived to be affected in some way(s) by the nearby PA and/or other geographical features nearby. The questionnaires were administered by using an online open data kit (ODK) for mobile data (Brunette et al., 2013; Hartung et al., 2010) and it was conducted with the head of the household as core respondent, unless he or she was not available. Using stratified random sampling, households were randomly chosen with villages or VAGs as strata (Soltani, Angelsen, & Eid, 2014). In the KNP, the total number of households in the villages of Kabulwebulwe chiefdom was on average about 400, while in Kaindu chiefdom the number was 833 per village. In South Luangwa the average number of households in the villages of Lupande and Lumimba GMAs was 776. A representative sample for the study from each village based on Boyd's formula n/N x 100 = c, where "c" represents the figure greater or equal to five percent of the villages' household population, "N" is the total number of households in the selected villages and "n" is the total number of selected households in a particular village (Boyd, Westfall, & Stasch, 1981; Boyd, Westfall, & Stasch, 1972). However, for the purpose of this study, a sampling of 50 respondents in each selected village was adopted and used as it was deemed adequate for statistical analysis (Bailey, 1994).

To analyse and compare the influence of PAs on local settlements, geographical or physical features common to all the selected settlements, were identified. The identified geographical features used as basis for comparison were assumed to be present in all the selected settlements near both national parks. These geographical features included the NP boundaries, other PAs' boundaries, nearby park entrance gates, all-weather roads, centre of VAGs, central business districts (CBDs), park regional area management units (AMUs) and the main nearby fisheries (river/s). During the survey the online ODK global positioning system (GPS) points taken from each household surveyed, were later used to estimate the distances of households from the geographical features of interest using online Google maps for calculations. The other PAs included forestry reserves, private and community game ranches, GMA conservation zones and other NPs. Google maps and QGIS maps, and the ODK GPS points were used to draw and find the shortest distances of households from all the selected geographical features.

A quota sampling methodology, which is a non-probability equivalent of a stratified random sampling where a sample is divided into several sub-groups (Gorny & Napierała, 2016; Yang & Banamah, 2014), was applied in the study to avoid listing all the households in the villages since stratified random sampling is a costly and time-consuming task. When selecting households to interview in a village, a specified path of travel was adhered to and interviewers were instructed to begin the survey process at some random geographical point (Division, 2008). Every third household was selected to represent the target population. The interviews for the surveys in each VAG continued from one qualifying household to the next until a predetermined one-fifth of 50 households (10), which is a fraction of fifty for the five enumerators engaged, was reached (Turner, 2003). It is also justified to claim that a non-response was avoided, since interviewers continued "beyond non-responding households until they obtained enough responding ones to meet the predetermined number" (Turner, 2003). To avoid bias in the technique, random determination of the starting point was applied along the path of travel (Gitaka et al., 2019). The surveys and other data-collection methodologies covered a 7-month period using 3- to 12-month recall periods. A total of 468 questionnaires for Kafue and 419 questionnaires for South Luangwa were administered with the heads of the households – preferably – or an adult member of a household, as core respondent. To fulfil the objectives of the study, the values of the natural resources – both legal and illegal – collected from both the park and the GMAs or OAs were estimated. This generally measured the values of resources collected 3 to 12 months previously. As expected, these household surveys were used to yield information on key socio-economic elements, such as asset ownership, household composition, household income and consumption from different sources, education levels, etc (Soltani et al., 2014). Household data collected through the questionnaire were supplemented by other sources of primary data such as interviews with key stakeholders as stated in the next section. To measure individual variables appropriately, most of the individual questions in the questionnaire were not designed in the same way, leading to different formats of the collected household data as outlined in the following selected items: household heads' education levels – – ordinal data, number of household heads with employed household members (and also those working in tourism sector) – binary data, house-wall and roof building materials – – nominal data, and natural resources consumption – – continuous data.

Interviews

Interviews were conducted with selected community leaders to gather additional data of the parks' influence on the characteristics of the settlements and on the socio-economic impact of the locals. The questions of interviews were unstructured, and the key informants included leaders in some of the Community Based Organisations (CBOs) working in the settlements around the parks. Those who were interviewed included CRB leaders for Kabulwebulwe and Kaindu from the Kafue system and CRB leaders for Kakumbi, Malama, Mnkhanya, Nsefu and Mwanya from the South Luangwa system; KNP and SLNP park managers (DNPW); and the leaders from the Natural resources-based non-governmental organisations which included Kaindu Natural Resources Trust (KNRT), The Nature Conservancy (TNC) in Kafue and the Common Market for Conservation (COMACO) in South Luangwa. In total 12 key informants were interviewed. These interviews with key informants were important for obtaining more knowledge on livelihood changes in each of the villages. All the interviews were recorded using audio equipment and later transcribed into text for analysis as outlined in the next section.

2.4 Data analysis

The data collected through derivation of local multipliers, surveys for visitor spending and interviews at selected tourism facilities, as outlined in the preceding sections above, were subjected to analyses using the Money Generation Model 2 (MGM2). On the other hand, the data collected through the focus group discussions, household surveys and interviews of community leaders, as outlined above in the preceding sections, were subjected to several statistical analyses and some validation tests as outlined in the sections below.

2.4.1 Application of the Money generation model 2

The details on the MGM2, which was applied to evaluate the economic impacts of visitor spending around the national parks, are outlined in the literature review section of chapter 1. The data for the MGM2 included derived multipliers, visitor spending surveys and interviews of selected tourism facilities' managers as mentioned in the preceding sections above. The MGM2 was adapted to evaluate local economies and included country specific multipliers (Stynes et al., 2000). The application of this model and the analysis of the collected data are outlined under Chapters 3 and 4. The basic equation applicable in the MGM2 is as follows:

Economic impacts = number of visitors × average spending (per visitor or party) × economic multipliers (Fish, 2009; Stynes et al., 2000).

2.4.2 Statistical analyses and assumptions

Several statistical analyses and some validation tests were applied in the data analysis collected through the focus group discussions, household surveys and interviews of community leaders as outlined above in the preceding sections. The application of statistical analyses and other analyses, as outlined in the proceeding sections including descriptive statistics, bivariate analyses and multivariate analyses, on the collected data is detailed under Chapter 6. Those statistical analyses were conducted using R version 3.5.3 (Great Truth) (RCoreTeam, 2019). R a free software environment/program for statistical computing; data analysis and graphics complies and runs on a wide variety of UNIX platforms, Windows and MacOS (Crawley, 2012; James et al., 2013).

Descriptive statistics

Descriptive analyses were conducted as the first steps in statistical analyses to gain an idea of the distribution of the data, which helped to detect outliers and typos, and enabled identification of associations among variables for further statistical analyses. The use of descriptive analyses is outlined in Chapter 6 and some of the areas applied to included characteristics of households in settlement near PAs, the social impact of the PAs on locals and households' consumption of natural resources. During the household surveys people were asked about specific perceived positive and negative social impacts that had affected the well-being of their households over the last one to five years of living near PAs (Franks et al., 2018). In some of the impacts, four-point individual Likert-type items questions were asked to the respondents to rate their importance (Boone & Boone, 2012; Clason & Dormody, 1994; Norman, 2010). The analyses of the impacts were based on the percentage of people who reported the importance of the impacts as zero, low, medium or high. Moreover, during the household surveys people were asked to estimate the quantities of natural resources they consumed from the surrounding GMAs or OAs in their villages. The information obtained was analysed as household consumption and monetised in US dollars based on the market prices obtained from the local markets.

Bivariate analysis

The application of bivariate analyses is outlined in Chapter 6. Some of the analyses that were applied on the collected data included the Pearson's Chi-squared test and the Fisher's Exact Test of independence (applied on selected socio-economic characteristics of households) and the standard two-sample t-tests (on the influence of geographical locations on other variables). For example, the F-test was performed to compare two variances of samples from two populations (Kabulwebulwe and Kaindu of KNP and SLNP) as a prior condition before conducting either the Student Two Sample t-test or the Welch Two Sample t-test. The Two Sample t-tests were performed to determine significant differences between the samples with continuous data. The "t-statistic" (abbreviated from "hypothesis test statistic") is used to test that the means of two populations are equal. The t-test was introduced by William Sealy Gosset in 1908 who used "Student" as his pen name, and this is why it is known as "Student's t-test". The test assumes that the samples are normally distributed (Mankiewicz, 2000; Xia, 2020). On the other hand, when several different population variances are involved, Welch's t-test is used as a generalized version of Student's t-test. It is considered as more reliable when two samples have unequal sample sizes, and unequal variances (Ruxton, 2006; Welch, 1947; Xia, 2020). Wilcoxon rank-sum tests was also performed to determine significant differences between the samples with ordinal data. The difference between the Wilcoxon rank-sum test and Wilcoxon signed-rank test is that the former is used to compare two independent samples, while the latter is used to compare two related samples. They were proposed by Frank Wilcoxon in a single paper. The two tests are both nonparametric alternatives to the unpaired and paired Student's t-tests respectively. They are also both nonparametric tests, and this means that they do not assume that the samples are normally distributed (Kruskal, 1957; Wilcoxon, 1992; Xia, 2020). The Kruskal-Wallis test is a nonparametric method and was proposed by Kruskal and Wallis in 1952. It is used for testing whether samples originate from the same distribution, extending the Mann-Whitney U test to more than two groups. Unlike the analogous one-way ANOVA, the Kruskal-Wallis test is nonparametric, and it does not assume a normal distribution of the underlying data (Daniel, 1990; Kruskal & Wallis, 1952; Xia, 2020). In R programming the two-sample t-tests were conducted with the t-test function in the native stats package. The outputs included the means of each sample, confidence intervals for the difference in means, and p-values for the t-tests (James et al., 2013).

Multivariate analysis

The application of multivariate analyses is also outlined in Chapter 6. The statistical analyses that were applied on the collected data were the Multiple linear regression analysis and the Principal Component Analysis (PCA) while other statistical tests included the Sample selection bias and the Heckman model, multi-collinearity testing and the Heteroscedasticity test. Summarised details of the applied statistical analyses and other statistical tests are outlined in the following sections.

Multiple linear regression analysis

In this study, the multiple linear regression analyses were performed by regressing the household consumption of natural resources against household distances from different geographical features in settlements near both the Kafue and the South Luangwa national parks. Details on the application of the multiple linear regression model, which is applied when predicting a quantitative response, is summarised in the literature review of Chapter 1. The response variables in these models were the different types of natural resources (firewood, foods and medicines, and materials and fibre) consumed in the settlements and the model predictors were the selected geographical features listed below. The assumption taken was that the selected geographical features were present in settlements near both the KNP and the SLNP. The GPS points, taken from each household surveyed and saved on the online survey platform known as ODK, were later used to estimate the distances of households from the selected geographical features. Google maps, QGIS maps and the ODK/GPS points were used to draw and calculate the shortest distances between sampled households and all the selected geographical features.

- National Park boundaries = NP/bound,
- Other PAs' boundaries = OPAs/bound,
- National Park gates = NP/gate,
- Village centres or village marketplaces = V/centres,
- All-weather roads = A/W/road,
- DNPW Area Management Units for KNP and SLNP = AMU,
- Mumbwa or Mambwe Central Business Districts = CBD, and
- Kafue River or Luangwa River (main fisheries in the respective areas) = M/fishery.

The output of these multiple linear regressions included the least square coefficient estimates, standard errors, t-statistics and the p-values. The significant p-values (less than or equal to 0.05) obtained from the analyses were stated as to whether there was any linear relationship between household consumption and the household distance from selected geographical features. The multiple R-squared from the multiple linear regression analysis outputs were also reported and commented on. The interpretation of the results – should the household distance from any of the significant geographical features be increased by 1km – was stated.

Sample selection procedure: Heckman two-step correction model

In this study, the sampling of households instead of consideration of a population, could have contributed to biases when testing the hypothesis. The other causes of sample selection bias could have come about due to the missing values in the dependent variables used. The details on the sample selection bias and Heckman model are summarised under literature review of Chapter 1 and the results of the analysis can be found in Chapter 6. The sample selection procedure in this study was that the two regressions equations were performed to estimate the natural resources (firewood, foods and medicines, or material and fibre) consumption and the results were compared. The first regression was simply an ordinary least square (OLS), using the sample of households located close to the national parks, from where one could observe the natural resources consumption. The impact of selection bias of households (natural resources consumers) was neither thrown away nor assumed to be random but was modelled in the equation for estimating the outcome in the regression of households' consumption of resources.

Multicollinearity testing of independent variables

The household resource consumption models were subjected to the multicollinearity testing of independent variables. The methods applied in testing multicollinearity included the tolerance calculation and the Variance Inflation Factor (VIF) calculation. More details on the multicollinearity testing of independent variables are summarised in the literature review of Chapter 1 and the results of the analysis can be found in Chapter 6. The solution to the multicollinearity problem was done by dropping variables causing problems (tolerance > 0.2 or VIF < 10.0) through a stepwise regression process of variable determination.

Tolerance = $1 - R^2$

$$\text{VIF} = \frac{1}{(1-R^2)}$$

Heteroscedasticity

In this study, the variance stabilizing transformations of the dependent variables (Y), for the household resource consumption regression models, were performed and helped to correct the problem of heteroscedasticity and made them homoscedasticity. More details on the heteroscedasticity transformation can be found in the literature review of Chapter 1 and the results section of Chapter 6.

Principal Component Analysis (PCA)

The Principal Component Analysis (PCA) was performed to compute principal components in household survey data and then use them to understand the well-being of households in different geographical locations. More details on the PCA are summarised under the literature review of Chapter 1 and the results of the analysis can be found in Chapter 6. During the household surveys in settlements near Kafue and South Luangwa NPs, people were asked about specific impacts that had affected the well-being of their households over the preceding year – including some cases up to five years of living near PAs. Observations of their dwellings for the types of construction materials used for the walls and roofs, for example, were also recorded and later used as proxies for household well-being. For each impact, four-point individual Likert-type items questions were asked to the respondents to rate its importance from zero, low, medium to high. The PCA was then performed to extract important information from the household well-being data table and represent it as a set of new orthogonal variables, called principal components. The principal components were then displayed in a pattern of similarity of the observations and of the variables as points in maps.

The proxy variables for well-being of households included:

- plot ownership (plot);
- fired-brick (and concrete-block) walls of houses (fired brick);
- house roofs of galvanised iron sheets (iron sheet);
- toilet constructed on their plot within 50m from the main house (toilet);
- households experiencing an increase in well-being (well-being increase); and
- households experiencing food shortages (food shortage).

The household distances from geographical features included the following features:

- NP/bound
- OPAs/bound
- NP/gate
- V/centres
- A/W/road
- AMU
- CBD and
- M/fishery.

Errors and assumptions

Sources of errors were identified, and tolerable levels estimated. Up-to-date local data on visitation, spending and economic activities were collected from parties spending at least a night at tourism facilities such as safari lodges and safari camps. However, the numbers of questionnaires collected were not large enough to represent estimates which are closer to the true mean of the target population. Some assumptions were made during the study with some being inherent in the model, while others were necessary in sampling. However, some assumptions made could unavoidably have been the source of errors towards the results. Though it was impractical to quantify these errors inherent in survey designs such as measurement taking, sampling, non-response cases and data analysis errors, the errors could be less with estimates of visitor spending direct effects than with visitor spending total effects. Attempts were made to reduce different interpretations in questions by ensuring that these were clear and unambiguous. To reduce errors further in the analysis, the visitor spending estimate was taken as ranges, between the lowest and highest values, rather than average point mark. What matters, however, are not the exact values of estimates, but their relative magnitudes (Chidakel et al., 2018; Stynes, 1997b). The following limitations could be identified in this study, and which may have impacted on the accuracy of the findings:

- The study focused on safari lodges, safari camps, camping sites and park entrance gates although a good number of established tourism facilities from both parks did not participate in the study.
- This means that the number of collected surveys were much fewer than anticipated and consequently, the numbers collected could not be adequate for a robust statistical analysis (Melville Saayman & Saayman, 2006).
- The peak of tourism in both parks is during the dry seasons from May/June to November/December while during the rainy season, from December/January to April/May, most tourism establishments are closed in both parks. This means that the data collected from August to December may not be extrapolated to represent the variations in a full year.
- Some of the categories identified for certain tourism establishments provided fewer completed visitor questionnaires than other identified categories and this scenario may influence the results or introduce biasness in the results (Theron, 2011).

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Chapter 3 ESTIMATION OF OUTPUT, INCOME, EMPLOYMENT AND VALUE-ADDED MULTIPLIERS FOR THE TOURISM SECTOR IN ZAMBIA

Abstract

Local tourism economic activity can be described in terms of 'effects' or 'impacts' (income, jobs, value added, taxes, etc.) experienced directly or indirectly by businesses and induced by households in the local economy. A better understanding of the impacts of the tourism industry on local areas can be provided by the construction of the multipliers which allows one to decompose the multiplier effect into direct, indirect and induced effects. Estimation of multipliers can be done by using economic models such as the Input-Output (I-O) models that analyse the interdependence of industries in an economy. The I-O models are a representation of national or regional economic accounting that records the way industries trade with one another and produce, for example, flows of products and services in a given period, typically a year. To achieve this, two derivative I-O tables were constructed from Zambia's 2010 Input-Output tables, expressed in terms of either direct requirements coefficients or total requirements coefficients. In Zambia the publication of input-output tables is currently done at the national level only and therefore the derived direct coefficients had to be rescaled to rural area level (regional) to produce multipliers that attempt to reflect the peculiarities of a rural area or to quantify impacts on the local economy. Associated rural area Leontief inverse matrices were derived and used to calculate type I and type II tourism-related industries' disaggregated multipliers for output, income, employment and value added. The averages of the derived rural area multipliers for tourism-related sectors were for type I and type II multipliers respectively: 1.16 and 1.20 for output, 0.099 and 0.102 for income, 17.3 and 18.9 for employment and 0.60 and 0.62 for value added.

Keywords: *Input-output tables, technical coefficients, total coefficients, Leontief inverse matrix, multipliers, direct effects, indirect effects and induced effects*

3.1 Introduction

3.1.1 Background and rationale

The economic impact of tourism activities, due to park visitors' spending, in local areas around national parks can be captured as multiplier effects through the application of national or regional multipliers. The economic multipliers and their definitions are outlined in the literature review section of Chapter 1. The multiplier effect can be decomposed into three parts, namely (1) the initial (or direct) effects; (2) the indirect effects; and (3) the induced effects (Deller et al., 2009). In other words, tourism multipliers can be used to estimate the direct effect and the secondary effect – which are the indirect and induced effects – of tourism activity in an economy (Stynes, 1997a). Currently there are no published tourism multipliers in Zambia and the focus of this study was to estimate the rural region tourism multipliers through the I-O approach.

An I-O coefficient may be defined as the dollar ($) value or kwacha (K) equivalent of an input required from sources within the region to produce $1 (one dollar or kwacha equivalent)[8] worth of an output (Fjeldsted, 1990). In Zambia applications of the I-O model are carried out at the national level (CSO, 2017). The method applied in this study to derive rural multipliers, was based on what has been done already in other countries, where the national "I-O models are modified to reflect the peculiarities of a regional problem" (Miller & Blair, 2009). The characteristics of a regional I-O study are influenced by at least two basic features of a regional economy: (i) In a particular region, the structure of production may be identical to or it may differ markedly from, that recorded in the national I-O table; and (ii) Generally the smaller the economic area is the more dependent it is on trade with the 'outside' areas which include the transactions that cross the region's borders (both for sales of regional outputs and purchases of inputs needed for production) (Miller & Blair, 2009). The recommendations contained in the 2008 System of National Accounts and the 2008 Eurostat Manual of Supply, Use and I-O Tables was the basis for compilation of the 2010 I-O tables for Zambia as reported by the Central Statistics Office in Zambia (CSO, 2017).

The results of the study will assist us to use the derived rural area tourism multipliers for evaluating economic impacts of PAs on local or regional economies and allow future policy

[8] K1 was equivalent to US$0.00021 in 2010

making for a combined nature conservation and tourism development. For instance, park managers, consultants or researchers, may wish to use these multipliers for the purpose of adaptive management and/or to integrate economic impact evaluation with a livelihoods or social analysis of the PA that would reveal non-monetary benefits and costs. At the same time, government administrators may wish to compare the local or regional level value of a park with other land uses, or with parks in similar regions. Again, both the PA managers and society benefit from derived multipliers that are applicable in economic valuation of PAs (El-Bekkay, Moukrim, & Benchakroun, 2013).

3.1.2 Objectives and research questions

The overall objectives of the study are to measure the relative economic impacts of tourism on locals living in settlements near the Kafue and the South Luangwa national parks, and to develop an understanding of how the geographical locations of their settlements influence the realization of income from primary sources and to ascertain how their location affects the main positive and negative social impacts.

Specific objective:

To derive estimates of wildlife-based tourism multipliers that can be used for economic impact assessments of rural areas or regions of Zambia.

Related question

How can estimates of multipliers for tourism in the rural area economy of Zambia be derived from I-O tables for the following:

a) Output or sales?
b) Income?
c) Employment or jobs? and
d) Value-added in tourism?

3.1.3 Limitations of the study

The Central Statistics Office (CSO) of Zambia does not publish regional input-output (I-O) tables. National multipliers deduced directly from the national I-O tables are not suitable for application in rural regions' economic impact analysis (Gretton, 2013). In order to deduce the rural area tourism multipliers, the national multipliers are rescaled to a rural area level by multiplication with percentages that attempt to reflect a regional (rural area) economy peculiarities (Miller & Blair, 2009). The benefits of rescaled rural area multipliers are that they quantify impacts for the local rural area economy – this area of study – rather than national multipliers that quantify impacts at a national level. However, the disadvantages of rescaled rural area multipliers include the deduction/conversion process from national multipliers, a process that may introduce some conversion errors.

3.2 Research methods

The details of the research methods applied in this chapter are outlined in Chapter 2. The methods describe how to estimate the following multipliers:

a) Output or sales
b) Income
c) Employment or jobs and
d) Value-added in tourism

for tourism in the rural area economy of Zambia by using the I-O tables as outlined in the literature review section of Chapter 1 and data collection section of Chapter 2. The steps taken to derive multipliers include the following:

- Deriving technical or direct coefficients from the I-O tables.
- Calculating the total requirements coefficients from the technical coefficients; and
- Rescaling of the national coefficients to rural coefficients to produce multipliers that quantify impacts on local economies.

3.3 Results

3.3.1 National input-output table

The input-output (I-O) table theory is described in the literature review of Chapter 1. The I-O table presented in Table 3.1 (also in Appendix 7.1) is Zambia's data for the year 2010 as developed by the Zambian Central Statistics office (CSO, 2014). Typically, each year the trading of industries with one another and the production of flows of products and services, are recorded by a representation of a national or regional economic accounting system. A group of industries produce goods or outputs and consume goods or inputs from other industries thereby producing each industry's own output. In Zambia 19 sectors constituted the I-O tables for the year 2010 and those industries included 'Agriculture, forestry and fishing'; 'Mining and quarrying'; 'Manufacturing'; 'Electricity, gas, steam and air conditioning supply'; 'Water supply, sewerage, waste management and remediation activities'; 'Construction'; 'Wholesale and retail trade; Repair of motor vehicles and motorcycles'; 'Transportation and storage'; 'Accommodation and food service activities'; and 'Information and communication'. Others were 'Financial and insurance activities'; 'Real estate activities'; 'Professional, scientific and technical activities'; 'Administrative and support service activities'; 'Public administration and defence; Compulsory social security'; 'Education; Human health and social work activities'; 'Arts, entertainment, and recreation'; and 'Other service activities' (Appendix 7.1).

Zambia's tourism related sectors

Five economic sectors under the Zambia's I-O table for 2010 were identified as related to wildlife-based tourism in the country. Those sectors (with their shortened names in brackets) included 'Wholesale and retail trade; repair of motor vehicles and motorcycles' (Wholesale and retail); 'Transportation and storage' (Transportation and storage); 'Accommodation and food service activities' (Accommodation and food); 'Arts, entertainment and recreation' (Arts, entertainment); and 'Other service activities' (Other service activities). Table 3.1 shows the transaction matrix, in red, with only these Zambia's economic sectors of interest to tourism multipliers included (because of space limitations). The domestic investment matrix is shown in blue and it accounts for the supplies of goods that are not consumed by domestic industries (Benga, Hāzners, & Miķelsone, 2017). The domestic intermediate matrix (within the red in Table 3.1), represents sectors of Zambia's economy. However, only the five tourism related sectors shown, are considered for this analysis: the 'Wholesale and retail trade; repair of motor vehicles and motorcycles' sector with an annual production (or output in millions of kwacha) of 24,067.2; the 'Transportation and storage' sector with a total output of 9,284.8; the 'Accommodation and food service activities' sector with a total output of 2,217.5; the 'Arts, entertainment and recreation' sector with a total output of 463.3; and the 'Other service activities' sector with a total output of 2,085.5. All these outputs are in millions of kwacha and are read on the row, or column of 'industry outputs at basic prices' (for full details see Appendix 7.1). Typically, the columns describe the structure of the input of the corresponding sector (SPICOSA, 2010). For instance to produce 24,067.2 million kwacha, the 'Wholesale and retail trade; repair of motor vehicles and motorcycles' needed 371.1 of its own production, and, respectively, 426.5, 121.3, 3.2 and 19.3 of the production in the 'Transportation and storage', the 'Accommodation and food service activities', the 'Arts, entertainment and recreation' and 'Other service activities' sectors (SPICOSA, 2010).

Table 3.1: Zambia's 2010 Industry by Industry Input-Output Table (I-O) (in K millions) with only selected sectors included

Industry (Row) Industry (Column)	Wholesale and retail trade; repair of motor vehicles and	Transportation and storage	Accommodation and food service activities	Arts, entertainment, and recreation	Other service activities	Household final consumption expenditure	Government final consumption	NPISH final consumption	GFCF	Changes in inventories	Exports, fob	Total final use	Use at basic prices
Wholesale and retail trade; repair of motor vehicles and motorcycles (Wholesale and retail)	371.1	198.6	107.2	14.9	62.7	13,001.3	15.6	414.7	3,011.9	9.8	1,913.0	18,366.3	24,067.2
Transportation and storage	426.5	234.4	58.5	9.6	315.3	2,259.5	9.6		134.6	-21.2	2,185.1	4,567.7	9,284.8
Accommodation and food service activities (Accommodation and food)	121.3	45.5	4.4	1.2	11.1	583.1	6.9		63.9		688.9	1,342.8	2,217.5
Arts, entertainment and recreation (Arts, entertainment)	3.2	0.9	3.6	0.0	0.1	246.0	81.6		2.9	0.0	41.6	372.2	463.3
Other service activities	19.3	10.8	9.5	1.6	84.8	367.1	0.2	1,091.6	0.7	-8.0	83.9	1,535.4	2,085.5
CIF/FOB											-881.1	-881.1	-881.1
Net Taxes	214.1	143.7	10.1	9.9	10.9	3,619.3	0.0	0.0	999.8	-13.0	152.1	4,758.2	5,379.7
Use of imports	801.6	534.4	114.5	51.7	48.1	4,212.3	0.0	0.0	6,111.5	850.5	1,751.4	12,925.7	27,655.5
Total Use at Purchaser's Price	6,417.2	3,073.9	958.2	174.0	1,296.9	48,978.8	9,118.5	4,105.6	25,126.0	2,001.9	35,995.1	125,325.9	200,916.9
GVA at basic prices	17,650.0	6,210.8	1,259.4	289.3	788.6								
Wages and salaries	1,995.6	1,257.0	372.9	188.7	560.7								
Social contribution	42.8	20.6	7.8	13.1	32.0								
Consumption of fixed capital	915.2	108.0	157.9	35.3	13.4								
Other net taxes on production	-21.8	0.0	0.8	0.0	0.0								
Mixed Income	8,402.9	1,429.8	138.8	47.4	172.5								
Net Operating Surplus	6,315.3	3,395.5	581.1	4.8	10.0								
Output at basic prices	24,067.2	9,284.8	2,217.5	463.3	2,085.5								

Source: adapted from CSO (2014)

Direct requirements matrix

The first step in producing the national I-O multipliers from the I-O table was the calculation of the direct requirements coefficient matrix also called the *technology matrix* (Table 3.2). The values of cells in the direct requirements matrix, were derived by dividing each cell in the I-O table (Table 3.1 and Appendix 7.1) – the inter-industry transaction matrix – by the total of its column. These values of cells, derived from the I-O table (Table 3.1), measure the fixed relationships between a sector's output and its inputs (Cassar, 2015) and are known as *technical coefficients* as already defined in the literature review of Chapter 1. Only the technical requirements for the five sectors that are tourism related are represented in Tables 3.1 and 3.2, but calculations were based on the complete table as in Appendix 7.1. Two square direct requirements coefficient matrices, known as A-matrices, were deduced from the I-O table, are differentiated as Type I and Type II (Appendices 7.3 and 7.4). The difference of Type II from Type I is the inclusion of households' column and compensation row within the matrix of technical coefficients as displayed in Table 3.3 (for Type I) and Table 3.4 (for Type II). For this case, only five tourism-related sectors are displayed as columns on the mentioned tables, but calculations were based on a complete table in Appendix 7.1.

Type I technical coefficients (Type I A-matrix) provided for the calculation of direct and indirect effects that reflect on the production caused by exogenous changes to final demand and omit the notion that increased production requires more labour input, which in turn increases household income that further increases demand and consequently production. Type II technical coefficients (Type II A-matrix), on the other hand, included the induced effects, apart from direct and indirect effects, which are a result of the additional impact on domestic production caused by the demand for goods and services made by households. This induced effect is caused by the additional income obtained through the production of the new output due to the initial exogenous shock to the final demand.

Table 3.2: Direct requirements matrix with only selected sectors included (summary)

	Wholesale and retail	Transportation and storage	Accommodation and food	Arts, entertainment	Other service activities	household final consumption expenditure	Government final consumption expenditure	NPISH final consumption expenditure	GFCF	Changes in inventories	Exports, fob	Total final use	Total use at basic prices
Wholesale and retail	0.0154	0.0214	0.0483	0.0321	0.0301	0.2654	0.0017	0.1010	0.1199	0.0049	0.0519	0.1455	24,067.2
Transportation and storage	0.0177	0.0252	0.0264	0.0207	0.1512	0.0461	0.0011	0.0000	0.0054	-0.0106	0.0593	0.0362	9,284.8
Accommodation and food	0.0050	0.0049	0.0020	0.0025	0.0053	0.0119	0.0008	0.0000	0.0025	0.0000	0.0187	0.0106	2,217.5
Arts, entertainment	0.0001	0.0001	0.0016	0.0000	0.0000	0.0050	0.0090	0.0000	0.0001	0.0000	0.0011	0.0029	463.3
Other service activities	0.0008	0.0012	0.0043	0.0034	0.0407	0.0075	0.0000	0.2659	0.0000	-0.0040	0.0023	0.0122	2,085.5
CIF/FOB	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.0239	-0.0070	-881.1
Net Taxes	0.0089	0.0155	0.0046	0.0213	0.0052	0.0739	0.0000	0.0000	0.0398	-0.0065	0.0041	0.0377	5,379.7
Use of imports	0.0333	0.0576	0.0516	0.1116	0.0231	0.0860	0.0000	0.0000	0.2432	0.4248	0.0475	0.1024	27,655.5
Total Use at Purchaser’s Price	0.2666	0.3311	0.4321	0.3756	0.6219	1.0000	1.0000	1.0000	1.0000	1.0000	0.9761	0.9930	200,916.9
GVA at basic prices	0.7334	0.6689	0.5679	0.6244	0.3781								
Wages and salaries	0.0829	0.1354	0.1682	0.4072	0.2688								
Social contribution	0.0018	0.0022	0.0035	0.0284	0.0154								
Consumption of fixed capital	0.0380	0.0116	0.0712	0.0761	0.0064								
Other net taxes on production	-0.0009	0.0000	0.0004	0.0000	0.0000								
Mixed Income	0.3491	0.1540	0.0626	0.1023	0.0827								
Net Operating Surplus	0.2624	0.3657	0.2621	0.0104	0.0048								
Output at basic prices	1.0000	1.0000	1.0000	1.0000	1.0000								

Adapted from CSO (2014)

Table 3.3: Zambia's 2010 Type I – A-matrix (technical coefficients) – a simplified table showing only tourism related sectors on both rows and columns

Industry/Sector	Wholesale and retail	Transportation and storage	Accommodation and food	Arts, entertainment	Other service activities
Wholesale and retail	0.0154	0.0214	0.0483	0.0321	0.0301
Transportation and storage	0.0177	0.0252	0.0264	0.0207	0.1512
Accommodation and food	0.0050	0.0049	0.0020	0.0025	0.0053
Arts, entertainment	0.0001	0.0001	0.0016	0.0000	0.0000
Other service activities	0.0008	0.0012	0.0043	0.0034	0.0407

Note: Only tourism related sectors are displayed

Table 3.4: Zambia's 2010 Type II – A-matrix (Technical coefficients) – a simplified table showing only tourism related sectors on both rows and columns

Industry/Sector	Wholesale and retail	Transportation and storage	Accommodation and food	Arts, entertainment	Other service activities	Household final consumption expenditure
Wholesale and retail	0.0154	0.0214	0.0483	0.0321	0.0301	0.2654
Transportation and storage	0.0177	0.0252	0.0264	0.0207	0.1512	0.0461
Accommodation and food	0.0050	0.0049	0.0020	0.0025	0.0053	0.0119
Arts, entertainment	0.0001	0.0001	0.0016	0.0000	0.0000	0.0050
Other service activities	0.0008	0.0012	0.0043	0.0034	0.0407	0.0075
Compensations (wages and salaries)	0.0829	0.1354	0.1682	0.4072	0.2688	

Note: Only tourism related sectors are displayed

3.3.2 National input-output multipliers

National output multiplier

The theory and method of deriving output multipliers are described in the literature review of Chapter 1 and under the data collection section of Chapter 2. Table 3.5 shows Type I multipliers representing direct and indirect effects, Type II multipliers representing direct, indirect and induced effects, and the disaggregated induced effects. From tourism related sectors' results, it was observed that the 'Other service activities' sector had the largest Type I output multiplier of 1.81, followed by the 'Accommodation and food' sector with a multiplier of 1.51. The Open Leontief Inverse matrix model was the basis for deriving the Type I multipliers. To find the Type II output multipliers, the Type II technical coefficients across the rows in the total requirement coefficients (Leontief inverse) matrix were summed up as shown in Table 3.5. With focus on tourism related sectors' results, it was again observed that 'Other service activities' sector had the largest Type II output multiplier of 2.40, followed by the 'Accommodation and food' sector with a multiplier of 1.94.

Table 3.5: Zambia's 2010 National Type I and Type II output multipliers for tourism economy – a simplified table showing only tourism related sectors on rows

Industry/Sector	Type I Direct and indirect effects	Type II Direct, indirect and induced effects	Induced effects
Wholesale and retail	1.32	1.50	0.18
Transportation and storage	1.37	1.63	0.26
Accommodation and food	1.51	1.82	0.31
Arts, entertainment	1.32	1.94	0.62
Other service activities	1.81	2.40	0.58

Note: Only tourism related sectors are displayed

Derived national multipliers for income, employment and value-added

The national multiplier for income, employment or value-added refers to the ratio of the change in respective total income, employment or value-added in all sectors of the national economy to the change in respective income, employment or value-added directly related to the production of the basic output. The national type I and type II multipliers were obtained by the multiplication of the respective income, employment or value-added ratios (Zambia's 2015 national ratio – – Appendix 7.6) (CSO, 2016b) by either the Open or the Closed Leontief Inverse Matrices respectively (Appendices 7.2 and 7.3) and then calculating the sums of each column for the resultant matrices (Table 3.6 and Table 3.7). The multiplication of the national type I and type II multipliers with Zambia's 2015 national ratios makes the derived income, employment and value-added multipliers equivalent to 2015 national multipliers.

Table 3.6: Zambia's 2010 National Type I and Type II income, employment and value-added multipliers for tourism economy

	Industry/Sector	Type I Multipliers	Type II Multipliers	Direct effects	Indirect effects	Induced effects
Income	Wholesale and retail	0.08	0.09	0.04	0.03	0.02
	Transportation and storage	0.14	0.17	0.10	0.04	0.02
	Accommodation and food	0.09	0.12	0.04	0.05	0.03
	Arts	0.20	0.26	0.17	0.03	0.05
	Other service activities	0.11	0.16	0.02	0.09	0.05
Employment	Wholesale and retail	36.9	44.4	31.0	5.9	7.5
	Transportation and storage	21.1	32.2	13.5	7.6	11.1
	Accommodation and food	56.2	69.5	23.4	32.8	13.3
	Arts	23.3	49.5	15.1	8.2	26.2
	Other service activities	52.4	77.1	36.9	15.5	24.7
Value-added	Wholesale and retail	0.91	1.02	0.73	0.18	0.11
	Transportation and storage	0.82	0.98	0.61	0.20	0.17
	Accommodation and food	1.02	1.22	0.72	0.30	0.20
	Arts	0.97	1.36	0.79	0.17	0.39
	Other service activities	0.85	1.22	0.38	0.47	0.37

Table 3.7: Zambia's 2010 derived national multipliers for selected tourism-related sectors

Industry/Sector	Output I	Personal Inc/sales	Jobs /MM sales	Value added/ sales	Output II	Inc II/sales	Jobs II /MM sales	VA II/sales
Wholesale and retail	1.32	0.08	36.91	0.91	1.50	0.09	44.36	1.02
Transportation and storage	1.37	0.14	21.10	0.82	1.63	0.17	32.17	0.98
Accommodation and food	1.51	0.09	56.23	1.02	1.82	0.12	69.50	1.22
Arts	1.32	0.20	23.35	0.97	1.94	0.26	49.53	1.36
Other service activities	1.81	0.11	52.44	0.85	2.40	0.16	77.14	1.22

The national direct requirement coefficients (A-matrices) for both Type I and Type II multipliers, are rescaled to rural area direct requirement coefficients by multiplication with supply percentages as outlined in the next sections.

3.3.3 Rural area input-output multipliers

Rural area supply percentages

The extent of economic activities of all the sectors of the economy in rural areas of Zambia was used as rural area share of production by finding the percentage of rural production as described by Melville Saayman & Saayman (2006) (Table 3.5). Miller (2009) recommends use of supply percentages for the region, but this data was not available. The supply percentages p_i^r were calculated based on the economic output for rural areas compared to that of national output for all sectors, but with focus on the selected tourism-related sectors (CSO, 2015, 2016a). The calculated supply/production percentages (Table 3.8) were then used to rescale the national A-matrices (technical coefficients) (Tables 3.3 and 3.4) to rural area A-matrices (technical coefficients) for the purpose of deriving rural area multipliers.

Table 3.8: Production percentages for rural area sectors (rural area share) in the national economy of Zambia for 2015

Industry/Sector	Rural Area Share (%)
Agriculture	66
Mining	37
Manufacturing	51
Electricity	39
Water supply	39
Construction	45
Wholesale and retail	46
Transportation and storage	39
Accommodation and food	40
Information and communication	39
Financial and insurance	32
Real estate activities	33
Professional, scientific	45
Administrative and support	33
Public administration	45
Education	54
Human health and social work	49
Arts, entertainment	26
Other service activities	34

Adapted from CSO (2015a) and CSO (2016)

Rural area total requirement coefficients

The direct requirement coefficients (A-matrices) derived from the national input-output table, for both Type I and Type II multipliers, were rescaled to rural area direct requirement coefficients by multiplication with supply percentages (Table 3.8). The rescaled rural area Type I and Type II direct requirement coefficients were then converted to Type I and Type II total requirement coefficients (Open and Closed Leontief Inverse Matrices) as indicated in Table 3.9 for type I and Table 3.10 for type II.

Table 3.9: Zambia's 2015 Rural area Type I – Total requirements coefficients (Leontief Inverse matrix) – a simplified table showing only tourism related sectors on both rows and columns

Industry/Sector	Wholesale and retail	Transportation and storage	Accommodation and food	Arts, entertainment	Other service activities
Wholesale and retail	1.009	0.012	0.025	0.017	0.018
Transportation and storage	0.008	1.011	0.012	0.009	0.063
Accommodation and food	0.002	0.002	1.001	0.001	0.003
Arts, entertainment	0.00004	0.00004	0.0005	1.000	0.00002
Other service activities	0.0004	0.001	0.002	0.001	1.014
Type I Output Multipliers	1.102	1.122	1.198	1.113	1.269

Note: Only tourism related sectors are displayed

Table 3.10: Zambia's 2015 Rural area Type II – Total requirements coefficients (Leontief Inverse matrix) – a simplified table showing only tourism related sectors on both rows and columns (truncated matrix)

Industry/Sector	Wholesale and retail	Transportation and storage	Accommodation and food	Arts, entertainment	Other service activities	Household final consumption expenditure
Wholesale and retail	1.014	0.020	0.036	0.040	0.035	
Transportation and storage	0.009	1.013	0.014	0.013	0.066	
Accommodation and food	0.002	0.003	1.002	0.002	0.003	
Arts, entertainment	0.000	0.000	0.001	1.000	0.000	
Other service activities	0.000	0.001	0.002	0.002	1.015	
Compensations (wages and salaries)						
Type II Output Multipliers	1.120	1.150	1.232	1.190	1.328	

Note: Only tourism related sectors are displayed

The total requirements coefficients estimate for Type I and Type II shown in Table 3.9 and Table 3.10 respectively, indicate the extra demands needed from sectors in the local economy for every additional unit change worth of final demand of any respective sector. For example, under Type I – – Total requirements coefficients, an initial extra unit of final demand for the 'Wholesale and retail' sector generates 1.009 total demand for the 'Wholesale and retail' sector itself, 0.008 extra demand for the 'Transportation and storage' sector, 0.002 extra demand for the 'Accommodation and food' sector, 0.00004 extra demand for the 'Arts' sector and 0.0004 extra demand for the 'Other service activities' sector. The basis of calculating the Type I and Type II Total requirement coefficients was the Open Leontief Inverse matrix model and Closed Leontief Inverse matrix model (truncated) respectively. The sum of each column in the Type I and Type II total requirement coefficient matrices produces the output multiplier for each respective sector (Type I and Type II output multipliers) as outlined in the next section.

Output multiplier

As already outlined under the national output multiplier section above the theory and method of deriving output multipliers are described in the literature review of Chapter 1 and under the data collection section of Chapter 2. In this section the summarised results are shown in Table 3.11, with only tourism related sectors displayed as the focus of this analysis. From tourism related sectors' results, it was observed that the 'Other service activities' sector had the largest Type I output multiplier of 1.269, followed by the 'Accommodation and food' sector with a multiplier of 1.198. The Open Leontief Inverse matrix model was the basis for deriving the Type I multipliers. To find the Type II output multipliers, the Type II technical coefficients across the rows in the total requirement coefficients (Leontief inverse) matrix were summarised. With focus on tourism related sectors' results, it was again observed that the 'Other service activities' sector had the largest Type II output multiplier of 1.328, followed by the 'Accommodation and food' sector with a multiplier of 1.232.

Table 3.11: Zambia's 2015 Rural area Type I and Type II output multipliers – a simplified table showing only tourism related sectors on rows

Industry/Sector	Type I	Type II	
	Direct and indirect effects	Direct, indirect, and induced effects	Induced effects
Wholesale and retail	1.102	1.120	0.018
Transportation and storage	1.122	1.150	0.028
Accommodation and food	1.198	1.232	0.035
Arts, entertainment	1.113	1.190	0.077
Other service activities	1.269	1.328	0.059

Note: Only tourism related sectors are displayed

Income multiplier

The theory and method of deriving output multipliers are described in the literature review of Chapter 1 and in the data collection section of Chapter 2. The income multiplier represents a change in total income that includes employee compensation, proprietary income and other property income for every kwacha change in income in any given sector. Only tourism related sectors are displayed, as can be seen in Table 3.12. It was observed that among the tourism related sectors in 2015, the 'Accommodation and food' sector had the highest Type II income multiplier of 0.20, followed by the 'Arts' sector with 0.16 (Table 3.12). The interpretation of these results indicates that a total of 0.2 kwacha household income was generated under the the 'Accommodation and food' sector due to the additional kwacha increase in the final demand of this sector. Out of that income, 0.19 kwacha was paid directly as salaries and wages to workers in the sector itself, 0.012 kwacha was paid to workers from other sectors due to the sector's linkages with other productive sectors in the Zambian economy, supplying inputs for its requirements, and finally, another 0.002 kwacha of wages and salaries from all sectors accrued in households – due to induced effects – was spent in the economy. A summation of direct and indirect effects made up Type I income multipliers of 0.20 kwacha per kwacha of increased final demand.

Table 3.12: Income, value-added and employment ratios – a simplified table showing only tourism related sectors on rows

Industry/Sector	Income ratio	Value-added ratio	Employment ratio
Wholesale and retail	0.04	0.65	11.86
Transportation and storage	0.03	0.46	7.86
Accommodation and food	0.19	0.57	9.29
Arts	0.15	0.49	4.29
Other service activities	0.02	0.39	32.76

Note: Only tourism related sectors are displayed

Table 3.13: Zambia's 2015 Rural area Type I and Type II income multipliers – a simplified table showing only tourism related sectors on rows

Industry/Sector	Type I Multipliers	Type II Multipliers	Direct effects	Indirect effects	Induced effects
Wholesale and retail	0.05	0.05	0.04	0.008	0.001
Transportation and storage	0.04	0.04	0.03	0.010	0.002
Accommodation and food	0.20	0.20	0.19	0.012	0.002
Arts	0.16	0.16	0.15	0.008	0.005
Other service activities	0.04	0.05	0.02	0.020	0.004

Note: Only tourism related sectors are displayed

Employment (jobs) multiplier per million sales

The theory and method of deriving employment multipliers are described in the literature review of Chapter 1 and in the data collection section of Chapter 2. It was observed that among the tourism related sectors in 2015, the 'Other service activities' sector had the highest Type I and Type II employment multipliers of 35.8 and 38.1 respectively, followed by the 'Accommodation and food' sector with 22.3 and 23.6 respectively (Table 3.14). Taking an example of the 'Accommodation and food' sector, the results mean that – out of a total of 23.6 new jobs created per million kwachas of increased final demand – 9.3 of them were generated directly within the sector itself, 13.0 jobs were created due to the sector's linkages with other productive sectors in the Zambian economy, supplying inputs for its requirements, and another 1.3 jobs were created in all sectors of the economy due to induced effects. A summation of direct and indirect effects made up Type I employment-output multipliers of 22.3 jobs per million kwachas of increased final demand.

Table 3.14: Zambia's 2015 Rural area Type I and Type II employment multipliers (per million sales) – a simplified table showing only tourism related sectors on rows

Industry/Sector	Type I Multipliers	Type II Multipliers	Direct effects	Indirect effects	Induced effects
Wholesale and retail	13.0	13.7	11.9	1.1	0.7
Transportation and storage	9.4	10.4	7.9	1.5	1.1
Accommodation and food	22.3	23.6	9.3	13.0	1.3
Arts	6.0	8.9	4.3	1.7	2.9
Other service activities	35.8	38.1	32.8	3.1	2.2

Note: Only tourism related sectors are displayed
Source: Author's calculations

Value-added multiplier

The theory and method of deriving value-added multipliers are described in the literature review of Chapter 1 and in the data collection section of Chapter 2 respectively. It was observed that among the tourism related sectors in 2015, the 'Wholesale and retail' sector had the highest Type II value-added multiplier of 0.72, followed by the 'Accommodation and food' sector with 0.69 (Table 3.15). This means that under the 'Accommodation and food' sector, a total of 0.72 kwacha value-added was generated per kwacha of increased final demand. Out of that value-added, 0.65 kwacha was generated directly within the sector itself, 0.06 kwacha was generated due to the sector's linkages with other productive sectors in the Zambian economy – which supplies inputs for its requirements – and another 0.01 kwacha was generated in all sectors of the economy due to induced effects. A summation of direct and indirect effects made up Type I value-added multipliers of 0.71 kwacha per kwacha of increased final demand.

Table 3.15: Zambia's 2015 Rural area Type I and Type II value-added multipliers – a simplified table showing only tourism related sectors on rows

Industry/Sector	Type I Multipliers	Type II Multipliers	Direct effects	Indirect effects	Induced effects
Wholesale and retail	0.71	0.72	0.65	0.06	0.01
Transportation and storage	0.52	0.54	0.46	0.06	0.02
Accommodation and food	0.67	0.69	0.57	0.10	0.02
Arts	0.55	0.59	0.49	0.06	0.05
Other service activities	0.53	0.57	0.39	0.15	0.03

Note: Only tourism related sectors are displayed

Derived rural area multipliers for income, employment and value-added

As already described above the rural area type I and type II multipliers were obtained by the multiplication of the respective income, employment, or value-added ratios (Zambia's 2015 National ratios – Appendix 7.6) by either the Open or the Closed Leontief Inverse Matrices respectively (Appendices 7.2 and 7.3) and then calculating the sums of each column for the resultant matrices (Table 3.16). The multiplication of the rural area type I and type II multipliers with the Zambia's 2015 national ratios makes the derived income, employment, and value-added multipliers equivalent to 2015 national multipliers. The direct, indirect, and induced effects were derived as described in the preceding section of this chapter. The direct, indirect, and induced effects under the rural area multipliers were calculated in the same as that done under the national multipliers.

Table 3.16: Zambia's 2015 Rural area Type I and Type II income, employment, and value-added multipliers for tourism economy

	Industry/Sector	Type I Multipliers	Type II Multipliers	Direct effects	Indirect effects	Induced effects
Income	Wholesale and retail	0.05	0.05	0.04	0.008	0.001
	Transportation and storage	0.04	0.04	0.03	0.010	0.002
	Accommodation and food	0.20	0.20	0.19	0.012	0.002
	Arts	0.16	0.16	0.15	0.008	0.005
	Other service activities	0.04	0.05	0.02	0.020	0.004
Employment	Wholesale and retail	13.0	13.7	11.9	1.1	0.7
	Transportation and storage	9.4	10.4	7.9	1.5	1.1
	Accommodation and food	22.3	23.6	9.3	13.0	1.3
	Arts	6.0	8.9	4.3	1.7	2.9
	Other service activities	35.8	38.1	32.8	3.1	2.2
Value-added	Wholesale and retail	0.71	0.72	0.65	0.06	0.01
	Transportation and storage	0.52	0.54	0.46	0.06	0.02
	Accommodation and food	0.67	0.69	0.57	0.10	0.02
	Arts	0.55	0.59	0.49	0.06	0.05
	Other service activities	0.53	0.57	0.39	0.15	0.03

The summarised rural area output, income, employment, and value-added multipliers are displayed in Table 3-17 below:

Table 3.17: Zambia's derived 2015 rural area multipliers for selected tourism-related sectors

Industry/Sector	Output I	Personal Inc/sales	Jobs /MM sales	Value added/ sales	Output II	Inc II/sales	Jobs II /MM sales	VA II/sales
Wholesale and retail	1.10	0.05	12.98	0.71	1.12	0.05	13.65	0.72
Transportation and storage	1.12	0.04	9.37	0.52	1.15	0.04	10.44	0.54
Accommodation and food	1.20	0.20	22.33	0.67	1.23	0.20	23.64	0.69
Arts	1.11	0.16	6.01	0.55	1.19	0.16	8.94	0.59
Other service activities	1.27	0.04	35.81	0.53	1.33	0.05	38.06	0.57

3.3.4 Comparison of national multipliers and rural area multipliers

The derived national and rural area multipliers were put in one table for the purposes of comparison (Table 3.18). As expected, the national multipliers were found to range between 1.2 and 5.5 times larger than the rural area multipliers. This means that the difference between the two types of multipliers would approximately be equal to urban area multipliers (should be verified by following the same procedures). The output multipliers for both national and rural area were higher under the 'Other service' sector than any other tourism related sectors. Income multiplier for rural area was higher under the 'Accommodation' sector while for national level it was higher under the 'Arts' sector. Jobs or employment multipliers for rural area was also higher under the 'Other service' sector, but for the national level it was higher under the 'Accommodation' sector. The value-added in rural area was higher under the 'Wholesale' sector while for the national level it was higher under the 'Accommodation' sector.

Table 3.18: Zambia's 2015 national and rural area multipliers for selected tourism-related sectors

	Industry/Sector	Output I	Personal Inc/sales	Jobs /MM sales	Value added/ sales	Output II	Inc II/sales	Jobs II /MM sales	VA II/sales
National multipliers	Wholesale and retail	1.32	0.08	36.91	0.91	1.50	0.09	44.36	1.02
	Transportation and storage	1.37	0.14	21.10	0.82	1.63	0.17	32.17	0.98
	Accommodation and food	1.51	0.09	56.23	1.02	1.82	0.12	69.50	1.22
	Arts	1.32	0.20	23.35	0.97	1.94	0.26	49.53	1.36
	Other service activities	1.81	0.11	52.44	0.85	2.40	0.16	77.14	1.22
Rural area multipliers	Wholesale and retail	1.10	0.05	12.98	0.71	1.12	0.05	13.65	0.72
	Transportation and storage	1.12	0.04	9.37	0.52	1.15	0.04	10.44	0.54
	Accommodation and food	1.20	0.20	22.33	0.67	1.23	0.20	23.64	0.69
	Arts	1.11	0.16	6.01	0.55	1.19	0.16	8.94	0.59
	Other service activities	1.27	0.04	35.81	0.53	1.33	0.05	38.06	0.57

Examples of other multipliers from Zambia and other countries

A literature review was conducted to seek more information on the multipliers published previously from Zambia and other countries. The data obtained in the period ranging between 1967 and 2001 showed that the output, income, employment and value-added for tourism and 'general' (average of all sectors) sector ranged between 0.458 and 2.7 (Table 3.19). The output (sales) and value-added multipliers were generally found to be within range of Zambia's multipliers, while the employment and income multipliers were out of range.

Table 3.19: Examples of other multipliers from Zambia and other countries

Type of multiplier	Multipliers	Country	Year/period	Citation
Output (Recreation and cultural)	2.0	Zambia	1987	Bocoum and Labys (1993)
Income (Recreation and cultural)	2.1	Zambia	1987	Bocoum and Labys (1993)
Employment (Recreation and cultural)	2.7	Zambia	1987	Bocoum and Labys (1993)
Output (tourism)	1.57 – 1.81	Kenya	1967 – 1976	Summary (1987)
Output (general)	1.73	United Kingdom	1995 – 1998	Muhanna (2007)
Output (general)	1.59	Sri Lanka	1995 – 1998	Muhanna (2007)
Output (general)	1.27	Jamaica	1995 – 1998	Muhanna (2007)
Output (general)	1.23	Egypt	1995 – 1998	Muhanna (2007)
Output (general)	1.07	Fiji	1995 – 1998	Muhanna (2007)
Output (general)	1.03	Seychelles	1995 – 1998	Muhanna (2007)
Output (general)	0.97	Mauritius	1995 – 1998	Muhanna (2007)
Output (general)	0.82	Philippines	1995 – 1998	Muhanna (2007)
Output (general)	0.79	Bahamas	1995 – 1998	Muhanna (2007)
Output (tourism)	1.96	South Africa	1996 – 1997	Kirchner, Sakko, & Barnes (2000)
Income (tourism)	0.7 – 1.1	Namibia	1996 – 1997	Kirchner, Sakko, & Barnes (2000)
Value-added (tourism)	0.458 – 0.785	Tanzania	2001	Blake (2008)

3.4 Discussion

In Zambia, tourism in a conventional sense, is not a discrete sector, but an amalgam of other sectors such as 'Wholesale and retail trade', 'Transportation and storage', 'Accommodation and food service activities', 'Arts, entertainment and recreation' and 'Other service activities'. To derive multipliers for tourism, all five of these sectors had to be incorporated. The sector with the highest total output, under the domestic intermediate matrix in the Zambia's 2010 input-output (I-O) tables was the Wholesale sector followed by the Transportation sector. This shows how important these two sectors are in the local tourism industry. On the other hand, the sector with the lowest annual production among the five tourism-related sectors was the 'Arts', of which the output was about 50 times smaller than the 'Wholesale' sector. It was assumed that all the tourism-related sectors produced identical products and employed the same production technology for the estimates of the I-O table analysis to be comparable at both rural area and national levels (Miller & Blair, 2009). It was also assumed that economies or diseconomies of scale were not there in production or factor substitution for the derived multipliers to be comparable at both levels (Stynes, 1997a). Even though the data in the I-O coefficients table are averages of data collected from different producers across the country – both from rural and urban areas – the structure of production in Zambia's rural areas may be identical to, or it may differ markedly from that recorded in Zambia's I-O table. And although Zambia's I-O tables were some years out of date, at the time of data collection, one important aspect about the I-O tables is that it is assumed that various model parameters are sufficiently accurate to represent the current year although they may be a few years out of date (Stynes, 1997a).

During the study, Zambia's previous I-O multipliers were not available from the government gazette and no other studies conducted on tourism multipliers in Zambia could be found. However, a study was conducted in the mining sector that examined the industry linkages and growth prospects for copper in Zambia and for phosphates in Morocco. The obtained results may be treated as estimates only and not as exact values of rural area multipliers because their accuracy could have been impacted upon during the process of adapting national I-O to rural area I-O. In Zambia the I-O table for rural areas, from which the rural area multipliers could have been derived directly, are not available, but only an averaged table for the entire country is published. Again, there were no previous studies with derived tourism multipliers in the country as reference. This study agreed well with the theory regarding likely multiplier impacts applicable to our study from the empirical results obtained using a modified static I-O framework (Bocoum & Labys, 1993). The obtained output multipliers for tourism-related sectors ranged between 1.7 and 2.3, for income they ranged between 1.7 to 3.9, and for jobs they ranged between 1.0 to 2.0. However, these recreation and cultural multipliers adapted from the mining output multipliers, were slightly higher than the average of the derived rural area tourism multipliers, but within the range of derived national multipliers. Again, the income and jobs multipliers were out of range for both derived rural area and national multipliers, clearly so because in the case of Bocoum and Labys (1993) the construction of hypothetical I-O vectors involved borrowed processing coefficients from the US national I-O table and incorporating higher degrees of processing (Bocoum & Labys, 1993). In comparison, a study in Kenya used domestic I-O tables and the Leontief Inverse Technique to calculate the output multipliers (production multiplier) for tourist expenditures, which ranged between 1.57 and 1.81 for the period between 1967 and 1976 (Summary, 1987), and agreed well with the range of our derived national output multipliers.

The intended region for the application of the derived rural area multipliers is the rural areas of Zambia, around national parks. However, the Central Statistics Office (CSO) does not publish regional I-O tables and it would be an error to apply directly the derived national multipliers to local regions such as the Kafue and South Luangwa national parks. The derived national direct requirements coefficients were then disaggregated to rural area regional level to refine the calculation of multipliers, as supported by the findings of other researchers that higher multipliers are expected for larger and more diversified economies (D'Hernoncourt et al., 2011; Miller & Blair, 2009; SPICOSA, 2010). The derived rural area multipliers are on average slightly lower than the derived national multipliers and urban multipliers are expected to be slightly higher than the national multipliers because urban areas have more diversified economies than rural areas. Other researchers have demonstrated that multipliers differ from region to region, and from country to country with lower multipliers in smaller less developed economies, such as island countries that normally import tourism-goods and services in greater proportion, than larger and more developed economies (Muhanna, 2007). If we look at an example from Muhanna (2007), we see that the multipliers from different economies were "1.73 in the United Kingdom, 1.59 in Sri Lanka, 1.27 in Jamaica, 1.23 in Egypt, 1.07 in Fiji, 1.03 in the Seychelles, 0.97 in Mauritius, 0.82 in Philippines, and 0.79 in The Bahamas" (C. Cooper & Wanhill, 1997; Muhanna, 2007). Application of derived national multipliers directly to rural areas would be biased upwards, with the yielded estimates of local multiplier effects (D'Hernoncourt et al., 2011; SPICOSA, 2010). As a way of performing tourism economic impacts analysis, at regional levels, given the lack of regional multipliers, generic multipliers are applied in countries where they have been developed, or could be applicable. Other scholars have suggested conducting a regional survey on tourism activities (business activities, employment, purchasing, etc.) to obtain multipliers for those regions (Huhtala et al., 2010; SPICOSA, 2010; Stynes et al., 2000).

The output or sales multiplier in this study was found to be higher under the 'Other service activities' sector for both type I and type II multipliers than for any of the other four tourism-related sectors. This means that tourism businesses in Zambia are well established and probably diversified under the 'Other service activities' sector than the other four tourism-related sectors. This finding on differences of multipliers confirms that output multipliers were generally greater than income multipliers as suggested by (Wang, 1997) in (Melville Saayman, Saayman, & Naudé, 2002). The output and income multipliers derived in this study are within the ranges of other respective multipliers used in other studies conducted in southern Africa. For example, a study conducted in South Africa on domestic tourist expenditure, applied an output multiplier of 1.96, while in Namibia a study on recreational shore-angling fishery used the crude income multiplier ranging between 0.7 and 1.1 (Kirchner, Sakko, & Barnes, 2000). However, more tourism jobs or employment are expected under the 'Other service' sector in rural area level, while at national level more tourism jobs are expected under the 'Accommodation' sector. Again, personal income in rural area would be captured more under the 'Accommodation' sector, while at national level it would be captured more under the 'Arts' sector. This means that most of tourism spending would be captured as wages and salaries, proprietor's income and employee benefits, in these sectors than any other sector. Of note is that empirical evidence shows that most of the jobs in the tourism-related sectors fall under these sectors. Generally, the marginal propensity to consume tourism related goods and services is higher at national level than rural area level – hence the higher multipliers at national level. Unfortunately, rural areas are not able to satisfy all the needs of tourists by using their local production because they have limited capacity to produce. At the rural area level, higher value-addition is obtained under the

'Wholesale' sector while at the national level it is obtained under the 'Accommodation' sector. The commonly used measure of the contribution of a sector to gross national or gross state product – through personal income plus rents and profits, plus indirect business taxes – is the value-added multiplier (Stynes et al., 2000). In 2001 a study on tourism and income distribution in East Africa reported value-added multipliers in Tanzania ranging between 0.458 and 0.785 for direct multipliers and between 0.154 and 0.468 for indirect multipliers (Blake, 2008). The results confirm that the derived value-added multipliers were within the same range as those from other African countries.

In the analysis, for both national and rural area levels, there was not much clear difference between the derived type I and type II multipliers for all the tourism-related sectors. This means that not much of the tourism spending activities would be captured by households as induced effects at local level. In other words, not much of the income from tourists spending was being translated into personal income, jobs and creation of tourism value added for households among the rural area regions of Zambia because of the possibility of leakage. In induced effects multiplier computations assume that jobs created by additional spending in the area are new jobs and involve new households (SPICOSA, 2010; Stynes, 1997a). Low induced multipliers do occur in other African economies and a study conducted on the tourism's contribution to the economy of Kenya between 1967 and 1976 confirmed this (Summary, 1987). When the difference between direct effects of the tourists' spending activities and the indirect effects of the same is comparatively small, then it is more likely that more visitor spending could be escaping the local region as leakage (Cook, 2013; Cullinane & Koontz, 2014; M Saayman et al., 2010; Stynes, 2001). This does not conflict with other studies which suggest that vast majority of the secondary effects of tourism in rural areas are accounted for by induced effects (Stynes, 1997b) because it depends on the type of the tourism destination and the tourism policies in place. However, the overall multiplier effect of tourism in Zambia was an important finding and it turned out that it was not significantly different from that of international tourism.

3.5 Conclusion and recommendations

The input-output tables (I-O) for the year 2010 for Zambia developed by the Central Statistics office (CSO, 2014) were applied to derive the input-output model that was also applied to estimate the rural area region tourism multipliers for Zambia. The national technical coefficients were first derived from the 2010 national input-output tables and then rescaled to rural area regional level to identify multipliers that would enable quantification of the impacts on the local economy being studied, using sector-specific supply percentages. Type I and type II rural area regional level tourism multipliers were derived from the total requirement coefficients through the open and closed Leontief Inverse Matrices. The obtained results can be treated as estimates only and not as exact values of rural area multipliers because their accuracy could have been impacted upon during the process of adapting national I-O to rural area I-O. The derived estimates of wildlife-based tourism multipliers are outlined by sector in the table below:

Table 3.20: Zambia's derived 2015 rural area multipliers for selected tourism-related sectors in Zambia

Industry/Sector	Output I	Personal Inc/sales	Jobs /MM sales	Value added/ sales	Output II	Personal Inc II/sales	Jobs II /MM sales	VA II/sales
Wholesale and retail	1.10	0.05	12.98	0.71	1.12	0.05	13.65	0.72
Transportation and storage	1.12	0.04	9.37	0.52	1.15	0.04	10.44	0.54
Accommodation and food	1.20	0.20	22.33	0.67	1.23	0.20	23.64	0.69
Arts	1.11	0.16	6.01	0.55	1.19	0.16	8.94	0.59
Other service activities	1.27	0.04	35.81	0.53	1.33	0.05	38.06	0.57

Source: Author's own calculations

Study outcomes

Specific objective 1: The specific objective of this chapter was to derive estimates of wildlife-based tourism multipliers that can be used for economic impact assessments of rural areas or regions of Zambia.

Related question and outcomes: How can estimates of multipliers for tourism in the rural area economy of Zambia be derived from input-output tables for the following:

a) Output or sales?
b) Income?
c) Employment or jobs? and
d) Value-added in tourism?

The study applied the I-O table to derive the national and rural area multipliers using the Open Leontief Inverse matrix model. The Type I multipliers represented the direct and indirect effects, while Type II multipliers represented direct, indirect and induced effects. Derived multipliers were focused on tourism related sectors that include the 'Wholesale and retail', 'Transportation and storage', 'Accommodation and food', 'Art', and 'Other service activities'. The procedure of calculating the national multipliers was the same as the rural area multiplier except that the rural area multipliers were rescaled based on the rural area share of Zambia's total production. The specific procedures applied to derive multipliers and the results are stated as indicated:

a) Output or sales multiplier:

The procedure for deriving the national output multipliers is outlined under the section 'National output multiplier' of Chapter 3.2.1 and the results are displayed in Table 3.5 and Table 3.7. The procedure deriving the rural area output multipliers is outlined under the section 'Output multiplier' of Chapter 3.2.2 and the results are displayed in Table 3.11.

b) Derived multipliers (Income, employment or jobs, and value-added)

The procedures for deriving the national multipliers for income, employment and value-added are outline under the section 'Derived national multiplier for income, employment or jobs, and value-added' of Chapter 3.2.1 and the results are displayed in Table 3.6 and Table 3.7. The procedure deriving the rural area multipliers is outlined under sections 'Income multiplier', 'Employment (jobs) multiplier' and 'Value-added multiplier' of Chapter 3.2.2 and the results are displayed in Tables 3.13, 3.14, 3.15 respectively and in Table 3.16.

Going forward: Based on the findings, insights from literature and the author's estimation of tourism rural area multipliers, the following recommendations would help policy makers, stakeholders, researchers and the government agencies as thus:

- Policy analysis can provide insight into the characteristics of the structure of tourism in rural areas and can be useful in preliminary policy analysis when estimating the economic impacts of alternative policies or changes in the local economy.
- Policy makers' concerns over the impacts that additional tourist visits or increased tourism investments may have on households' income, value added or created jobs in rural areas can be addressed by the application of tourism multipliers in economic analysis tools.
- Consultants and researchers can integrate the tourism multipliers into economic impact evaluations, or social analysis of communities living around PAs.
- Government administrators will find tourism multipliers appropriate specifications for rural areas when comparing the values of PAs at local or regional level with other PAs or other land uses in similar regions.

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Chapter 4 THE ECONOMIC IMPACT OF NATIONAL PARK VISITOR SPENDING ON LOCAL ECONOMIES: CASES OF KAFUE AND SOUTH LUANGWA NATIONAL PARKS

Abstract

The goal of this study was to evaluate the economic impact of Kafue and South Luangwa national parks on human communities and thus provide a way of informing stakeholders of the value of these parks apart from conservation purposes. A series of on-site intercept surveys of visitors' daily expenditures was conducted at randomly selected tourism facilities throughout the parks. A total of 48 visitor party surveys of Kafue and 33 of South Luangwa were completed successfully. The party's (group) spending averages per night for both national parks had a lower range of between ZMW1,086 and ZMW4,442 for day/self-drive visitors and a higher range of between ZMW5,479 and ZMW12,698 for top-end lodges. To evaluate the economic impacts of visitor party spending in these national parks, the Money Generation Model 2 (MGM2), that was adapted to evaluate local rural economies around the national parks, was applied. The total tourism economic effects/impacts generated by visitor spending in the local areas fell within the range of ZMW28.08 million and ZMW135.91 million for Kafue and ZMW120.66 million and ZMW547.64 million for South Luangwa. The number of new jobs supported in the local regions by visitor spending were in the ranges of 29 – – 125 for Kafue and 154 – – 636 for South Luangwa. The total tourism economic value, which estimates the likely losses in economic activity to the local region if the national parks were not available, was estimated at ZMW275 million for the KNP and ZMW1,031million for the SLNP. The study showed that wildlife-based tourism provides an important contribution to local economies and provides business and employment opportunities at local levels, especially for a park that is popular with tourists.

Keywords: *National parks, visitation, visitor expenditures, Kafue National Park, South Luangwa National Park, Money Generation Model2 (MGM2)*

4.1 Introduction

4.1.1 Background and rationale

Kafue and Luangwa national parks have the sizes and diversities of landscapes and wildlife to offer variety of tourism products that service all geographic, prices, and interest source markets in Zambia (Lindsey et al., 2014; ZAWA, 2011b). South Luangwa National Park (SLNP) is now among the most developed and publicised national parks in southern Africa with an elaborate network of game viewing loops (Balakrishnan & Ndhlovu, 1992; Jachmann & Billiouw, 1997; Milupi et al., 2017). Kafue National Park (KNP) has been receiving very poor numbers of tourist visits for many years. There is a need to evaluate how KNP and SLNP, which are among Africa's socio-ecologically important conservation areas (boasting a high diversity of wildlife), impact on the livelihoods of people living in GMAs and OAs around them. Unfortunately, some of the KNP and SLNPs' tourism outputs and their contributions to socio-economic development are often ignored or grossly underestimated by the agents. The major problem is that the evaluation methods for the total economic footprint of these parks are not well developed, including other tools that may be used for evaluating their comparative advantage with alternatives.

The tourism *economic significance* estimates the effects of spending by all visitors, including visitors from local area, while the tourism *economic impacts*, which does not include spending by local visitors (Stynes & Sun, 2003), measure the effects of spending by visitors who did not reside in the local regions or specifically the gateway regions (Cui et al., 2013). The Money Generation Model 2 (MGM2) was applied to estimate local *economic significance* and *economic impacts* of visitor spending using multipliers (Cui et al., 2013; Stynes & Sun, 2003) derived from the Zambia's Input-Output Tables for 2010 and rescaled to rural area regional level as outlined in Chapter 3 and also described in Chapter 1. Both the direct and secondary economic effects, in local regions or gateway regions around the parks, are captured using multipliers in terms of jobs, labour income and value added (Cui et al., 2013).

The data for the annual visitation of the Kafue National Park (KNP) and the South Luangwa National Park (SLNP) were obtained from the Department of National Parks and Wildlife

(DNPW) visitor arrivals' records for the period from 2008 to 2015 (Figure 4.1). Those visitor arrivals' records were the only information available during the period of the study.

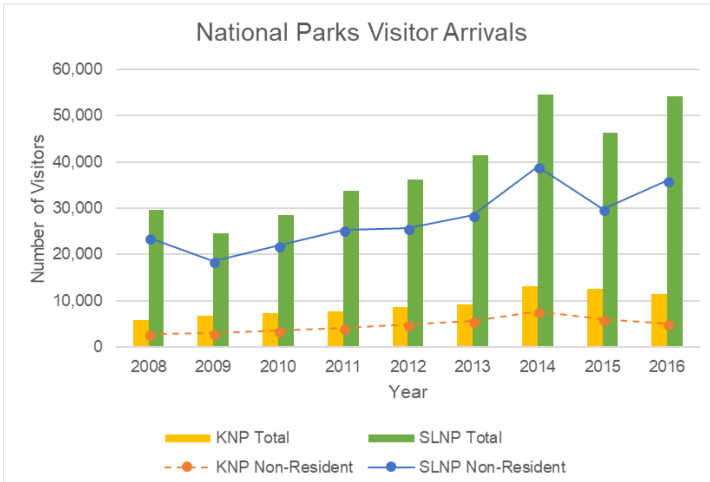

Figure 4.1: National Parks visitor arrivals from 2008 to 2015
Source: (DNPW, 2016; ZAWA, 2011b)
Figure notes:
Visitors to the parks:

- *Zambian visitors – Zambian nationals.*
- *Resident visitors – foreign nationals living in Zambia.*
- *Non-resident visitors – foreign nationals coming from outside Zambia.*

The economic impacts of visitors' spending on local economies, in and around both KNP and SLNP, just like in any Protected Area (PA) popular with tourists, are captured through payments of park fees and payment for goods and services, which include lodging, meals and transport. Both the local and non-local visitors' spending contributes to the local region's gross economic activity, but the local economic region is impacted by the new money brought in through the non-local visitors' spending (Crompton & Park, 2010; Cullinane & Koontz, 2014). Henceforth, the analysis of economic impacts exclude spending by local visitors based on the assumption that if they decided not to visit the park, they would still spend their money on other recreational activities within the local economy (Cullinane & Koontz, 2014). One of the ways to analyse tourism economic activity, as described in terms of 'effects' or 'impacts' (income, jobs, value added, taxes, etc.) and experienced directly or indirectly by businesses or induced by households in regional economies (Figure 4.2), is by application of Money Generation Model 2 (MGM2) using multipliers (Stynes et al., 2000). In this study the MGM2 was adapted to evaluate rural region economies using the Zambia's rural area derived multipliers (Table 3.20).

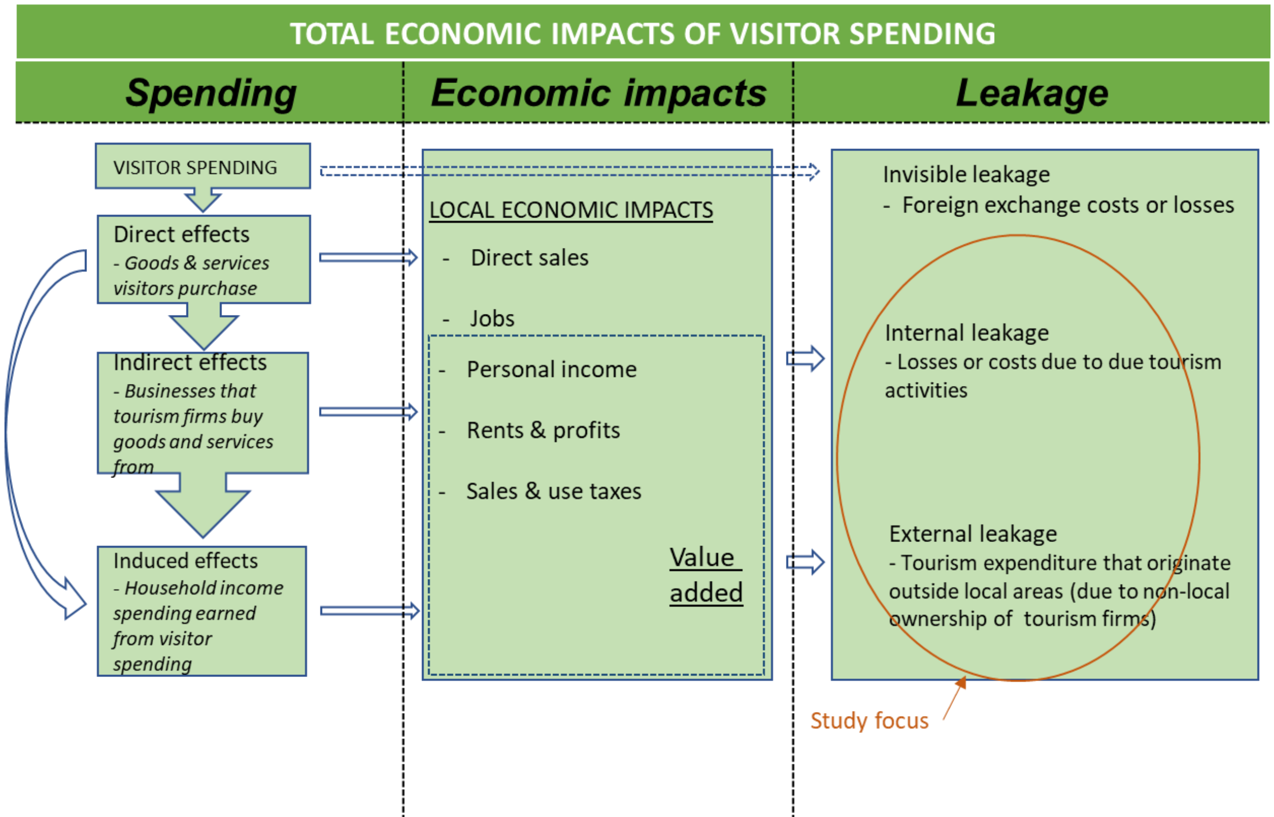

Figure 4.2: Flow diagram of total economic impacts and leakage of visitor spending

The goal of this study was to estimate the economic significances and impacts of both the KNP and SLNP, and therefore use the estimates as a basis for informing stakeholders on the value of these PAs in not only conserving wildlife and its habitats, but serving as engines for economic growth (Child, 2014; Souza Beraldo, 2017). The tourism impact results on local economies around both NPs would help future policy making for both tourism development and nature conservation (Fernandez, Richardson, Tschirley, & Tembo, 2009).

4.1.2 Objectives and research questions

The overall objectives of the study are to measure the relative economic impacts of tourism on locals living in settlements near the Kafue and the South Luangwa national parks, and to develop an understanding of how the geographical locations of their settlements influence the realization of income from primary sources and to ascertain how their location affects the main positive and negative social impacts.

Specific objective:

To estimate the economic significance and impact of tourism on the local economies around Kafue and South Luangwa national parks.

Related questions

a) What is the estimated local visitor spending in both Kafue and South Luangwa national parks?
b) What is the economic impact /effect of park tourist visitor spending on local economies in close proximity to Kafue and South Luangwa national parks?

4.2 Research methods

The research methods applied in this study to estimate the impacts of visitor spending on local economies around the Kafue and the South Luangwa NPs, are outlined in the data collection section of the Research methods chapter (Chapter 2). These methods include the following:

- Site selection from among areas bordering and lying within 50-60km of Kafue and south Luangwa national parks.
- On-site intercept surveys for visitors' daily expenditures conducted at randomly selected tourism facilities.
- Derivation of the national and rural area economic multipliers from the input-output table published by the Central Statistics Office of Zambia.
- Collection and segmentation of the annual numbers of visitors to the national parks into five categories of spending patterns (top-end, upper middle, lower middle budget/self-catering or day/self-drive categories).

- Application of the Money Generation Model 2 (MGM2) to evaluate the economic impacts of visitor spending in the national parks' local economies.

4.3 Results

4.3.1 National Parks Visits

Annual visits and profile of tourists

The results from the visitors' intercept surveys conducted in both the KNP and the SLNP are presented in Table 4.1 and Table 4.2. Comparable statistics of visitor numbers for the two national parks, during the study, was only available for the period from 2008 to 2015. Data obtained showed that in 2015 the two national parks received 12,550 and 46,257 visits to Kafue and South Luangwa respectively. Total visitor segment spending was estimated by dividing all the recorded visitors into segments of spending patterns and multiplying each segment with the spending averages from the surveys conducted in both national parks. The segmentation patterns of the visitors from the surveys showed that 17.3% of the tourists were from the UK and 14.8% from Europe, comprising Germany, the Netherlands, Italy, France, and Switzerland. Both the USA and South Africa tourists accounted for 7.4% for each country while Canada accounted for 2.5%. Southern Africa, apart from South Africa, recorded 7.4% of the tourists – the larger share of 42% were Zambian residents. The sample size from own surveys was not large enough to determine the party size ratio and the tourists' length of stays in both parks. However, we had to use what other previous researchers in the parks established. The MCC Supply Survey report established that 28.6% of tourists that visited the KNP travelled as families (i.e., parents and children) and 40% of tourists that visited the KNP were couples. The single travellers and honeymooners were found to comprise only 6% and 2.7% respectively. A relatively small proportion of tourists visiting the KNP (13.2%) were reported to have travelled in groups of six or more. Only 1.6% was reported to have travelled in groups of more than 20.

Table 4.1: Tourists and their nationalities from a survey in the KNP and SLNP

Country of origin	Kafue National Park	South Luangwa National Park	Total sample	Percent (%)
United Kingdom (UK)	5	9	14	17.3
United States of America (USA)	2	4	6	7.4
South Africa	4	2	6	7.4
Germany	2	2	4	4.9
Netherlands	2	2	4	4.9
Canada	1	1	2	2.5
Italy	1	1	2	2.5
Botswana	1	1	2	2.5
Zimbabwe	1	1	2	2.5
Namibia	1	1	2	2.5
France	1	-	1	1.2
Switzerland	1	-	1	1.2
Australia	-	1	1	1.2
Zambia	26	8	34	42.0
Total	48	33	81	100

Segmentation of visitors

The tourism facilities that were selected from both the KNP and SLNP were segmented into five segments that consisted of the top-end lodges, upper-middle lodges, lower-middle lodges, budget or self-catering accommodation and the self-drive visitors. The segmentation of the facilities was based on what they offered their clients comparable to other facilities. The data on the total number of visitors to both parks, collected from the DNPW, was also segmented into five segments based on previous percentages of visitor accommodation preferences. The segmentation percentages used for this study, for both the KNP and the SLNP, was adapted from the survey conducted by MCC Supply Survey (Chemonics, 2011) backed by expert[9] advice. The day/self-drive visitors' segment, which is almost non-existent in both parks, was included as a fifth segment, separated from the budget segment since at least three surveys were recorded for this segment (Table 4.3 and Figure 4.3). Table 4.2 below shows the party (group) trips, converted from total park visits, number of tourists that visited the parks, and the party sizes adapted from

[9] Practitioners in the tourism business of a specific park, e.g. park manager or tourism business manager

MCC supply survey backed by expert[10] advice. The MCC supplied survey data was also adapted to calculate the tourist length of stay of 3.5 days based on the report that about 51.5% of tourists (majority) stayed for 3 to 5 days, and 32.5% stayed for 1 to 2 days. Moreover, the report approximated that 11% of tourists visiting the park stayed for more than 6 days (Chemonics, 2011). The same party sizes and length of stay adapted from MCC supply survey, backed by expert advice, was used as proxy for the SLNP because data for that park was not available.

Table 4.2: Park visits, party sizes and party trips for the KNP and the SLNP

Park	Park Visits	*Average Party Sizes					Party Trips
		Top end	Upper-middle	Lower-middle	Budget/Self-catering	Day/Self-drive	
KNP	12,550	2.0	2.4	2.6	2.5	2.0	4,652
SLNP	46,257	2.0	2.4	2.6	2.5	2.0	17,146

**Based on MCC supply survey Chemonics International Inc, 2011 and author's own calculations.*

<u>Table notes</u> (definitions according to Stynes et al., 2000):
Segments:

- *Top-end – Visitors staying at top-end lodges and bush camps.*
- *Upper or middle – Visitors staying in middle range lodges and bush camps.*
- *Budget/self-catering – Visitors at self-catering camp areas.*
- *Day/self-drive – applicable to visitors who did not stay overnight in the area but drove from outside the local area.*

Table 4.3: Segmentation of visitor arrivals into party trips based on accommodation preferences (survey segments) and party sizes

Visitor Segment/Arrivals	*Accommodation preference (%)	Party Trips	
		KNP	SLNP
Top-end lodges	9	565	2,082
Upper-middle lodges	30	1,494	5,507
Lower-middle lodges	15	658	2,426
Budget/Self-catering	45.5	1,903	7,016
Day/self-drive	0.5	31	116
Total	100	4,652	17,146

**Based on MCC supply survey Chemonics International Inc, 2011 and author's own calculations*

[10] Practitioners in the tourism business of a specific park, e.g. park manager or tourism business manager

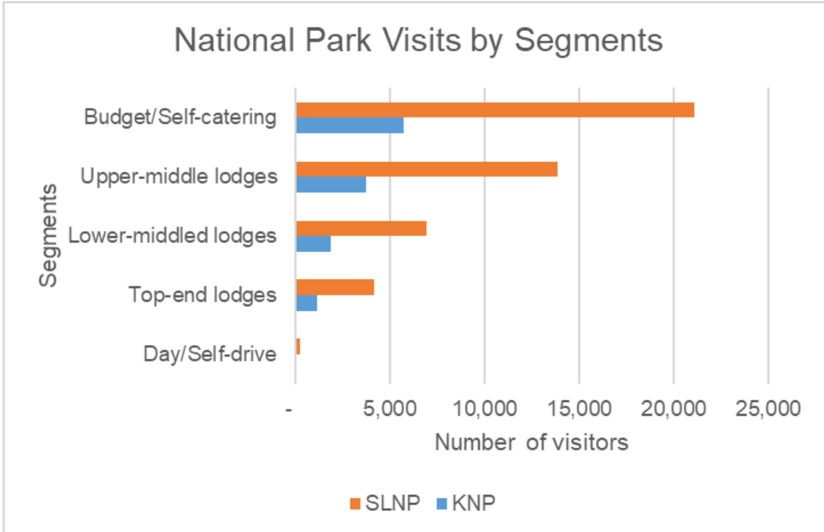

Figure 4.3: Segmentation of visitor arrivals into party trips based on accommodation preferences.

National Park party nights (per party per night/day)

The DNPW records of annual park visits were converted from person entries to party day/night entries, the application of average party size, park re-entry factors and length of stay (Cui et al., 2013; Stynes & Sun, 2003). The visitor segment percentage, party size and length of stay factors were adapted from the MCC supply survey, backed by expert[11] advice, while the re-entry factor was estimated based on expert advice only (Table 4.4).

Table 4.4 summarizes the park visits and party nights by visitor segments to the Kafue and South Luangwa national parks. The party day/night percent by visitor segments are based on 16,203- and 59,721 party nights generated by the 12,550 and 46,257 park visits in 2015 respectively for the KNP and the SLNP.

[11] Practitioners in the tourism business of a specific park, e.g. park manager or tourism business manager.

Table 4.4: Kafue National Park party nights by visitor segment

KNP Party Nights by Visitor Segment						
	Segment					
	Top end	Upper-middle	Lower-middle	Budget/Self-catering	Day/Self-drive	Total
*Accommodation preference – percent	9	30	15	45.5	0.5	100
	1,130	3,765	1,883	5,710	63	12,550
Conversion factors for visits						
Re-entry factor	1	1.05	1.1	1.2	1	1.1
Party size	2.0	2.4	2.6	2.5	2.0	2.4
Length of stay	3.5	3.5	3.5	3.5	1	3.5
Measures for park use						
Adjusted visits	1,130	3,586	1,711	4,759	63	11,248
Party trips	565	1,494	658	1,903	31	4,652
Party nights	1,977	5,229	2,304	6,662	31	16,203
Percent of party nights	12.1	32.2	14.2	41.3	0.2	100

Source: Author's own calculations

Table notes (definitions and formulas according to Stynes & Sun, 2003):

- *Adjusted visits = Park visits/re-entry factor (this is the number a visitor enters the park during his/her stay in the area).*
- *Party nights/party days = (Park visits * Length of stay in area)/ (party size * re-entry factor)*
- *Party = a visitor spending unit, normally all persons in the vehicle or all visitors staying in the same room or campsite.*
- *Party night /party day = number of nights/days spent in the area on a party basis.*
- *Segments: Top-end – Visitors staying at top-end lodges and bush camps. Upper or middle – Visitors staying in middle range lodges and bush camps. Budget/self-catering – Visitors at self-catering camp areas. Day/self-drive – Visitors driving from outside local area who did not stay overnight in the area.*

Table 4.5 summarizes the park visits and party nights by visitor segments to the Kafue and South Luangwa national parks. The party day/night percent by visitor segment is based on 16,203 and 59,721 -party nights generated by the 12,550 and 46,257 park visits in 2015 respectively for the KNP and the SLNP (Appendix 7.11).

Table 4.5: Summary of Kafue and South Luangwa national parks party nights by visitor segment

Segment	Park visits		Party nights		Party day/night percent	
	KNP	SLNP	KNP	SLNP	KNP	SLNP
Top end	1,130	4,163	1,977	7,285	12%	12%
Upper-middle	3,765	13,877	5,229	19,274	32%	32%
Lower-middle	1,883	6,939	2,304	8,491	14%	14%
Budget/self-catering	5,710	21,047	6,662	24,555	41%	41%
Day/self-drive	63	231	31	116	0.2%	0.2%
Total	12,550	46,257	16,203	59,721	100%	100%

Source: Author's calculations

The Summary of Kafue and South Luangwa national parks party nights by visitor segment**,** shows that the DNPW received a total of 16,203 party overnight stays for the KNP and 59,721 for the SLNP. The party night percentages were calculated from total party nights in the abovementioned Table 4.5 above. The budget/self-catering segment accounted for 41% – 46% were in middle range lodges and 12% stayed in top-end lodges. The day/self-drive segment accounted for less than 1%.

4.3.2 Local Visitor Spending

The Kafue National Park (KNP) visitor spending averages obtained from the surveys are indicated in Table 4.6 and Table 4.7. The visitor spending averages covered expenses in the local regions excluding 50% of animal fees. These KNP park entry fees, 50% of animal fees, admission fees and camping fees are not managed by the local park agency in local areas but are sent to the agency headquarters in the country's capital. Visitor spending in Table 4.6 is reported on a party night basis for overnight stays and on a party day basis for day/self-drive trips (Stynes & Sun, 2003). The visitor spending profiles are adapted from the MCC supply survey, backed by expert advice, and price adjusted to 2015. Each spending category was estimated by the visitor surveys conducted in both the KNP and the SLNP during the study. Spending averages vary between the Kafue and South Luangwa national parks based on local prices, spending opportunities and accommodation preferences. The total spending by visitors in each segment was estimated by totalling the thirteen (13) different categories of expenditure lines (Table 4.6).

Table 4.6: The KNP visitor spending range in local areas by visitor segment (ZMW[12] per party per day/night)

Spending Categories / Visitor Segment	Top End (ZMW)		Upper Middle (ZMW)		Lower Middle (ZMW)		Budget/Self-Catering (ZMW)		Day/Self-drive (ZMW)	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Accommodation: lodges and bush camps	2,566	3,914	838	2,376	147	544	173	320	0	0
Camping fees	–	–	–	432	–	259	–	346	0	0
Meals: restaurants, bars	600	855	–	804	0	3,050	–	786	0	0
Groceries, retail, wholesale	–	86	–	1,440	–	432	–	864	248	500
Gas and oil	–	346	–	432	–	1,728	–	500	324	700
Local transportation	21	484	–	1,880	–	1,744	–	1,091	0	2,000
Admissions and fees (PA entry)	207	415	207	484	207	484	242	484	207	242
Activities and guided tours: game drive ...	467	933	467	1,089	544	1,089	544	1,089	0	0
Souvenirs and other gifts	432	864	–	576	–	48	9	216	0	0
Animal fees, concession fees (license, permits)	2,456	2,456	242	242	126	126	67	67	–	–
Local dip, pack, taxidermy	617	617	112	112	8	8	24	24	–	–
Gratuities and tips	62	1,728	–	1,123	–	1,296	–	864	0	0
Other expenses	–	–	–	–	–	–	–	500	501	1,000
Total	7,428	12,698	1,867	10,990	1,033	10,809	1,058	7,149	1,281	4,442

Source: Author's calculations

Table 4.7 below shows the total spending from the total contribution of the thirteen different categories of visitor (tourists) expenditure lines in the Kafue National Park multiplied by the party nights for each segment. The party day/night stays from the five different segments were 16,203 generated from 12,550 park visits in 2015. The spending averages for each segment were measured per party per night/day basis. The party night/day stays were generated from the DNPW records of annual visits by converting the person entries making use of party sizes, length of stay and park re-entry factors as shown above in Table 4.4 (Cui et al., 2013; Stynes & Sun, 2003). The grand total of visitor spending, from all segments, in Kafue ranged between ZMW 33,915,002 and ZMW 155,235,200.

[12] ZMW stands for Zambian Kwacha currency: US$1.00 = ZMW8.64 in 2015.

Table 4.7: Kafue National Park total visitor spending by visitor segment

	Top end	Upper-middle	Lower-middle	Budget/ self-catering	Day/ self-drive
Party nights	1,977	5,229	2,304	6,662	31
Spending average range (per party per night/day (ZMW 000's))	7.4 – 12.7	1.9 – 11.0	1.0 – 10.8	1.1 – 7.1	1.3 – 4.4
Total spending range (ZMW 000's)	14,683 – 25,099	9,762 – 57,467	2,380 – 24,901	7,050 – 47,629	40 – 139

Source: Author's calculations

<u>Table notes</u> (formulas according to Stynes & Sun, 2003):

- *Each segment's total spending = party nights * average spending per party per night/day*
- *Rows/columns may not sum to totals due to rounding and conversion from US dollar currency to kwacha currency*

Table 4.6 shows that the visitor spending averages per party per night/day ranged from the day visitor's range of between ZMW1,300 and ZMW4,400 to the top-end visitor's range of between ZMW7,400 and ZMW12,700 with a difference ranging between ZMW6,100 and ZMW8,300. Apart from the day/self-drive segment, the budget/self-catering segment was cheaper than the other three segments but had the most party nights. The spending average range per party per night for the budget/self-catering segment was between ZMW1,100 and ZMW7,100. Lower-middle lodge visitors spent between ZMW1,000 and ZMW10,800, while the upper-middle lodge visitors spent between ZMW1,900 and ZMW11,000. The upper-middle segment received the second most party nights but had the highest visitor's total spending range. The difference between the highest average spending range (top end) and lowest range (day/self-drive) was between ZMW6,100 and ZMW8,300. The total spending for each segment recorded highest among the four segments (without considering the day/self-drive segment) from the upper-middle segment with a range of ZMW9,762,000 – ZMW57,467,000, and the lowest was the lower-middle with a range of ZMW2,380,000 – ZMW24,901,000 (Table 4.7 and Table 4.8).

Table 4.8 below gives the total spending from the total contribution of the five different segments of accommodation preferences in both the Kafue and South Luangwa national parks. The segments of accommodation preferences for South Luangwa national were categorised in a similar way as was done for Kafue and the grand total of visitor spending in Kafue ranged between ZMW33,915,000 and ZMW155,235,000 from 16,203 party nights, while for South Luangwa it ranged between ZMW 111,603,000 and ZMW498,279,000 from 59,721 party nights. In South Luangwa, the difference between the highest average spending (top-end) and lowest (day/self-drive) ranged between ZMW4,393 and ZMW6,841, which was cheaper than that of Kafue (ZMW6,100 – – ZMW8,300). The total spending for each segment recorded highest among the five segments from the upper-middle segment (ZMW33,015 – ZMW182,624) and the lowest, without considering the day/self-drive segment, was the lower-middle segment (ZMW9,463 – ZMW78,792) (Appendices 7.13 and Table 4.8). The table shows that the percentages of spending categories was similar for both national parks with the highest spending in the middle segments (combined) at 46% (i.e., 11% + 35% for Kafue and 12% + 34% for South Luangwa) for both parks followed by a budget segment of 28% for Kafue and 32% for South Luangwa. Top-end segment spending accounted for 26% for Kafue and 22% for South Luangwa.

Table 4.8: Total visitor spending by segment

Visitor Segment / Total Spending	Kafue National Park		South Luangwa National Park	
	Spending (ZMW 000's)	Average Percent of Total Spending (%)	Spending (ZMW 000's)	Average Percent of Total Spending (%)
Day/self-drive	40 – 139	0.1	126 – 404	0.1
Budget/self-Catering	7,050 – 47,629	28	29,084 – 161,148	32
Lower Middle	2,380 – 24,901	11	9,463 – 78,792	12
Upper Middle	9,762 – 57,467	35	33,015 – 182,624	34
Top End	14,683 – 25,099	26	39,915 – 75,311	22
Total	33,915 – 155,235	100	111,603 – 498,279	100

Source: Author's calculations

Table notes:

- *Rows/columns may not sum to totals due to rounding and conversion from US dollar currency to kwacha currency.*

The combined totals for the visitor spending in local areas of both the Kafue and South Luangwa national parks (Table 4.9), gives a sum ranging between ZMW145,518,000 and ZMW653,514,000 (ZMW33,915,000 to ZMW155,235,000 plus ZMW111,603,000 to ZMW498,279,000). The visitor spending segments in South Luangwa accounted for 77% while that of Kafue contributed the remaining 23% (Table 4.8 and Figure 4.4).

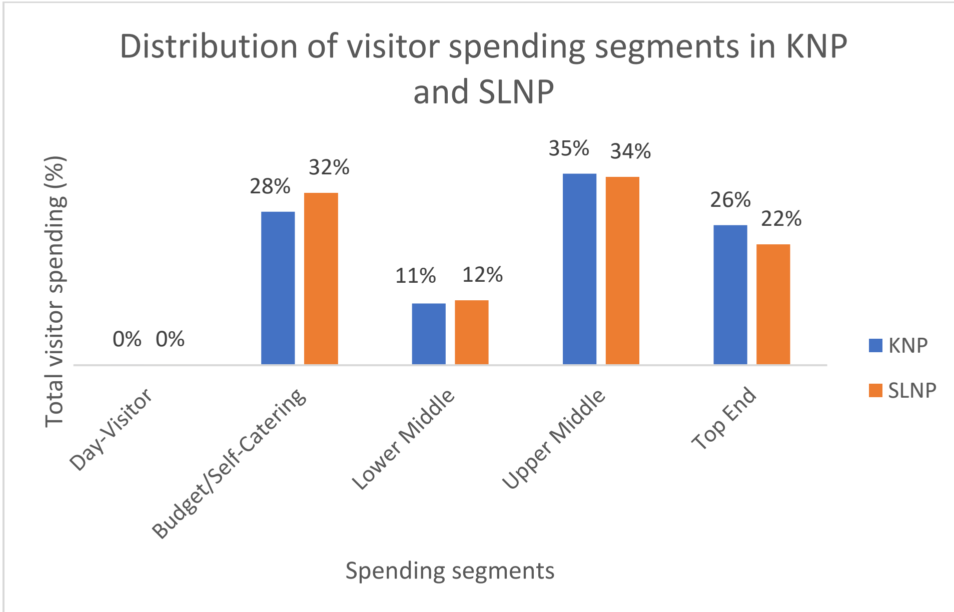

Figure 4.4: Distribution of National Parks visitor spending in segments (combined).

When comparing the spending categories of the two national parks, one sees from Figure 4.4 below that in the KNP the highest visitors' expenditure was the accommodation category with 24%, while in the second position visitors spent more on park activities (e.g., guiding) at 18%. The third position was meals and beverages at 13% followed by animal fees at 9% and then park admission fees at 8%. Gratuities and local transportation were both at 6%, while the rest of the spending categories ranged between 1% and 4% as outlined in Figure 4.5 below. In the SLNP the highest visitors' expenditure was the activities category with 24%, while in the second position visitors spent more on accommodation at 19%. The third position was admissions at 14% followed by beverages and meals at 11% and then animal fees at 7%. Gratuities and local transportation were both at 5%, while the rest of the spending categories ranged between 1% and 4% as outlined in Figure 4.5 below.

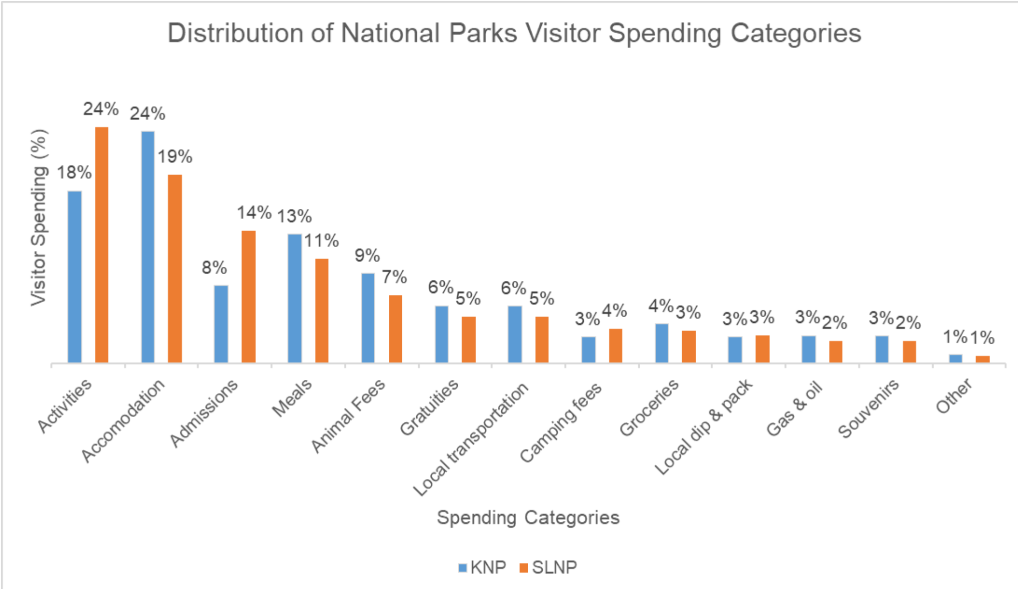

Figure 4.5: Distribution of National Parks visitor spending in categories (combined).

4.3.3 Local Significance and Impact of Visitor Spending

The local significance and local impact of visitor spending were estimated – as outlined below – for local areas in each respective national park. A brief description of MGM2 is outlined in Chapter 2 and also attached in Appendix 7.12.

Local Economic Significance

The Kafue National Park's total visitor spending averages obtained from the surveys are shown in Table 4.8 above. The economic significance analysis of total visitor spending averages covered expenses in the local regions, excluding 50% of animal fees (Cui et al., 2013) and camping fees (not applicable to South Luangwa). On top of the excluded abovementioned expenses Kafue visitor spending averages excluded 100% expenses on park entry fees. These KNP park entry fees, 50% of animal fees and camping fees, are not managed by the local park agency in local areas but are sent to the park agency headquarters (DNPW-Chilanga). To evaluate the economic significance of the total visitor spending mentioned above on the local economies around the Kafue National Park, the MGM2 model was applied. The MGM2 output table below reflects the Kafue National Park's local economic significance resulting from the ZMW33,915,000 and ZMW155,235,000 range in visitor spending by all the visitors, including those who reside in the 50km radius around the park or in the gateway regions. This spending yielded an extra income of ZMW13.93 million – ZMW67.29 million range in direct sales – costs of goods and services not made locally were excluded (Stynes & Sun, 2003). A range of between 26 and 109 new local full time jobs, with a total payroll in a range of ZMW2.24 million – ZMW9.76 million, were supported by direct spending in the local economy of the park (Stynes & Sun, 2003). Including local secondary effects, the total effects ranged between ZMW17.04 million and ZMW81.17 million in sales, 29 – 125 new jobs and ZMW2.29 million – ZMW10.01 million in personal income. Value added yielded ranged between ZMW8.75 million and ZMW41.73 million (Table 4.9).

Table 4.9: Economic significance of the Kafue National Park visitor spending on the local economy, 2015 (includes spending by local tourists)

Sector/Spending category	Direct Sales (ZMW million)	Jobs	Personal Income (ZMW million)	Value Added (ZMW million)
Direct Effects				
Accommodation: lodges and bush camps	4.61 – 9.92	12 – 26	0.92 – 1.98	3.10 – 6.68
Camping fees	0.00 – 1.82	0 – 8	0.00 – 0.08	0.00 – 0.97
Meals: restaurants, bars	0.71 – 10.89	2 – 28	0.14 – 2.17	0.48 – 7.34
Groceries, retail, wholesale	0.00 – 1.45	0 – 2	0.00 – 0.08	0.00 – 1.03
Gas and oil	0.00 – 1.03	0 – 2	0.00 – 0.05	0.00 – 0.73
Local transportation	0.01 – 7.94	0 – 9	0.00 – 0.33	0.01 – 4.14
Admissions and fees (PA entry)	0.00	0	0.00	0.00
Activities and guided tours: game drives,	6.18 – 12.97	4 – 9	0.99 – 2.07	3.38 – 7.09
Souvenirs and other gifts	0.18 – 1.25	0 – 1	0.03 – 0.20	0.10 – 0.68
Animal fees, concession fees (license, permits)	1.71	7	0.08	0.92
Local dip, pack, taxidermy	0.40	0	0.06	0.22
Gratuities and tips	0.11 – 16.23	0 – 11	0.02 – 2.59	0.06 – 8.86
Other expenses	0.01 – 1.68	0 – 7	0.00 – 0.07	0.00 – 0.90
Direct Effects	13.93 – 67.29	26 – 109	2.24 – 9.76	8.27 – 39.56
Secondary effects	3.11 – 13.88	4 – 16	0.05 – 0.25	0.48 – 2.17
Total Effects	17.04 – 81.17	29 – 125	2.29 – 10.01	8.75 – 41.73

Source: Author's calculations

Table 4.10 below summarizes the MGM2 output for both the Kafue and the South Luangwa National Parks' local economic significances resulting from the ranges of ZMW33.92 million – – ZMW155.24 million and ZMW111.60 million – – – ZMW498.28 million in visitors' spending respectively (Appendix 7.14). The visitor spending yield (multiplier effects) for Kafue has already been alluded to above (Table 4.9) while for South Luangwa, the visitor spending yielded a range of ZMW61.08 million – ZMW280.22 million in direct sales, which excluded the costs of goods and services not made locally, and in the process directly supported 137 – 563 new local jobs, with a total payroll of ZMW7.61 million – ZMW33.82 million, outside the park (Stynes & Sun, 2003). The total effects – including local secondary effects – was in the range of ZMW76.12 million – ZMW344.34 million in sales, 154 – – 636 new jobs and ZMW7.87 million – ZMW34.93 million in personal income. The value-added yield was in the range of ZMW36.67 million – ZMW168.37 million (Table 4.10).

Table 4.10: Economic significance of the Kafue and South Luangwa National Parks' visitor spending on local economies, 2015 (includes spending by local tourists)

Economic measure	Direct Sales (ZMW Millions)		Jobs		Personal Income (ZMW Millions)		Value Added (ZMW Millions)	
	KNP	SLNP	KNP	SLNP	KNP	SLNP	KNP	SLNP
Direct Effects	13.9 – 67.3	61.1 – 280.2	26 – 109	137 – 563	2.2 – 9.8	7.6 – 33.8	8.3 – 39.6	34.4 – 158.6
Secondary Effects	3.1 – 13.9	15.0 – 64.1	4 – 16	17 – 72	0.1 – 0.3	0.3 – 1.1	0.5 – 2.2	2.3 – 9.7
Total Effects	17.0 – 81.2	76.1 – 344.3	29 – – 125	154 – – 636	2.3 – 10.0	7.9 – 34.9	8.8 – 41.7	36.7 – 168.4

Source: Author's calculations

Table notes:

- *Rows/columns may not sum to totals due to rounding and conversion from US dollar currency to kwacha currency*

The total economic significances (that includes total effects for direct sales), total effects for personal income and total effects for value-added, equalled a range between ZMW28.08 million and ZMW135.91 million for Kafue and between ZMW120.66 million and ZMW547.64 million for South Luangwa. All visitors, including non-local visitors to the Kafue National Park, supported seven (7) new jobs through animal fees spending, between 12 – 26 new jobs through accommodation spending, between 2 – 28 new jobs through meal (restaurants and bars) spending and between 4 – 9 new jobs through park activities (guided tours) spending, among others (Table 4.9). Comparatively South Luangwa visitors supported more new jobs in different spending categories than did the visitors to Kafue (Appendix 7.14)

Figure 4.6 and Figure 4.7 below compare the results of total economic significances in local areas for the Kafue and South Luangwa National Parks as ZMW17 million – ZMW81 million and ZMW76 million – ZMW344 million range in direct sales, ZMW9 million – ZMW42 million and ZMW37 million – ZMW168 million range in personal income, ZMW2 million – ZMW10 million and ZMW8 million – ZMW35 million range in value-added and 29 – – – 125 new jobs and 154 – – 636 new jobs range respectively. The graphs show that the tourism economic significance estimated in South Luangwa in 2015 was much higher in all the economic measures than those of the Kafue National Park.

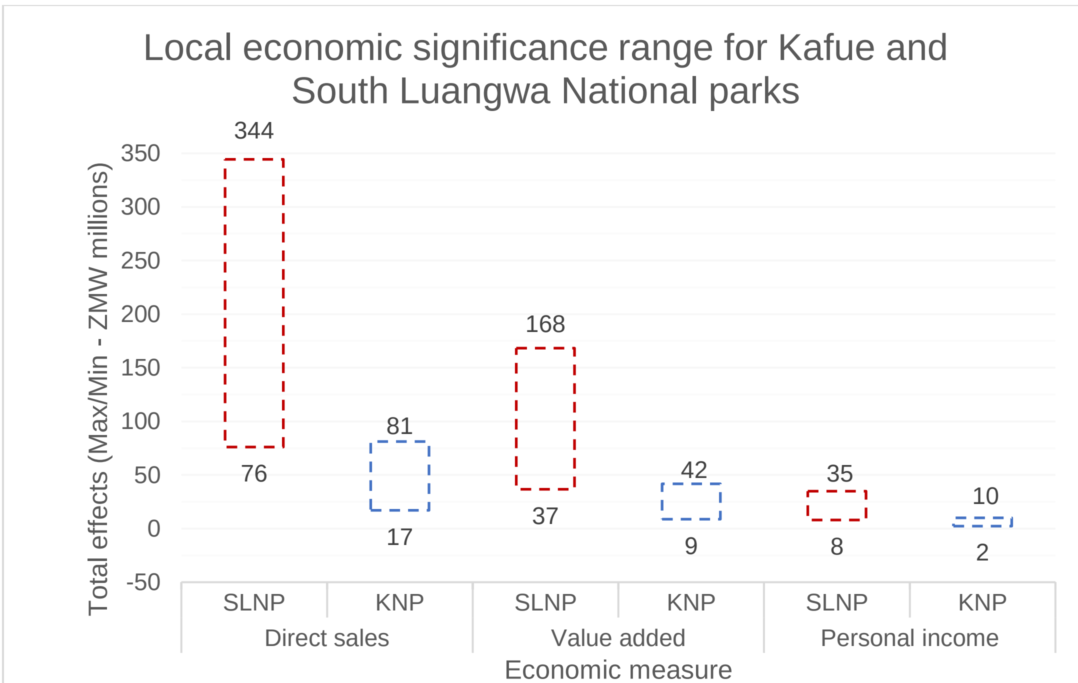

Figure 4.6: Tourism Economic Significance Ranges of National Parks' Visitor Spending on Local Economies' Direct Sales, Personal Income and Value Added in 2015.

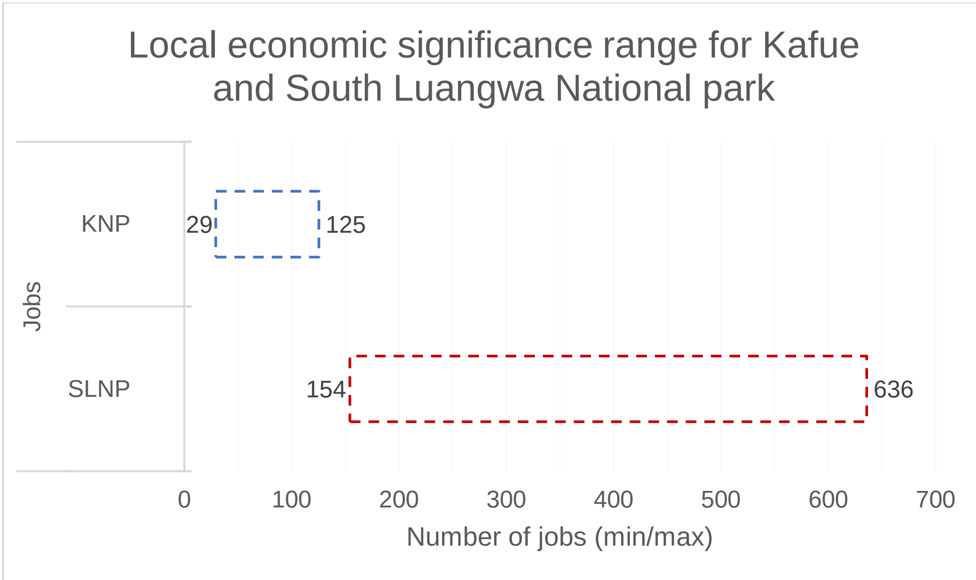

Figure 4.7: Tourism economic significance ranges for Kafue and South Luangwa National Parks generated new jobs in 2015.

Local Economic Impact

The local economic impact MGM2 output table below reflects the results from the ZMW33.85 million – ZMW149.70 million range of visitor spending by visitors who did not reside within the 50km radius around the Kafue National Park, or in its gateway region (Appendix 7.13). This spending yielded between ZMW13.00 million and ZMW63.70 million in direct sales, with the costs of goods and services not manufactured locally excluded and in the process between 24 – 103 local new jobs, with a total payroll of ZMW2.08 million – ZMW9.12 million, were directly supported outside the park (Stynes & Sun, 2003). Including local secondary effects, the total impact range was ZMW15.90 million – ZMW76.83 million in sales, 27 – 118 new jobs and ZMW2.13 million – ZMW9.36 million in personal income. Value added yielded between ZMW8.15 million and ZMW39.36 million (Table 4.11).

Table 4.11: Tourism Economic Impact of the Kafue National Park visitor spending in the local economy, 2015 (excludes spending by local tourists)

Sector/Spending category	Direct Sales (ZMW million)	Jobs	Personal Income (ZMW million)	Value Added (ZMW million)
Direct Effects				
Accommodation: lodges and bush camps	4.17 – 7.97	11 – 21	0.83 – 1.59	2.81 – 5.37
Camping fees	0.00 – 2.08	0 – 9	0.00 – 0.09	0.00 – 1.11
Meals: restaurants, bars	0.68 – 10.52	2 – 27	0.14 – 2.10	0.46 – 7.08
Groceries, retail, wholesale	0.00 – 1.40	0 – 2	0.00 – 0.07	0.00 – 1.00
Gas and oil	0.00 – 0.99	0 – 1	0.00 – 0.05	0.00 – 0.71
Local transportation	0.01 – 7.67	0 – 8	0.00 – 0.32	0.01 – 4.00
Admissions and fees (PA entry)	0.00	0	0.00	0.00
Activities and guided tours: game drives,	5.97 – 12.54	4 – 9	0.95 – 2.00	3.26 – 6.85
Souvenirs and other gifts	0.01 – 1.21	0 – 1	0.00 – 0.19	0.01 – 0.66
Animal fees, concession fees (license, permits)	1.65	7	0.08	0.88
Local dip, pack, taxidermy	0.38	0	0.06	0.21
Gratuities and tips	0.11 – 15.66	0 – 11	0.02 – 2.50	0.06 – 8.55
Other expenses	0.01 – 1.63	0 – 7	0.00 – 0.07	0.00 – 0.87
Direct effects	13.00 – 63.70	24 – 103	2.08 – 9.12	7.70 – 37.29
Secondary effects	2.90 – 13.14	3 – 15	0.05 – 0.24	0.45 – 2.08
Total Effects	15.90 – 76.83	27 – 118	2.13 – 9.36	8.15 – 39.36

Table adapted from Cui et al., (2013) and author's calculations.

Table 4.12 below summarizes the MGM2 output tables for both the Kafue and South Luangwa National Parks' local economic impact resulting from the ZMW33.85 million – ZMW149.70 million range and ZMW110.08 million – ZMW491.77 million range, respectively, in visitor spending by all the visitors, excluding those who resided in the 50km radius around the parks or in the gateway regions (Appendix 7.19). The spending yield for Kafue, which was found to be much lower than that of South Luangwa, has already been alluded to above (Table 4.11), while for South Luangwa the spending yielded ZMW59.23 million – ZMW275.71 million range in direct sales with the costs of goods and services not made locally excluded and in the process, 132 – 553 new local jobs range with a total payroll of ZMW7.32 million – ZMW33.28 million range, were supported both inside and outside the park (Table 4.12) (Stynes & Sun, 2003). Including local secondary effects, the total impact was ZMW73.81 million – ZMW338.75 million range in sales, 149 – 625 new jobs range and ZMW7.58 – 34.36 million range in personal income. The value-added yield was ZMW35.48 million – ZMW165.63 million range (Table 4.12).

Table 4.12: Tourism Economic Impact of the Kafue and South Luangwa National Parks on Local Economies, 2015 (excludes spending by local tourists)

Economic measure	Direct sales (ZMW millions)		Jobs		Personal income (ZMW millions)		Value added (ZMW millions)	
	KNP	SLNP	KNP	SLNP	KNP	SLNP	KNP	SLNP
Direct effects	13.0 – 63.7	59.2 – 275.7	24 – 103	132 – 553	2.1 – 9.1	7.3 – 33.3	7.7 – 37.3	33.2 – 156.1
Secondary effects	2.9 – 13.1	14.6 – 63.0	3 – 15	17 – 71	0.1 – 0.2	0.3 – 1.1	0.5 – 2.1	2.2 – 9.6
Total Effects	15.9 – 76.8	73.8 – 338.8	27 – 118	149 – 625	2.1 – 9.4	7.6 – 34.4	8.2 – 39.4	35.5 – 165.6

Source: Author's calculations

Table notes:

- *Rows/columns may not sum to totals due to rounding and conversion from US dollar currency to kwacha currency.*

Non-local visitors to the Kafue National Park supported 11 – 21 new jobs range through accommodation spending, seven (7) new jobs through animal fees spending, 2 – 27 new jobs range through meals (restaurants and bars) spending and 4 – 9 new jobs range in park activities (guided tours) spending, among others. Comparatively, the South Luangwa non-local visitors supported more new jobs in different spending categories than did the non-local visitors to Kafue (Appendices 7.20 and 7.21)

Figures 4.8 and 4.9 below compare the results of total economic impacts in local areas for the Kafue and South Luangwa National Parks as ZMW16 million – ZMW77 million and ZMW74 million – ZMW339 million range in direct sales, ZMW2 million – ZMW9 million and ZMW8 million – ZMW34 million range in personal income, ZMW8 million – ZMW39 million and ZMW35 million – ZMW166 million range in value-added and 27 – 118 new jobs and 149 – 625 new jobs range respectively. The graphs show that the tourism economic impact estimated in South Luangwa in 2015 was much higher in all the economic measures than those of the Kafue National Park.

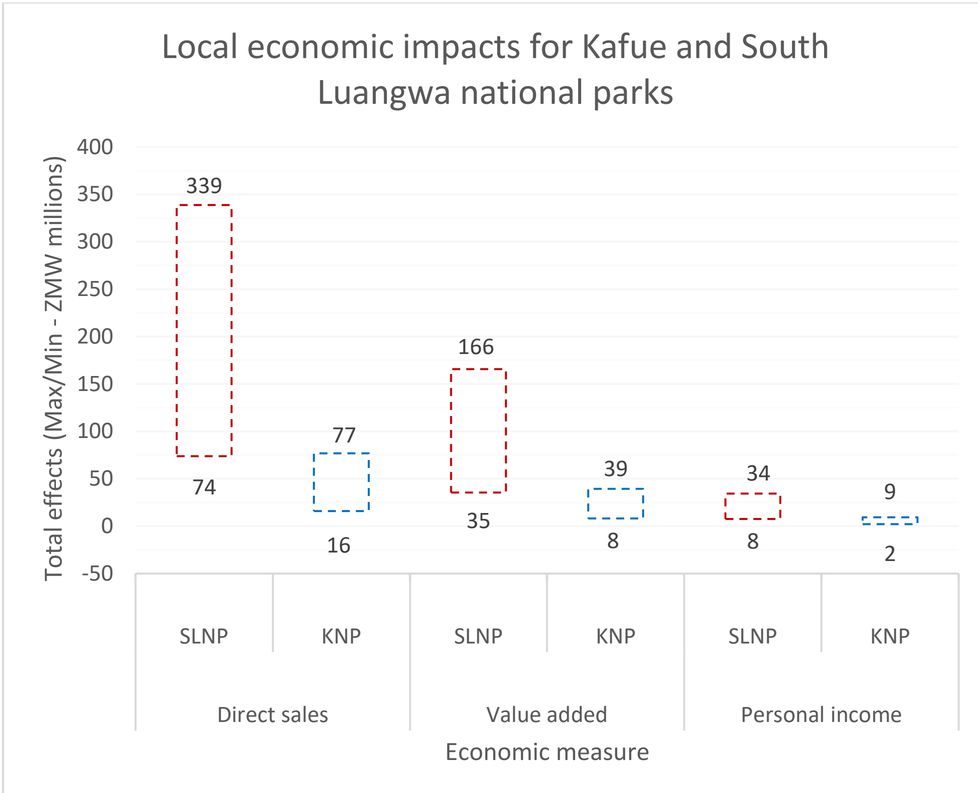

Figure 4.8: Tourism Economic Impact of National Parks Visitor Spending on Local Economies' Direct Sales, Personal Income and Value Added in 2015.

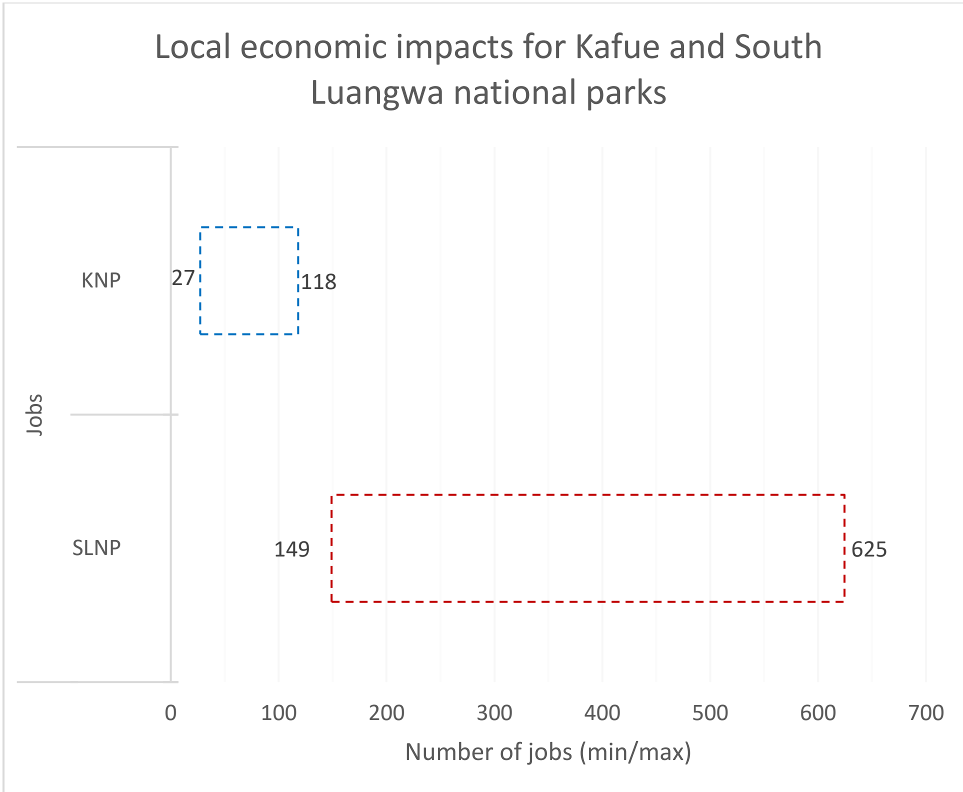

Figure 4.9: Tourism Economic Impact of National Parks Visitor Spending on Local Economies' Jobs in 2015

4.4 Discussion

National Park Visits

The Kafue National Park is generally less popular than the South Luangwa National Park, and in 2015 the Kafue received a total of 16,203 party overnight stays of visitors, while the South Luangwa received four times more, with 59,721 overnight stays despite both parks being among Zambia's socio-ecologically important conservation areas boasting a high diversity of wildlife (Table 4.4 and 4.5). The annual visitor arrivals to both parks have been increasing at an average percentage of 8.9%, for the nine (9) years leading up to 2015, which is approximately above the global growth rate of approximately 4-6% annually. This has indeed been in line with the reported global tourism market, in recent decades, which has experienced continual growth making it one of the world's fastest growing economic sectors with international tourist arrivals growing steadily from 25 million in 1950 to a total of 1.186 billion in 2015 (Glaesser et al., 2017). The total tourist annual arrivals to both Kafue and South Luangwa national parks for the year 2016 was 65,609 compared to 35,412 recorded in the year 2008, indicating an increase of some 85% in eight years, but still among the lowest in the region. However, some variations occurred in the year 2009, as well as in the year 2015, with a reduction in tourist arrivals of 12% and 13% in respective years. Kafue National Park reduction of 13.8% tourist arrivals from 2010 to 2011 could have been partly affected by the world economic recession which occurred around the same time, albeit visitors from different countries reacting heterogeneously during the recession, as was observed for visitors to South Luangwa where tourists different preferences, and willingness to pay, contributed to the variability (Eugenio-Martin & Campos-Soria, 2014; Papatheodorou, Rosselló, & Xiao, 2010). The good infrastructure status, especially the road network, in the South Luangwa National Park compared to that of the Kafue National Park at present, has contributed to its popularity.

In both national parks, visitor arrivals increased steadily from 2012 to 2014 by 50% but decreased again from 2014 to 2015 by 13%. The increase in the Kafue National Park from 2012 to 2014 could be alluded partly to the opening of five new accommodation establishments by tour operators in the park and surrounding Game Management Areas during the same period. It was also partly due to increased marketing efforts locally and abroad by both the tour operators and the Zambia National Tourism Board at the time (DNPW, 2016). However, in both national parks, the trend between 2014 and 2015 pointed to a decrease which, as most tourism operators alluded to, could have been brought about by factors that included the political climate that existed in the country during the 2016 general election campaigns (Goldring & Wahman, 2016). Tourist arrivals in South Luangwa recovered in 2016 with a 17.1% increase, but in Kafue the tourist arrivals continued to decrease by some 8.7% largely due to reduced marketing efforts.

The DNPW records of annual park visits are recorded as person entries and to obtain the party day/night entries they were converted by multiplication with the average party sizes, park re-entry factors and length of stay ratio (Cui et al., 2013; Stynes & Sun, 2003). From the results one could deduce that the South Luangwa receives more party day/nights than the Kafue National Park. The series of visitor intercept surveys, conducted to determine spending averages, did not collect large enough sample sizes to determine party sizes, re-entry factors and length of stay factors, but these were adapted from the MCC supply survey (Table 4.4), backed by expert advice on tourists' visitation numbers (Cui et al., 2013). According to guidelines provided in the document entitled 'Economic impacts of visitor spending in protected areas in developing countries' most park agencies are said to measure visits as entries to a park only without differentiating between entries and unique individual visitors. The unique individual visitors is when "a single person makes multiple entries over a number of days or between single visitors and those arriving in groups/parties" (Chidakel et al., 2018). The sensitivity analysis showed that the tourism total output effect was more sensitive with generic multipliers than with national and rural multipliers. Despite the Kafue being closer to Zambia's capital city, Lusaka, the 2015 party day/nights of 16,203 for Kafue were approximately four times less than those for South Luangwa (59,721).

Indeed, the Kafue National Park has a competitive advantage over the South Luangwa National Park in terms of size, which is more than twice the former, representing nine (9) percent of the total land mass of Zambia (Figures 1.1 and 1.2). The national park also maintains a large Miombo woodland, has major waterways such as the Kafue River and Lake Itezhi-Tezhi, and has greater diversity of wildlife habitats and wildlife species. However, it is not fully understood why Kafue receives less visitors than South Luangwa. But observations during data collection confirmed that poor infrastructure development, especially the road network, in the Kafue has contributed to the slightly higher average visitor spending per night, than is the case for the South Luangwa, thus leading to low visitations. According to Chemonics International Incorporation (2011) and Child (2012) the current revenue for Kafue is just a tenth of its potential. Much of the park is inaccessible during the rainy season with Busanga Plains, especially, being seasonally inundated (GEF-UNDP, 2011). Consequently, most of the economic impact parameters such as the total visitor spending, job creation, personal income, value-added and the tourism impact to area size ratio, favour the South Luangwa National Park. Currently the Kafue National Park is not only lagging behind the South Luangwa National Park, in party nights or park visits, but also with regards to other flagship national parks, within the region, such as the Lower Zambezi and the competing Chobe National Park in Botswana, which is frequently packaged with Zambia's tourism attractions (Chemonics, 2011).

Local Visitor Spending

The average visitor spending per party between similar segments for Kafue and South Luangwa national parks did not differ widely with the largest difference being in the range of ZMW1,950 – ZMW2,361 between the top-end segments, and the smallest being in the range of ZMW126 – ZMW587 between the budget/self-catering lodges (Table 4.5). Interpretation of the obtained results should be done with caution because the use of interval estimates, instead of the point (mean) estimates, applied to reduce the margin of error, has affected the accuracy of the obtained interval results. Spending averages differed, in some aspects, because of differences in local pricing and spending opportunities (Caspi et al., 2017), but generally Kafue was more expensive than South Luangwa in all respects. There are a bit more spending opportunities in South Luangwa, with more local businesses providing for tourists needs, than there are in Kafue. Approximately a difference of between ZMW77.7 million and ZMW343.0 million total visitor spending was recorded more in and around the South Luangwa National Park than in and around the Kafue National Park (Tables 4.6, 4.7 and 4.8). Total visitor spending in South Luangwa ranged between ZMW111.6 million and ZMW498.3 million, about three times of the total visitor spending in Kafue, but this was still lower than total visitor spending in other regional national parks (Table 4.8). For example, the annual recreational value for international visitors to South Africa’s Kruger National Park in 2015/16 was more than nine (9) times the same period than that of the South Luangwa National Park (Mukanjari, Muchapondwa, & Demeke, 2018). This means that visitation and visitor spending opportunities are expected to be lesser in the South Luangwa with lesser benefits to the locals. However, studies have shown that the real impact of tourist spending on the local economy goes far beyond the direct or initial visitor expenditure, but through multiplier effects (Ntibanyurwa, 2008). The average visitor spending per party, for both Kafue and South Luangwa, ranged from ZMW2,115 to ZMW9,218, which could be slightly higher when compared with other regional national park tourism destinations (Chirenje et al., 2013). The high average visitor spending could be attributed to the fact that most lodges from both Kafue and South Luangwa national parks ordered their goods from the country’s capital city (Lusaka) or through trading companies operating from Lusaka. This meant that the Kafue national park tourist spending and the South Luangwa national park visitor spending of ZMW33.85 million – ZMW149.70 million range and ZMW110.08 million – ZMW491.77 million range, respectively, was not fully benefiting the local economies because of the suspected leakage taking place.

Local Significance and Impacts of Visitor Spending

Although the total economic significance for South Luangwa (ZMW120.66 million – ZMW547.64 million) was four times higher than for Kafue (ZMW28.08 million – ZMW135.91 million), their average sales multipliers were the same, 1.24 and 1.22 respectively (Tables 4.9 and 4.10). This means that the marginal propensity to consume tourism related goods and services was on average the same for Kafue than South Luangwa although empirical evidence shows that there were more local tourism activities in the South Luangwa National Park than in the Kafue National Park. With these multipliers, it means that for every ZMW1 of direct sales, ZMW0.24 and ZMW0.22, respectively for South Luangwa and Kafue, is generated through secondary effects (Stynes & Sun, 2003). The visitor spending, in the local economies around the national parks, was captured as total economic significance/impact through the activities of local tourism businesses, households through tourism businesses' employees, the government agencies and other businesses not directly involved in tourism. Since economies are interconnected systems, where producers and consumers interact, the money spent by visitors with regards to the South Luangwa created and supported more local economic activities around the park than the money spent by visitors involving the Kafue (Hjerpe, 2018; Ntibanyurwa, 2008; Thomas, Huber, & Koontz, 2015). For the national park revenue, or the visitor spending around the park, to have an impact in local economies, there has to be linkages with local hotels (lodges), restaurants, transport, agriculture, retail trade and wholesale trade (Mbaiwa, 2015) and from the study the observations indicated that local tourism linkages were stronger in South Luangwa than in Kafue. The economic significance/impact of tourism, through direct sales, personal income, new jobs, value added, taxes, etc., is because of increased demand for tourism goods and services by visitors to the park which also causes some economic ripple effects. These ripple effects include indirect effects of backward business linkages and induced effects of local employee households' spending (Cullinane & Koontz, 2014; Thomas et al., 2015; Van Der Merwe & Saayman, 2008). However, in both national parks, the indirect and the induced effects values were insignificant as evidenced from output of the visitor spending analysis, which showed that there was low local tourism economic activities or linkages.

The South Luangwa National Park generated about five times more direct sales, five times more personal income, four times more value added and four times more new jobs than the Kafue

National Park (Figure 4.6 and Figure 4.7). It was noted that the direct sales effects in the range of ZMW13.93 million – ZMW67.29 million was less than the range of ZMW33.92 million and ZMW155.24 million for visitor spending in the Kafue National Park (Table 4.9), while in South Luangwa the range of ZMW61.08 million – ZMW280.22 million for the direct sales effects was less than the range of ZMW111.60 million – ZMW498.28 million for visitor spending (Table 4.10). This was so because most of the manufacturing share of retail purchases such as groceries, gas, and other goods was not included in the direct sales (Cui et al., 2013). These local areas around the parks have almost no manufacturing companies for the goods needed to supply the local tourism industry. There are mostly retail trading and a few wholesales trading businesses within the local economies of both the Kafue and the South Luangwa national parks. The assumption was that there was immediate leakage for most of the producer price of retail purchases, out of the regions, to cover the costs of goods sold (Cui et al., 2013; Topuz, Yazdifar, & Sahadev, 2017). From the data analysis the estimated percentages of retail producer price leakages from the local areas were found to be 56% and 41% for Kafue and South Luangwa respectively. High leakage of the producer price from the local areas meant that there would be low secondary effects, which included both the indirect effects and the induced effects, respectively, for businesses which buy goods and services from backward-linked locals businesses (firms) and household spending their earnings (Cui et al., 2013; Naidoo, Fisher, et al., 2016; Rutty, Gössling, Scott, & Hall, 2015).

Considering the amounts spent by park visitors from the local areas, ZMW2,061,643 – ZMW5,537,556 range in the Kafue and ZMW1,523,154 – ZMW6,510,889 range in the South Luangwa, only 4% – 6% for Kafue and only 1% for South Luangwa represented local spending (Table 4.12). This means that between 94% and 96% in the Kafue and 99% in the South Luangwa of the economic activities, due to visitor spending, estimated economic impacts or represented 'new money' to the local areas. The economic impacts estimated the losses in economic activities that were likely to be incurred, by the local areas, in the absence of the park. In instances that the Kafue and the South Luangwa national parks' opportunities one day in future would no longer be available, the assumption is that local residents would spend their money on other local activities while non-local visitors, who hail from outside the region, would not make the trip there (Cui et al., 2013). However, when estimating the Kafue and South Luangwa visitor spending impacts in the local areas, the spending by local residents on visits to the parks was excluded because it did not represent ‘new money’ (Cui et al., 2013). In the Kafue National Park, the economic sectors mainly directly affected by non-local visitors’ spending were animal fees, accommodation, meals (restaurants and bars) and park activities (guided tours), while in the South Luangwa it was the admissions fees and animal fees, the accommodation sector, park activities (guided tours) and meals (restaurants and bars). For example, the park admission fees supported 143 new jobs in the South Luangwa, but no new jobs were supported in the similar sector in the Kafue. The reason for this difference was because South Luangwa retains and utilizes all the admission fees within the local region, while in the Kafue, all the admission fees are paid or sent to the head office of the park agency in the country’s capital city. Again, 50% of the animal fees and camping fees are paid to the head office of the park agency. This transferring of tourism revenue from the local economies of the parks to the park agency head office in the city, is part of the visitor spending leakage which, most likely, contributes to the under-performance of the Kafue National Park (Rogerson, 2011; Sandbrook, 2010). The estimated total tourism economic value of visitor spending for the KNP was approximately three times less than the value for the SLNP (Figure 4.10). The results show that in the SLNP the multiplier effect of visitor spending is slightly higher than the total visitor spending, while in the KNP the opposite is true.

4.5 Conclusion and recommendations

The Kafue National Park is generally less popular than the South Luangwa National Park, and in 2015 the Kafue received a total of 16,203 party overnight stays of visitors, while the South Luangwa received four times more, namely 59,721 overnight stays despite both parks being among Africa’s socio-ecologically important conservation areas boasting a high diversity of wildlife. The good infrastructure status, especially the road network, in the South Luangwa National Park compared to that currently existing in the Kafue National Park has contributed to its popularity. The location of the administration cost centre, within the local area around the park, is another reason that has contributed to the success of the SLNP. The interpretation of the obtained results, shown below, should be done with caution because the use of interval estimates instead of the point (mean) estimates, applied to reduce the margin of error, has affected the accuracy of the obtained interval results. The conclusions for the economic impact assessments of visitor spending are outlined below:

- ✓ The party (visitor) spending averages for both parks ranged from ZMW1,086 – ZMW4,442 for day/self-drive visitors to ZMW5,479 – ZMW12,698 for top-end lodges (Tables 4.6 and 4.7; Appendix 7.13).
- ✓ The total visitor spending ranged between ZMW33.85 million and ZMW149.70 million for the Kafue NP's visitors and the South Luangwa NP's total visitors spending was three times more and ranged between ZMW110.08 million and ZMW491.77 million in local areas situated in a 50km radius of the parks (Table 4.8).
- ✓ The economic significance was in the range of ZMW17 million – ZMW81 million and ZMW76 million – ZMW344 million range in direct sales, ZMW9 million – ZMW42 million and ZMW37 million – ZMW168 million range in personal income, ZMW2 million – ZMW10 million and ZMW8 million – ZMW35 million range in value-added for Kafue and South Luangwa respectively (Table 4.10).
- ✓ And the total economic significance of new jobs supported in the local regions by visitor spending were in the ranges of 29 – 125 for Kafue and 154 – 636 for South Luangwa (Table 4.10).
- ✓ The economic impact of visitor spending, which estimates the likely losses in economic activity to the local region if the national parks were not available, was in the range of ZMW16 million – ZMW77 million and ZMW74 million – ZMW339 million range in direct sales, ZMW2 million – ZMW9 million and ZMW8 million – ZMW34 million range in personal income, ZMW8 million – ZMW39 million and ZMW35 million – ZMW166 million range in value-added for Kafue and South Luangwa respectively (Tables 4.11 ad 4.12; Figure 4.8).
- ✓ The economic impact of new jobs that would be lost if the national parks were not available ranged between 27 and 118 for Kafue and between 149 and 625 for South Luangwa (Tables 4.11 and 4.12; Figure 4.9).

Study outcomes

Specific objective: To estimate the economic significance and impact of tourism on Kafue and South Luangwa national parks.

Related questions and outcomes:

a) What is the estimated local visitor spending in both the Kafue and the South Luangwa national parks?

- The estimated local visitor spending ranges in categories for both the Kafue and the South Luangwa national parks and were recorded on a party night basis for overnight stays and on a party day basis for day/self-drive trips (Table 4.7). Each spending category was estimated by the visitor surveys conducted in both the KNP and the SLNP during the study. The total spending averages were found to slightly vary between the Kafue and South Luangwa national parks based on local prices, spending opportunities and accommodation preferences (Table 4.7).

b) What is the economic impact /effect of park tourist visitor spending on local economies near Kafue and South Luangwa national parks?

- The economic impact/effect of visitor spending on local economies around the Kafue and the south Luangwa national parks was estimated by application of the MGM2 using multipliers derived from Zambia's Input-Output Tables for 2010 and rescaled to rural area regional level as outlined in Chapter 3 and described in Chapter 1 also. The results of the economic impact/effects were disintegrated in two impacts/effects:
- The *economic significance* estimated the effects of spending by all visitors, including visitors from local area (Table 4.10).
- The *economic impacts*, which do not include spending by local visitors, measured the effects of spending by visitors who did not reside in the local areas near the parks (Table 4.12).

Going forward: Based on the findings and the insights from literature the following recommendations could help policy makers, stakeholders, researchers and government agencies for tourism to ensure that:

- The potential of the Kafue National Park to perform as well as the South Luangwa National Park in terms of tourism economic impacts is achieved through infrastructure development, especially the road network, and the improvement of protection for wildlife resources.
- Continued sustainable management of resources, sound commercial management and controlling of costs in the Kafue and the South Luangwa national parks would save approximately 29 – 125 new jobs for Kafue and 154 – 636 new jobs for South Luangwa, and the total economic significances for tourism from direct sales, the personal income and the value-added amounting to approximately ZMW28.08 million – ZMW135.91 million for Kafue and ZMW120.66 million – ZMW547.64 million for South Luangwa annually.
- The Government empowers local people living close to the national parks through the funding for wildlife enterprises or business activities in line with tourism if the benefits of wildlife conservation could be captured within the local economies.

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Chapter 5 ECONOMIC LEAKAGE OF TOURISM IMPACTS FROM LOCAL AREAS AROUND NATIONAL PARKS: CASES OF KAFUE AND SOUTH LUANGWA NATIONAL PARKS

Abstract

The aim of this study was to evaluate the value of economic leakage of tourism from local areas around the Kafue and South Luangwa national parks. The study applied methodologies of quantitative nature to estimate the impact of visitor spending on local economies. To evaluate the tourism economic leakage the Money Generation Model 2 (MGM2), adapted for country specific multipliers, was applied. The results showed that the number of tourism businesses operating as local ownership firms, in the local areas of both parks, were those incorporated as joint ventures companies and were not more than 12% of all the selected establishments. The total value of visitor spending impact that escaped as internal and external economic leakage, was equal to ZMW37.92 – 167.25 million and ZMW103.30 – 422.45 million for Kafue and South Luangwa respectively. Similarly, the number of new jobs supported by the visitor spending, but which escaped the local regions as economic leakage, was equal to 60 – 197 and 141 – 442 for respectively Kafue and South Luangwa. About 57 – 59% of visitor spending impact and 62 – 69% of visitor spending supported new jobs, escaped as internal and external economic leakage from local areas around Kafue. In South Luangwa it was about 53 – 56% of total visitor spending impact and 41 – 49% of visitor spending supported new jobs that escaped as internal and external economic leakage. External leakage due to non-local ownership of tourism firms contributed ZMW6.02 – 30.01million and ZMW27.90 – 131.27 million to the total economic leakage which was 74 – 76% and 79% of value added respectively for Kafue and South Luangwa. Accordingly, lack of full local ownership and the low rate of local ownership for tourism businesses, as well as lack of tourism business linkages with local enterprises, contributed to a high rate of economic leakage.

Keywords: *National parks, visitation, visitor expenditures, Kafue National Park, South Luangwa National Park, Money Generation Model2 (MGM2), leakage, tourism.*

5.1 Introduction

5.1.1 Background and rationale

Most developing countries in southern Africa have strategies and efforts in place to manage Protected Areas (PAs) to a level that can contribute sustainably to both conservation and local economic development through ecotourism. Nonetheless, tourism leakage, which is broadly concerned with the failure of tourism income remaining in the destination economy, is an important element that has affected tourism development in many regions and countries such as Zambia (Narangajavana et al., 2016; Sandbrook, 2010). Tourism business investments in the Kafue and South Luangwa national parks are owned by the private sector, the local communities, and the public sector (DNPW) – they are either fully owned by the private companies (*total ownership)* or in partnership (*joint venture ownership)*. In these partnerships, the local communities only play a role of co-principal authority, together with DNPW, with regard to the approving and licensing of tourism business operations (PMTC-Zambia, 2008), without them becoming directly involved – a situation which perhaps has contributed to the repatriation of tourism profits from the local areas. The DNPW is the principal authority in terms of tenure and associated licensing of tourism facilities inside the National Parks. The private sector, on the other hand, is made up of a variety of formally incorporated private companies, established to carry out tourism-based businesses in Zambia, such as safari lodges and safari camp operators, tour operators and travel agents, safari hunting operators and outfitters, etc. (ZAWA, 2011b). Currently the local communities in the GMAs have no exclusive rights over the wildlife resources or land (Lindsey et al., 2014). However, the local communities in the OAs can own land and not the wild resources i.e., the privilege of the Kaindu Natural Resources Trust (KNRT). The failure by the current Wildlife Act, 2015 (No. 14 of 2015) to recognise the local communities in GMAs as rightful owners of land and the wild resources they contain, has perhaps also indirectly contributed to the increase in the leakage of tourism economic impacts from the local areas.

Regional economies in proximity of protected areas, especially in developing countries, are commonly affected by the external, the internal and the invisible leakages of tourism economic impacts. Internal leakage is defined as the tourism costs or losses that originate locally and are paid and accounted for locally (Pérez-Ducy de Cuello, 2001). External leakage is defined as the expenditure in tourism that is originally from non-local areas, but it is linked to local industries (WTO, 2001). This tourism goods and services value proportion of the total market is rendered, but not actually captured by the local economy (Pérez-Ducy de Cuello, 2001). It is hard to measure external leakage as it is not accounted for locally. The external leakage, where non-local owners of tourism businesses reap the profits from the investments away from local areas, was assumed to be present in the local economies of both the Kafue and the South Luangwa national parks because of the comparatively high percentages of non-local (foreign) tourism investments. This is a scenario which has perhaps led to inadequate tourism benefit flows for the local communities around these protected areas. The internal leakage, which occurs through imports that are paid and accounted for domestically, was also assumed to be present in the local economies of both parks because of the apparent large quantities of imported tourism goods and services to the areas. In this regard, the tourism income is sent outside of the local economies, rather than being recirculated within the local economies. And the invisible leakage, which occurs when the foreign exchange costs are neither properly accounted for nor documented as tourism sector costs, was not considered in the analysis because of the difficulty in estimating it. The value-added is also defined as personal income plus profits and rents, plus indirect business taxes (Stynes & Sun, 2003).

The total economic leakage of tourism had to be estimated from local areas around Kafue and the South Luangwa national parks to understand how it affected the incomes of locals and the local tourism development. The major problem is that the available evaluation methods for the total economic footprint have overlooked leakage estimation tools, that may be used to relate the leakage rate with the level of development in local areas. Leakage from tourists' destinations has significant impact on the development of local areas and research has shown that there is significant correlation between the leakage rate and the level of economic development (Chirenje et al., 2013; Meyer, 2013; Supradist, 2004). The total leakage rate (internal and external) was estimated, in terms of 'impacts' (income, jobs, value added, taxes, etc.), by application of the Money Generation Model (MGM) (Stynes et al., 2000) using Zambia's rural area derived multipliers (Table 3.16). The external leakage rate was estimated by evaluating the level of foreign proprietorship of tourism enterprises within local areas around the parks. The external leakage rate, due to non-local ownership of tourism businesses, was estimated by determining the difference between the value-added effects and the personal income effects (Figure 4.2). The results of these analyses could help researchers understand the real values of the Kafue and the South Luangwa national parks and the tourism income that escapes the local areas through leakage and therefore provide a way to inform the policy makers and stakeholders in ecotourism.

5.1.2 Objectives and research questions

The overall objectives of the study are to measure the relative economic impacts of tourism on locals living in settlements near the Kafue and the South Luangwa national parks, and to develop an understanding of how the geographical locations of their settlements influence the realization of income from primary sources, and to ascertain how their location affects the main positive and negative social impacts.

Specific objective:

To evaluate the economic value of tourism leakage from local areas around the Kafue and the South Luangwa national parks and the impact of this on local human communities.

Related question

a) What is the economic leakage of declining tourism from local economies around Kafue National Park compared to that of the South Luangwa National Park?

5.1.3 Limitations

The rural area economic multipliers were not available and instead the derived and rescaled national tourism multipliers were applied. A sensitivity analysis was conducted to determine the sensitivities of rural multipliers, national multipliers and the generic MGM2 rural multipliers.

The conversion factors for average party size, park re-entry factors and length of stay (Stynes et al., 2000), were not available for the South Luangwa National Park and instead the conversion factors for the Kafue National Park were applied as proxy.

Estimates for Kafue and South Luangwa national parks should be interpreted with a clear understanding and with some caution of the applied conversion factors and multipliers (Stynes et al., 2000).

Invisible leakage was not part of the analysis in the current study because of limited data and hence the study focused only on internal and external leakages.

Most of the randomly selected visitors to the national parks were reluctant to disclose the expenses of their trips and hence fewer than anticipated responses of intercept surveys were received.

Academic literature about economic leakage were very limited and the relevant literature was generally conducted a long time ago with the result that the latest figures were not easy to obtain.

5.2 Research methods

The research methods for this chapter to evaluate the economic value of tourism leakage from local areas around the Kafue and the South Luangwa national parks and its impact on local human communities, is outlined in Chapter 2 (Research methods). The results of the following research methods, which were covered in Chapter 4 will also be applicable in this chapter: Site selection of study sites, on-site intercept surveys for visitors' daily expenditures, derivation of multipliers from I-O tables, collection and segmentation of the annual numbers of visitors and the application of the MGM2 to evaluate the economic impacts of visitor spending. Moreover, other research methods that will be considered in this chapter and are outlined in Chapter 2 include the following:

- The selection of tourism companies or establishments operating from inside the parks and the surrounding areas (GMAs and OAs) and their categorisation according to type of investment ownership.
- Estimation of the non-local ownership leakage from local communities in settlements near the national park; and
- Estimation of the total leakage for the economic impacts of visitor spending from local economies in the immediate vicinity of the national parks.

5.3 Results

5.3.1 Tourism operators and ownership

In Kafue, 41 out of a total of 50 active establishments operated by various companies, were randomly selected of which 49% were inside the park, 34% in GMAs and 17% in OAs. The selected establishments included safari lodges, safari camps, bush camps, camp sites and safari hunting outfitters. Two types of business ownerships were identified from both parks: *total ownership* and *joint venture ownership* (Table 5.1). Similarly, all of the 52 active establishments were considered in South Luangwa of which 63% were inside the park and the remaining 37% in GMAs (Table 5.1).

Table 5.1: Type of ownership of tourism investments selected from Kafue and South Luangwa during the study

Location	Type of investment	Tour operators	Number of facilities selected	
			KNP	SLNP
Park	Joint venture ownership	Safari Lodges	5	8
		Safari Camps	7	8
		Bush Camps	8	16
		Camp site	0	1
GMA	Total ownership	Safari Lodges	9	9
		Safari Camps	2	0
		Bush Camps	0	2
		Camp site	0	2
	Joint venture ownership	Hunting blocks/camps	3	6
Open area	Total ownership	Safari Camps	4	0
		Bush Camps	1	0
		Hunting blocks/camps	1	0
	Joint venture ownership	Hunting blocks/camps	1	0
	Total		41	52

Source: Adapted from DNPW, (2016)

In Kafue, 24 out of a total of 50 active tourism establishments operated by various companies, were categorised as *joint venture ownership*, while in South Luangwa this figure was 39 out of 52 active establishments (Table 5.1). The rest of the establishments, in both parks, were categorised as *total ownership*. The partnering of the *joint venture ownership* firms was as follows:

- Private sector and public sector.
- Private sector and local community; and

- Private sector, public sector, and local community.

Table 5.2: Summary of tourism business ownership firms selected from Kafue and South Luangwa during the study

Type of investment	Ownership	Park	
		KNP	SLNP
Joint venture ownership	Private sector and local community	1	0
	Private sector, public sector, and local community	3	6
	Private sector and public sector	20	33
	Public and local community	0	0
Total ownership	Private sector	17	13
	Local community	0	0
	Public sector	0	0
Total		41	52

Non-local ownership leakage

The local ownership tourism firms, with local communities as partners, numbered four (4) in Kafue accounting for 10%, while in South Luangwa there were six (6) accounting for 12% of all the selected establishments in the areas. This means that the remaining 35 firms, accounting for 90% and 46 firms accounting for 88% tourism firms in the KNP and SLNP respectively, were non-locally owned. This also means that 90% and 88% of the total value-added for Kafue and South Luangwa national parks respectively do not accumulate to the local areas (Table 5.3). In this context, the non-accumulation of value added to the local areas is referred to as the non-local ownership leakage, and it is also categorised as tourism external leakage.

Table 5.3: Summary of local and non-local tourism business ownerships selected from Kafue and South Luangwa during the study

Type of ownership	Ownership	Tour operators (%)	
		KNP	SLNP
Local ownership	Private sector and local community	10	12
Non-local ownership	Private sector, public sector, and local community Private sector and public sector Private sector	90	88
Total		100	100

Local community's share of value-added

As stated above, the value-added is personal income plus profits and rents, plus indirect business taxes (Stynes & Sun, 2003). Analysis of financial records from one of the CRBs in Kafue GMA, in line with the definition of value-added, showed that the annual income for local communities from safari hunting was less than 50% of the hunting outfitter's spin-off. Since only 10% and 12% of the value-added, respectively, for the Kafue and the South Luangwa accumulate to tourism firms which are in joint-venture partnership between a private company and a local community. The local community's share of the national park's tourism value-added, from the captured tourism impact, was calculated at 5% and 6% respectively for Kafue and South Luangwa.

5.3.2 Total economic impacts of visitor spending

Using the same data and model as mentioned in the previous chapter on local economic impacts of tourism analysis, the total economic impacts of tourism were estimated by applying the MGM2 on visitor spending without excluding the costs of goods (and services) not manufactured locally. The MGM2 output is summarised in the table below (Table 5.4), for both Kafue and South Luangwa national parks resulting from the total visitor spending in local areas, which is equivalent to local visitor spending for the previous chapter, ranging from ZMW33.92 million to ZMW155.24 million and ZMW111.60 million to ZMW498.28 respectively (Appendices 7.20 and 7.21). Including both the direct and secondary effects, the total effects for the total economic impacts of visitor spending in local areas around Kafue ranged between ZMW39.78 million and ZMW180.34 million in direct sales, which included costs of goods and services not made locally in Kafue (Stynes et al., 2000). The total visitor spending directly supported between 87 and 315 new jobs around the park's economy with a total payroll of between ZMW4.50 million and ZMW18.30 million. Value-added yielded amounted to between ZMW19.81 million and ZMW94.17 million (Table 5.4 and Appendix 7.20). For South Luangwa, the visitor spending yielded between ZMW137.28 million and ZMW595.70 million in total effects of total economic impact for visitor spending – that included both the direct and secondary effects. The spending directly supported between 290 and 1,065 local new jobs around local areas of the park with a total payroll of between ZMW15.18 million and ZMW59.42 million. The value-added yield was between ZMW67.71 million and ZMW306.09 million (Table 5.4 and Appendix 7.21).

Table 5.4: Total impacts of visitor spending on local economies of Kafue and South Luangwa national parks (includes non-local costs and services)

Economic measure	Direct Sales (ZMW Millions)		Jobs		Personal Income (ZMW Millions)		Value Added (ZMW Millions)	
	KNP	SLNP	KNP	SLNP	KNP	SLNP	KNP	SLNP
Total economic impact	39.78 – 180.34	137.28 – 595.70	87 – 315	290 – 1,065	4.50 – 18.30	15.18 – 59.42	19.81 – 94.17	67.71 – 306.09

5.3.3 Captured economic impacts of tourism

The captured economic impacts of visitor spending were also estimated by applying the MGM2 to visitor spending after excluding the costs of goods (and services) not made locally – as outlined in the previous chapter. The captured economic impacts were calculated in the same way as the local economic impacts for tourism were calculated in the previous chapter. The summary of the MGM2 output in Table 4.12 in the previous chapter shows the results for both the Kafue and South Luangwa national parks captured economic impacts resulting from the visitor spending ranging from ZMW33.92 million to ZMW155.24 million and ZMW111.60 million to ZMW498.28, respectively in Table 4.7. Including the direct and the secondary effect, the total captured effects in local areas around Kafue ranged between ZMW15.90 million and ZMW76.83 million, without including costs of goods and services not made locally in the vicinity of Kafue (Stynes et al., 2000). The spending directly supported between 27 and 118 new jobs around the park with a total payroll of between ZMW2.13 million and ZMW9.36 million. Value-added yielded in the range between ZMW8.15 million and ZMW39.36 million (Tables 4.11 and 4.12). For South Luangwa, the spending yielded in the range between ZMW73.81 million and ZMW338.75 million in total effects of captured economic impact for visitor spending that included both the direct and secondary effects. The visitor spending directly supported between 149 and 625 local new jobs outside the park with a total payroll of between ZMW7.58 million and ZMW39.36 million. The value-added yield was between ZMW35.48

million and ZMW165.63 million (Table 4.12). The full details of the captured economic impact of tourism output are attached in Appendix 7.19.

5.3.4 Leaked economic impacts of tourism (internal and external)

The leakage of economic impacts for visitor spending was estimated by the difference between the total economic impacts of visitor spending and the captured economic impacts of visitor spending (Stynes & Sun, 2003). The leakage of tourism impacts is summarised in Table 5.5 below and includes both internal and external leakages. The percentage of captured and leaked tourism impacts relative to total economic impacts of tourism, are shown in Table 5.6 below. The full details of the leaked economic impacts of tourism output for Kafue and South Luangwa national parks are attached in Appendix 7.20 and Appendix 7.21, respectively.

Table 5.5: Leakage effects of visitor spending (impacts) on the local economies of the Kafue and South Luangwa national parks

Economic measure	Direct Sales (ZMW Millions)		Jobs		Personal Income (ZMW Millions)		Value Added (ZMW Millions)	
	KNP	SLNP	KNP	SLNP	KNP	SLNP	KNP	SLNP
Leaked economic impact (Internal and external)	23.9 – 103.5	63.5 – 256.9	60 – 197	142 – 442	2.4 – 8.9	7.6 – 25.1	11.7 – 54.8	32.2 – 140.5

Table 5.6: Percentages of captured and leakage effects of visitor spending (impacts) on local economies of Kafue and South Luangwa national parks

Economic measure	Direct Sales (%)		Jobs (%)		Personal Income (%)		Value Added (%)	
	KNP	SLNP	KNP	SLNP	KNP	SLNP	KNP	SLNP
Captured economic impact	40 – 43	54 – 57	31 – 37	51 – 58	47 – 51	50 – 58	41 – 42	53 – 54
Leaked economic impact (Internal and external)	60 – 57	46 – 43	69 – 63	49 – 42	53 – 49	50 – 42	59 – 58	48 – 46

On the other hand, the gross external leakage due to non-local ownership was estimated by the differences between the value-added in captured visitor spending impact and the personal income in captured visitor spending impact (Table 5.6). The estimated gross external leakage, which may include business profits and rents and government taxes paid, was found to range between 16% and 18% (ZMW6.02 – 30.01 million) of the total leakage for Kafue and between 27% and 31% (ZMW27.90 – 131.27 million) of the total leakage for South Luangwa (Table 5.7).

Table 5.7: Internal and external leakage of tourism economic impact and percentages from local economies of the KNP and the SLNP

External and internal leakage				
	KNP		SLNP	
	Min	Max	Min	Max
External leakage (ZMW millions)	6.02	30.01	27.90	131.27
Internal leakage (ZMW millions)	31.90	137.25	75.40	291.18
Total	37.92	167.26	103.3	422.45

The range of leaked direct sales, personal income and value-added is presented in Figure 5.1, while the range of new jobs for total, captured and leaked impacts is given in Figure 5.2. Note that the invisible leakage was not considered for this analysis due to insufficient data.

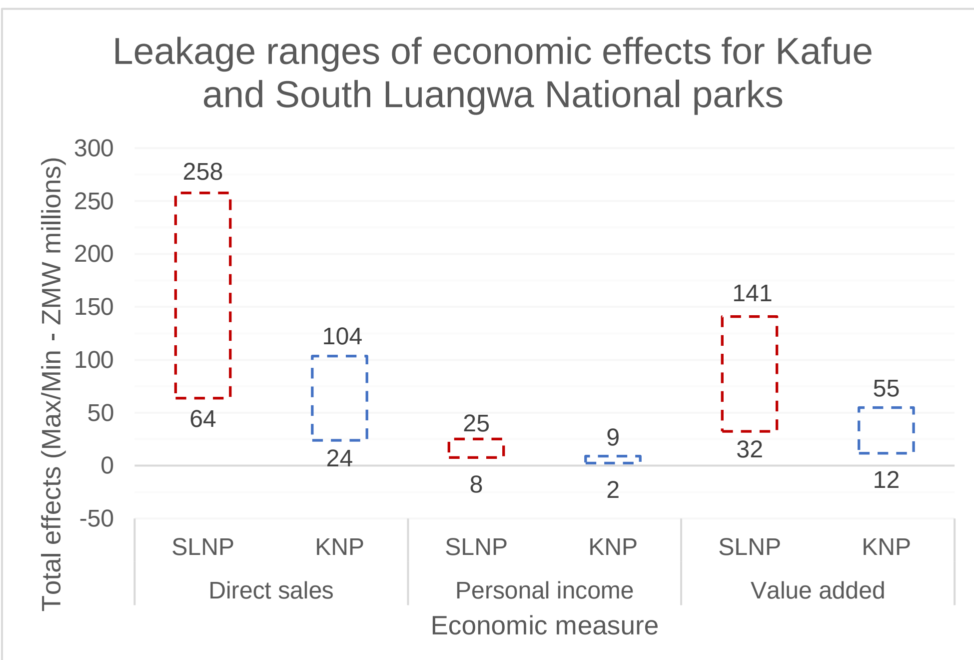

Figure 5.1: Leaked visitor spending impact in direct sales, personal income and value-added from the local economies of the Kafue and South Luangwa national parks.

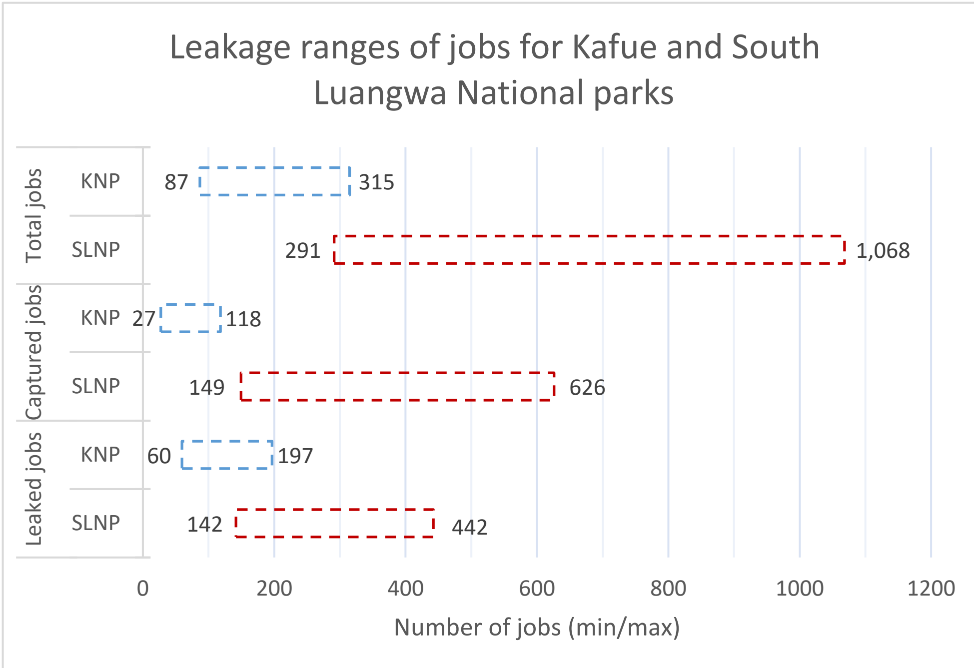

Figure 5.2: Leaked and captured visitor spending impacts in jobs from the local economies of the Kafue and South Luangwa national parks.

Figures 5.3 below estimates the ranges of percentages of captured and leaked tourism economic impacts on local areas of both Kafue and South Luangwa national parks. The captured impacts of visitor spending ranged between 41% and 43% of Kafue's total impacts for visitor spending, while that of South Luangwa was higher and ranged between 53% and 56% of total impacts for visitor spending. This means that the leaked impact of visitor spending was higher for Kafue and ranged between 57% and 59% than South Luangwa's which ranged between 44% and 47%. The percentages of generated new jobs due to visitor spending that were captured in the local economies, ranged between 31% and 38% for Kafue and between 51% and 59% for South Luangwa. This means that the new jobs that leaked from the local economies and which did not benefit the local people was higher for Kafue, and ranged between 62% and 69%, than South Luangwa's which ranged between 41% and 49% (Figure 5.4).

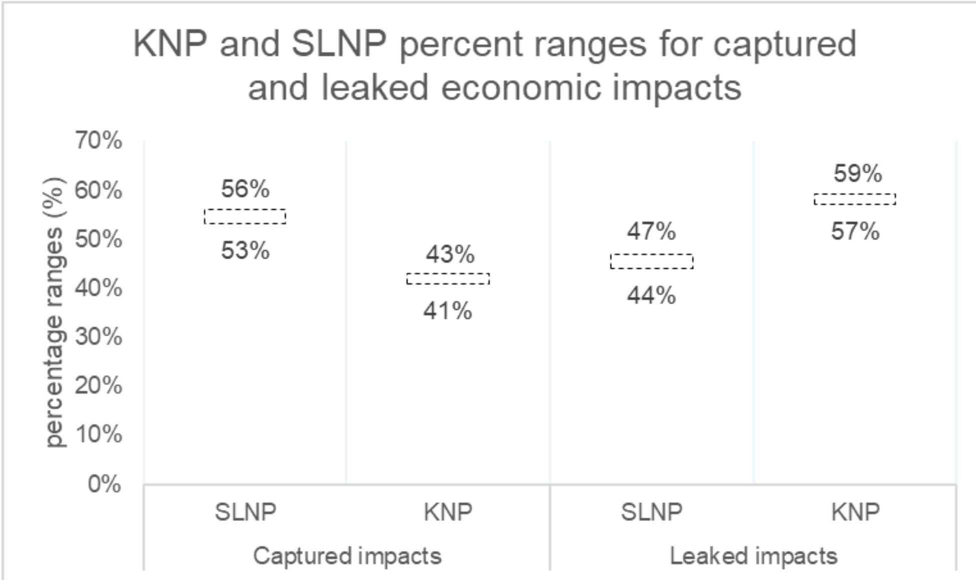

Figure 5.3: Captured and leaked visitor spending economic impacts (range of percentages) in local economies of Kafue and South Luangwa national parks

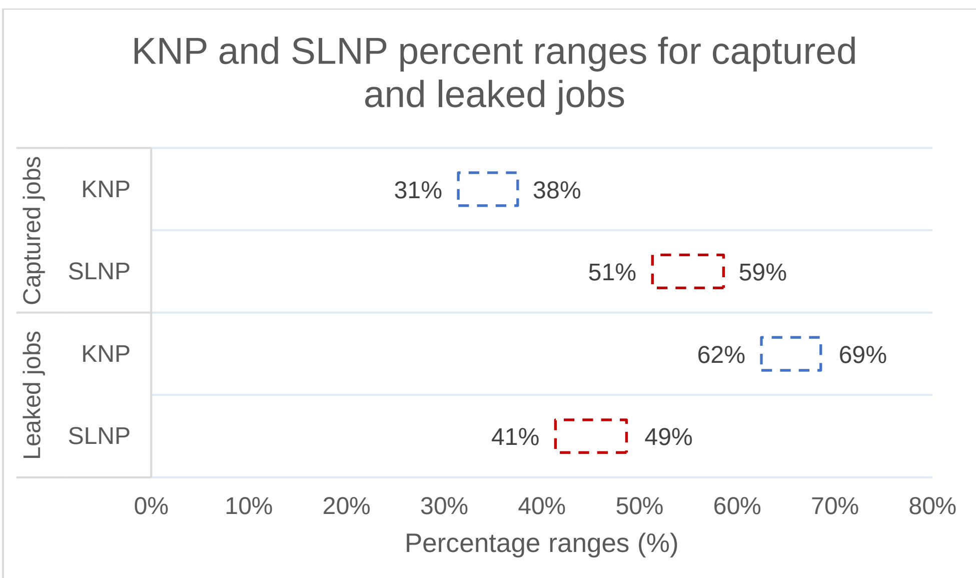

Figure 5.4: Range of percentages for visitor spending supported jobs in local economies of the Kafue and South Luangwa national parks

5.3.5 Sensitivity analysis for economic multipliers

In this sensitivity analysis the aim was to investigate the relationship between the tourism economic impacts and the economic multipliers (national, rural and generic) by varying visitor spending and holding all other base case values constant (Boardman, Greenberg, Vining, & Weimer, 2017). The relationship was based on the Money Generation Model 2 (MGM2) – see formula below:

'Economic impacts = Number of visitors × Average spending (per visitor or party) × Economic multipliers' (Stynes et al., 2000)

Specifically, visitor spending was varied by adding and subtracting the percentages of base value ranging from -25 to 25%, to and from the base value. In doing so the marginal partial effect of changes in visitor spending on tourism economic impacts was determined. The results of this procedure are displayed as lines curves labelled as national multipliers, generic multipliers and custom rural multipliers in the graph below (Figure 5.5).

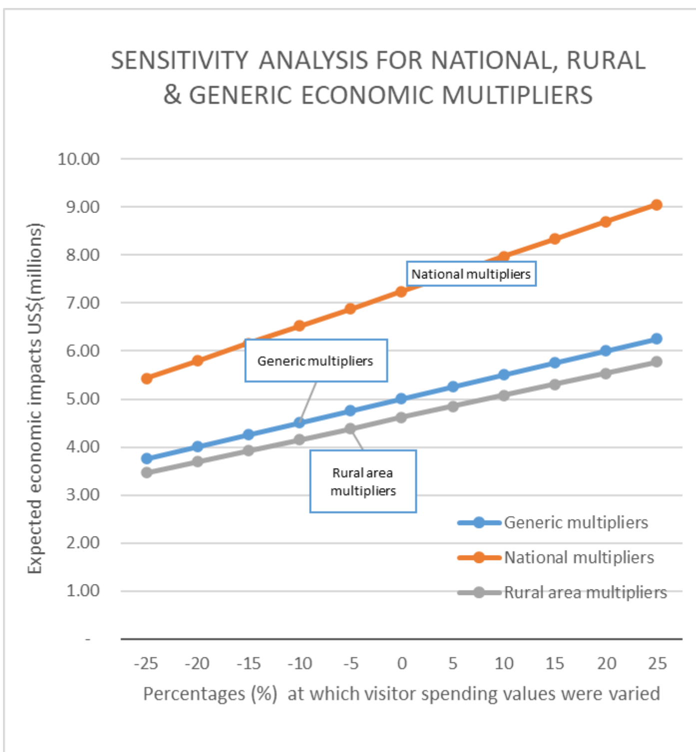

Figure 5.5: Graph showing sensitivity test for visitor spending and multipliers in tourism economic impacts determination for KNP

As expected, the lines are upward sloping: the higher the visitor spending, the higher the tourism total output/sales effects. Note that the values of total output effects, based on national multipliers, were on average US$2.2 million higher than the effects based on generic multipliers and on average US$2.6 million higher than the impact based on derived rural area multipliers.

National economic multipliers

The national wildlife-based tourism multipliers were derived by using the I-O ratios which are published by the Central Statistics Office (CSO) of Zambia and applied to the visitor spending totals for estimating the impact on local economies (CSO, 2017). The MGM2 model adjusts employment to sales ratios for the 2015 market prices based on consumer price indices.

Generic rural economic multipliers

According to Stynes and Sun (2003) the MGM2 'generic' multipliers were estimated based on 1996 IMPLAN data. Based upon consumer price indices the model adjusted employment to sales ratios to 2001 (Stynes & Sun, 2003). For local regions around national parks in the United States of America (USA) the MGM2 generic multipliers were derived using IMPLAN and they are reported in Appendix 7.17 (Stynes & Sun, 2003).

Derived rural economic multipliers

The national technical coefficients were first derived from the 2010 national I-O tables and then rescaled to rural area regional level in order to produce multipliers that quantify impacts on the local economy being studied, using sector specific supply percentages. The resultant multipliers were within 10% of the corresponding MGM2 generic figures as suggested by Stynes and Sun (2003).

5.4 Discussion

Tourism operators and ownership

The tourism businesses operating lodges, campsites and other tourism services inside the Kafue and the South Luangwa national parks, which are the prime areas for non-consumptive tourism, were found to be in *joint venture ownership* arrangements – only between the private sector and the public sector (Tables 5.1, 5.2 and 5.3) (PMTC-Zambia, 2008; Pope, 2005; ZAWA, 2011b). This means that even though the local communities and their settlements were adjacent to the parks, they were not involved in operating tourism businesses inside the park. The current study revealed that all the tourism businesses operating from inside the national parks had their head offices located more than 50km from the park boundary (referred to as the 'non-local' area) where most bookings and payments for tourists are done. This means that only the local communities and their settlements were considered as locally based, since the DNPW headquarters, where most payments for tourism licences, permits, taxes and tourists' fees are channelled to or where they are handled, is also located in the non-local area. A scenario is normally created where tourism companies fail to pay local taxes because most bookings and payments for tourists who visit the parks, through these companies, are done outside tourism destination areas where the companies' head offices are located. It is very difficult for the local authorities in the areas to obtain the necessary tax revenue and apparently this is a similar situation that has been reported as occurring in other regional countries (Mbaiwa, 2017). In these joint venture ownership firms, which are also types of Public-Private Partnerships (PPPs), the private sector leases tourism facilities from the public sector (DNPW) through the signing of Tourism Concession Agreements (TCAs), specifying varying terms of tenure, payment of fixed and variable fees and a variety of associated user and license fees, including park entry fees. Fixed fees are paid by private companies relating to the number of tourists' beds, size of the tourism facility, and length of the tourism season, while variable fees are fees covering visitors' sold bed-nights, park entry fees and bed levies (Mkanda et al., 2018). For instance, during the study, variable fees ranged from \$30 to \$50/person/day, as daily entrance fees, and from \$30 to \$50/person/day as bed levy fees for KNP and SLNP respectively. Yet again, minimum fixed fees ranged from \$150 to \$250 by number of beds per operating season for the KNP and the SLNP respectively.

In this study, the ownership of these tourism companies or establishments, operating under the *joint venture ownership* arrangements inside the national parks, were categorised as *non-local ownership* type of investments, where one hundred (100) percent ownership of equity is held by a non-local company, or subsidiary, for an unlimited time (Anderson, 2013; Benavides, 2001; Chirenje et al., 2013; Ntibanyurwa, 2008; Supradist, 2004). The *non-local ownership* tourism businesses accounted for 49% in the Kafue and 63% in the South Luangwa of all the businesses randomly selected (Tables 5.1, 5.2 and 5.3). The non-local ownership of tourism businesses around protected areas is not unique to the Kafue and South Luangwa national parks but has also been reported in other regional countries. For example, in the prime tourism areas of the Okavango Delta and Chobe regions of Botswana it was found that foreign companies and investors had an influence in about 82% of the accommodation facilities leaving just 18.5% fully owned by citizen companies (Mbaiwa, 2017). The *non-local ownership* investments benefit the local tourism destinations with direct investments and do not pose financial risks to the areas, but their major costs to the local areas include the large outflow of income. The large income outflows from local regions exacerbate the external leakage effect and undermine the multiplier effects that could have occurred in local regions (Anderson, 2013; Benavides, 2001; Ntibanyurwa, 2008; Supradist, 2004). Although the local human communities do not directly benefit financially from the operations of *non-local ownership* tourism firms inside the national parks, many local people are offered employment opportunities, even though, commonly, these are the less specialised jobs (Chirenje et al., 2013). This view is supported by other researchers, who stated that although there was quite a substantial number of employment opportunities in tourism for local people, the jobs which were usually given to them were of poor quality (Oppermann & Chon, 1997).

In the GMAs, the tourism businesses operating lodges, campsites, safari hunting and other tourism services, around the Kafue and the South Luangwa national parks, were found to be operating under both the joint venture ownership and the total ownership investments. The GMAs are a prime area for consumptive tourism (Matlhola, 2016) and the businesses operating this type of tourism were found to be in a three-tier joint venture ownership investment, involving the private sector, the public sector and the local community. In the GMAs, the tourism businesses' joint venture ownership arrangements were categorised as *local* ownership type of investments (Anderson, 2013; Benavides, 2001; Ntibanyurwa, 2008; Supradist, 2004). It is a public-private partnership (PPP) where the public sector was represented by the DNPW, and the private sector included both the private companies and the local communities. In these partnerships, the tourism businesses in the GMAs, with their profits and losses, are solely run by private companies, while the DNPW and the CRBs, representing the local communities, provide the landholdings and enabling environments. For instance, Safari Hunting Outfitters lease hunting blocks from DNPW and the communities by signing the Hunting Concession Agreements (HCAs) which specify varying terms of tenure, payment of hunting fees, that include concession fees, and animal fees. The DNPW jointly working with CRBs – as co-managers of the GMAs and on behalf of local communities – approves and licenses the Professional Hunting Safari Concessions (PHSC) (PMTC-Zambia, 2008).

The number of selected companies or establishments operating safari hunting operations under the *local ownership* investments were three in number in the Kafue National Park and six in the South Luangwa National Park which accounted for 7% and 12% of all the companies sampled, respectively (Table 5.3). According to Supradist (2004) a *joint venture* with local ownership holds an advantage for the local region by having access to international marketing networks and having access to extra capital (Supradist, 2004) as well as sharing the risk as a form of protection among partners. However, external leakage, due to profit repatriations by non-local partners, reduces the income to the region. Moreover, local communities could be vulnerable to signing unfavourable contracts with non-local partners due to limited bargaining powers (Benavides, 2001; Chirenje, 2017; Supradist, 2004). From this we can conclude that *local ownership* directly benefits the local human communities in GMAs with a good percentage of business spin-off, or value-added. The locals also benefit from the available employment opportunities from these joint venture tourism businesses. For instance, a safari hunting outfitter in 2015 paid concession fees during the hunting season in the ratio of 50% to the public (DNPW) and 50% to the local communities (CRBs). The chief's share of 5% was paid to the chiefs by DNPW from the community's share. The outfitter also paid animal fees, according to the quota allocation, which was shared between DNPW and the communities in the GMAs.

In the GMAs, another type of tourism business ownership selected was the *total ownership* investments, which were fully owned by non-local companies. These non-local companies also operate businesses such as safari lodges, safari camps and bush camps. Most of them are required to pay land rents to government and rates to the local district council but are not levied by DNPW or CRBs for fixed or variable operating fees. They pay park entry fees should they drive, walk, or boat in the park (PMTC-Zambia, 2008; ZAWA, 2011b). The number of selected *total ownership* investments in the Kafue National Park were eleven (11) and they accounted for 41% of all the selected companies or establishments – in the South Luangwa National Park there were thirteen (13) accounting for 25% of all the selected companies respectively. Similar to the *non-local ownership* companies operating from inside the park, the *total ownership* companies benefit the local regions with direct investments, and they do not pose financial risks to the local communities. However, the local regions lose tourism income through profit repatriations by non-local business owners and through remittances by non-local employees. This has been supported by several research efforts which have established that tourism revenue leaks out due to total foreign ownership of tourism businesses in over 70% of the developing countries (S. G. Britton, 1982; Mbaiwa, 2017; Sofield, 2003). Yet, in both the Kafue and the South Luangwa there were no companies operating as *full local ownership* investments. The *full local ownership* investment is a domestic or local investment without foreign or non-local ownership links (Anderson, 2013; Supradist, 2004).

In the OAs, both the *local* and the *non-local ownership* investments were selected. The total number of selected companies or establishments in the Kafue was seven (7) which accounted for 17% of all the selected companies – in the South Luangwa no Open Area tourism company was selected. The *joint venture* partnerships, which were part of the local ownership companies, were only between the local communities and the private sector (Ahmed, 2014). As is the case in the GMAs, the private sector in the OAs is required to sign TCAs and HCAs as lease agreements with local communities. Most of these tourism investments were on landholdings with the Ministry of Lands, and they pay land rents to government and rates to the local district council. They were also not levied by DNPW or the local community for fixed or variable operating fees. However, as with the GMAs, all the companies or establishments in OAs pay park entry fees and animal fees to DNPW – if they drive, walk, boat in the park or conduct safari hunting operations. The benefits and costs of *local and non-local ownership* investments in the OAs to the local human communities are comparable to what is obtained from the companies operating in GMAs except that the communities' share of tourism profits or value-added is expected to be higher in OAs.

The participation of local communities in tourism, as local owners in *joint venture* investments, was only 10% and 12% of all the selected companies or establishments in Kafue and South Luangwa respectively. This meant that the companies or establishments which fell under non-local ownership, were as high as 90%. This also meant that the external economic leakage, due to *non-local ownership* of tourism businesses, was expected to be very high. Economic leakage weakens the capacity of tourism enterprises by locals and the ability of local regions to allocate necessary resources for maintaining and improving basic infrastructure (Anderson, 2013; Benavides, 2001). Locals benefit from tourism businesses in various ways, for instance, employment, support of community projects, gratuities from tourists and game meat distributions from safari hunting outfitters. A side research effort and analysis of financial records from one of the CRBs in the Kafue GMA showed that the CRB's annual income from safari hunting was less than 50% of the hunting outfitter's spin-off. This meant that the local community's 'real' share of the national park's tourism profits or value-added was estimated at 5% and 6% or less for the Kafue and South Luangwa respectively.

It follows that having more inclusive economic policies for protected areas would positively affect the local human communities' participation in tourism businesses and wildlife conservation. *Full local ownership* investments would result in reduced external leakage, increased participation of locals in tourism enterprises and enjoyment of the tourism industry benefits by the local communities (Hampton, 2013). It is well-known that *non-local ownership* investments can house predatory practices and anti-competitive behaviour that create unbalanced distribution of benefits. Such economies with extractive elements could lead to enclave tourism and eventually threaten the possibility of the local regions achieving economic sustainability (Hjerpe, 2018; UNWTO, 2016; Wehrli, Egli, Lutzenberger, Pfister, & Stettler, 2017; Whitelaw et al., 2014). However, it is hereby noted that this is not to impend non-local ownership investments from participation in local tourism as there are many advantages that go with non-local investments such as access to extra capital, having an international reputation and lower marketing costs. Ultimately *full local ownership* of tourism enterprises ought to be encouraged to operate in tandem with *non-local ownership* investments.

Total, captured and leaked economic impacts of tourism

Tourism is said to bring many economic benefits to locals in tourism destinations, such as income generation and employment creation from visitor spending, through the multiplier effect or various rounds of re-spending of tourism income (Souza Beraldo, 2017; Stynes et al., 2000; Supradist, 2004). The combined total tourism economic impacts of the Kafue and South Luangwa national parks was estimated to range between ZMW284 million and ZMW1,254 million and had a very positive impact on the incomes of rural communities living next to these protected areas, through multiplier effects. The number of new jobs supported between the two parks was 779 with the South Luangwa accounting for 605 jobs, which were 431 more new ones created than in the Kafue (Table 5.4; and Appendices 7.20 and 7.21). The South Luangwa was a major contributor to all these total tourism impacts, which was about three times that of Kafue, because there was more visitor spending around the former than the latter. It is not fully understood why the Kafue receives less visitors than the South Luangwa, as they are both among Africa's socio-ecologically important conservation areas boasting a high diversity of wildlife. However, observations during data collection confirmed that the Kafue National Park has poorer infrastructure development, especially the road network, than the South Luangwa National Park and this perhaps could result in lower numbers of visitors. These factors prove that tourism in protected areas has significant impacts on local economies through direct sales, personal incomes, value-added and employment levels, albeit that some national parks perform better or worse than others (Naidoo, Weaver, et al., 2016; Rogerson, 2018). The interpretation of the obtained results, should be done with caution because the use of interval estimates instead of the point (mean) estimates, applied to reduce the margin of error, has affected the accuracy of the obtained interval results.

The captured visitor spending impact of both national parks ranged between ZMW143 million and ZMW664 million, which accounted for about 50-53% of their total tourism economic impact. However, when the Kafue's visitor spending impacts are considered separately, they accounted for about 41-43%, while the South Luangwa's accounted for some 53-56% of their total economic impacts of tourism. The results show that in the Kafue National Park total leakage (internal plus external) was clearly the more dominant component of the total economic impact of tourism. In the South Luangwa the more dominant component of the total economic impact of tourism was the captured economic impacts of tourism. This means that on average an amount ranging from ZMW57 to ZMW59 out of every ZMW100 spending by a party of tourists did not benefit the locals in the Kafue National Park because of leakage. In South Luangwa the amount that did not benefit the locals because leakage ranged between ZMW 44 to ZMW47 out of every ZMW100 spending. Although some researchers have shown that visitor spending in the rural areas could be highly significant where other income sources are scarce (Sandbrook, 2010) leakage, associated with tourism, if not checked, could cause overall negative economic impacts in the areas. Captured visitor spending impact in Kafue was about four (4) times less than that of South Luangwa. The number of new jobs captured ranged between 31-37% of the total economic impact in the Kafue while in the South Luangwa the captured new jobs ranged between 51-59% of the total economic impact. This means that there were more new jobs lost per visitor spending – probably due to higher internal leakage – in the Kafue than in the South Luangwa National Park. It also means that there are more tourism goods and services coming outside the local regions of the Kafue National Park than is the case with the South Luangwa National Park.

The total value-added share for local communities was estimated only at 5% and 6% of value-added for Kafue and South Luangwa respectively because there were more non-local ownership tourism firms than local ownership ones. Establishing more full local ownership enterprises and creation of more linkages of local entrepreneurs in tourism businesses could capture more tourism revenue and reduce both internal and external leakages from local regions (Rogerson, 2011; Supradist, 2004). It is also crucial to note that – at the tourism destination – captured tourism revenue does not necessarily result in impacts because the great majority of the revenue can be captured by a small group of local elites (S. Britton, 2004; Sandbrook, 2010; Schilcher, 2007). For instance, if the said revenue is captured by a small group of local elites, then impacts on poverty alleviation, among other challenges, would be minimal in the area. This means that the economic impacts or poverty alleviation impacts would also depend on the distribution of the captured visitor spending impacts within the local economies (Ostrom, 2015; Ribot & Peluso, 2003). The higher capture rate of total tourism jobs in the South Luangwa (51-59%) than in the Kafue (31-37%) could be due to more linkages between tourism business operators and local enterprises in South Luangwa. This is in line with other researchers' observations that levels of leakage are linked to local capacity to supply skilled staff, foods and other supplies which, in the majority of cases, are lacking in most rural areas of developing countries (Mbaiwa, 2015; Meyer, 2013; Rogerson, 2011; Torres, 2003). Higher tourists' spending opportunities in the South Luangwa than in the Kafue also contributed to a higher capture rate of visitor spending impact.

Researchers have found that some categories of tourists, such as backpackers, bring higher income to local people, albeit causing minimal leakage, because they tend to stay in tourist facilities that are mostly operated by the locals (Jonas & Mansfeld, 2017; Kevin & Irena, 2015; Sroypetch, 2017). It is also often argued, however, that in spite of higher leakage associated with large scale tourism operations – which are preferred by high-income visitors – there is potential to offset that leakage with the high *expenditures* involved in this category (Jarvis, 1994; Sroypetch, 2017; Supradist, 2004). Other researchers have stated that it is just about one percent of tourist spending that reaches local people living within the local regions of national parks because of leakage (Sandbrook, 2010; Walpole & Goodwin, 2000). Other factors associated with economic leakage of tourism include the economic diversification, level of development, government policy, state of ownership, business power integration, etc. (Anderson, 2013; Chirenje et al., 2013; Pérez-Ducy de Cuello, 2001; Supradist, 2004). South Luangwa's retention of one hundred (100) percent admission fees, fifty (50) percent of the animal fees and at least fifty (50) percent of camping fees, largely contributed to reduction of external tourism leakage. Whereas economic leakage has been described as a dynamic phenomenon that would rise and fall over time, high prevailing levels of economic leakage are feared to decelerate economic sustainability (Gollub et al., 2003; Ndivo & Cantoni, 2016; UNWTO, 2016). Feasible, employing ways of reducing economic leakage in national park local areas will always be desirable for most human communities (Sandbrook, 2010).

5.5 Conclusion and recommendations

Lack of an established local cost centre, which covers all park financial management, in the Kafue National Park contributed to the external leakage from the local economy. The non-ownership of tourism businesses by locals, such as the local communities in GMAs and OAs, also contributed to the external leakage from the local economies of both the Kafue National Park and the South Luangwa National Park. The supply of goods and services for park visitors by non-local suppliers and the lack of strong local business linkages, contributed to both internal and external leakages for both parks. The interpretation of the obtained results, shown below, should be done with caution because the use of interval estimates, instead of the point (mean) estimates, applied to reduce the margin of error, has affected the accuracy of the obtained interval results. The conclusions for the assessments are outlined below:

- ✓ The number of tourism businesses operating as *local ownership* firms – those incorporated as joint ventures companies – were found to be not more than 12% of all the selected companies or establishments in the local areas of both parks (Tables 5.1, 5.2 and 5.3).
- ✓ About 57 – 60% of visitor spending impact and 63 – 69% of visitor spending supporting new jobs did not benefit the local human communities in Kafue but escaped as internal and external economic leakage. In South Luangwa it was about 43 – 46% of total visitor spending impact and 42 – 49% of visitor spending supporting new jobs that escaped as internal and external economic leakage (Tables 5.5 and 5.6; and Figure 5.1).
- ✓ The total value of visitor spending impact that escaped as internal and external economic leakage, was equal to ZMW37.92 – 167.25 million and ZMW103.30 – 422.45 million for Kafue and South Luangwa respectively (Table 5.7).
- ✓ Similarly, the number of new jobs supported by the visitor spending, but which escaped the local regions as economic leakage, was equal to 60 – 197 and 141 – 442 for respectively Kafue and South Luangwa (Figure 5.2).
- ✓ External leakage due to non-local ownership of tourism firms contributed ZMW6.02 – 30.01million and ZMW27.90 – 131.27 million to the total economic leakage for the KNP and the SLNP respectively and were 74 – 76% and 79% of value-added respectively (Table 5.7).
- ✓ Accordingly, the lack of *full local ownership* and the low rate of *local ownership* for tourism businesses, as well as the lack of tourism business linkages with local enterprises, contributed to a high rate of economic leakage.

Study outcomes

Specific objective 3:

To evaluate the economic value of tourism leakage from local areas around the Kafue and South Luangwa national parks and the impact of this on local human communities.

Related question and outcomes:

What is the economic leakage of declining tourism from local economies around the Kafue National Park compared to that of the South Luangwa National Park?

The total economic value of tourism leakage from local areas around the Kafue and the South Luangwa national parks was estimated by:

- determining the non-local ownership of tourism businesses (external leakage) (Table 5.3) and
- estimating the total tourism leakage (internal and external) by establishing the difference between the total economic impacts of visitor spending and the captured economic impacts of visitor spending in local areas around the Kafue and the South Luangwa national parks (Table 5.5).

Going forward: Based on the findings, the insights from literature and the author's leakage estimations, the following recommendations could assist policy makers and the government agencies for tourism contribute to reducing the tourism leakage:

- Establishing a financial cost centre that caters for all park financial management transactions in the Kafue National Park area, like the South Luangwa Area Management Unit (SLAMU) established in the South Luangwa National Park.
- Securing land rights for local communities in GMAs and OAs, and ownership of wildlife existing in them, would contribute to the reduction of tourism economic leakage from local areas around protected areas. Secured land rights for local communities living around national parks would be the basis for protecting against loss of wildlife, land, forests and other natural resources (losses normally arise due to lack of sense of ownership by communities).
- Formation of Public-Private/Community Partnership (PPPs) would empower local communities to participate in wildlife management and reduce tourism leakage.

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Chapter 6 BENEFITS AND COSTS REALISED BY LOCAL POPULATIONS FROM GEOGRAPHICAL SETTLEMENTS AROUND NATIONAL PARKS: THE CASES OF THE KAFUE AND SOUTH LUANGWA NATIONAL PARKS

Abstract

The effects of national parks on the livelihoods and well-being of locals in Game Management Areas and Open Areas around protected areas had to be evaluated to fully understand their impacts. The overall objective of the study was to develop an understanding of the influence of geographies of settlements (circumferential or radial) around the Kafue National Park (KNP) and the South Luangwa National Park (SLNP) through the positive/negative impacts and realisation of income from primary sources by locals. The study applied a quantitative methodology to estimate the impacts of both KNP and SLNP on local settlements. The statistical analyses were conducted using R. The data were analysed using bivariate analyses, multiple linear regression analyses and the Principal Component Analysis applied to household consumption of natural resources, geographical locations, and well-being of locals as variables from both the KNP and the SLNP data. The results showed that the main perceived positive social impact on the KNP was the households' access to natural resources and fertile land, while in the SLNP it was the employment opportunities available in the tourism industry for locals. There were no significant negative social impacts on households in the KNP. In the case of the SLNP, the main perceived negative social impacts included the damage to crops, and the killing of people and livestock by wild animals. In both the KNP and the SLNP, households on average consumed between ZMW708.64 and ZMW2,263.87 of natural resources annually, with the highest rate indicated for firewood, then food and medicines, and lastly material and fibre. Natural resource consumption was found to be radially influenced by geographical settlements since consumption was dependent on the distances of households from the national parks' boundaries. The study also found that geographical locations of settlements near the SLNP were more correlated to the all-

weather roads, NP boundaries, NP entrance gates, village centres, rivers, and park regional area management units than those in the KNP. Moreover, the households near the SLNP were more correlated to ownership of houses made of fired-bricks, or concrete-block walls, plots, as well as houses made of galvanised iron-sheet roofs than those in the KNP, and hence their level of well-being was slightly higher than their counterparts in the KNP. The well-being of households in settlements near NPs was found to be circumferentially influenced by their geographical locations. Ultimately, although settlements located closer to PAs – especially to areas with high tourism activity – experienced high incidences of human-wildlife conflicts, they consumed fewer natural resources, obtained more benefits from tourism and their general well-being was better than settlements further away from these areas.

Keywords: *Geographical settlement, natural resources, Kafue National Park, South Luangwa National Park, Game Management Areas, Open Areas*

6.1 Introduction

6.1.1 Background and rationale

The Kafue National Park (KNP) and the South Luangwa National Park (SLNP) are important Protected Areas (PAs) for the conservation of wildlife biodiversity, for protection of large pieces of intact forests and as sources of water for the southern African region. These National Parks (NPs) are managed as non-extractive natural resource while and the buffer zones around these NPs, which includes Game Management Areas (GMAs) and Open Areas (OAs), are managed as extractive resource. There are several human communities living in the nine GMAs around the KNP and five GMAs around the SLNP, for example, there are populations of approximately 34,000 in Mumbwa GMA and 69,000 in Lupande GMA, consuming the extractive resource as part of their livelihoods. According to Lindsey et al., (2014), most of these GMAs around those NPs, generally offer comparatively fewer alternative livelihood opportunities and at the same time have low agricultural potential.

The local human communities, living in those geographical settlements of GMAs and OAs, may benefit from the available natural resources from within their settlement areas as part of their livelihood alternatives such as the consumption of NTFPs. Other benefits for those local communities may include traditional hunting, tourism employment, tourism related businesses and personal enjoyment. Generally those geographical settlements are dependent upon the presence of PAs for most of their economic activities, especially for those located in the gateway areas of the NPs, such as Mumbwa GMA and Lupande GMA in the KNP and the SLNP respectively (Milupi et al., 2017; Musengezi, 2010). As reported by Lindsey et al., (2014) the livelihood improvements for families in those GMAs, with viable wildlife populations, were estimated to have a 7.8% higher chance of obtaining employment and at the same time were 17% better off than those outside such GMAs. The communities in GMAs with viable wildlife populations may also participate in local safari hunting tourism by awarding hunting concessions to tourism operators through the Community Resource Boards (CRBs) operating under the Community-Based Natural Resources Management (CBNRM) programmes (Mupeta-Muyamwa, 2012).

The local people's benefits from conservation and the improvement of their well-being have been recognised as principles of the interventions by conservationists (Campagna & Fernandez, 2007) which are in line with the Convention on Biological Diversity (CBD) principles (Secretariat, 1992). These interventions in the conservation of PAs can change the locals' resource use-rights – they can also lead to displacement of local communities and a number of positive and negative social impacts can be generated (West, Igoe, & Brockington, 2006). In some cases, the conservation of PAs have threatened the livelihoods and well-being of locals instead of improving the situation (Mariki, 2016). Studies have shown that some government projects or private investors disempower local people when they take over the control of natural resources (Borrini, Jaireth, Farvar, Pimbert, & Kothari, 2007). For example, Mariki (2013) described a case where restriction to resources such as firewood became a problem to local people; probably because wood is the main energy source in Africa which is estimated at about 70% consumption (Coad, Campbell, Miles, & Humphries, 2008). In most NPs in Africa, including the KNP and the SLNP, the increase in wildlife movements between PAs has exacerbated local people's problems because as wild animals move, especially elephants, they not only raid crops, but in some cases also kill people and livestock. In reiteration, the killing of crop raiding animals or depredating animals by the affected local people, is not allowed by the wildlife authorities. Moreover, local people are not compensated for the costs of conservation they incur. Arguably, some local communities reiterate through squatting in or encroachment on PAs and poaching wildlife to keep themselves alive since they are left without alternatives (Colchester, 2002). In some PAs, the locals have resorted to guarding their farms during the night against crop raiding wildlife because they fear that if their crops were destroyed then their families' well-being would be affected (Colchester, 2002). In most cases, women walk long distances to fetch water where water sources near their homes have been damaged by elephants.

However, there are many benefits that PAs provide to local communities and the regions which may include ecosystem services and products, and contribution to employment and income generation (Pullin et al., 2013). In view of the foregoing, the social impacts should be monitored and evaluated to ensure that there is support and effective allocation of conservation resources (de Lange, Woodhouse, & Milner-Gulland, 2016; Grantham et al., 2010). The influence of NPs, through nature conservation and tourism activities, on the livelihoods and well-being of local human communities in these geographical settlements, had to be evaluated to fully understand their impacts. Both the qualitative and quantitative methodologies, through household surveys, were chosen to compare positive/negative impacts and realisation of income from primary sources. Some of the indicators considered in the analysis of the data, included positive and negative impacts, the consumption of natural resources and determination of the extent to which these impacts and consumptions affect the livelihoods among the rural poor. The results would be used to develop an understanding of the influence and impact for NPs on the livelihoods of people and then use them as a basis for informing stakeholders and policy makers.

6.1.2 Objectives and research questions

The overall objectives of the study are to measure the relative economic impacts of tourism on locals living in settlements near the Kafue and the South Luangwa national parks, to develop an understanding of how the geographical locations of their settlements influence the realization of income from primary sources and to ascertain how their location affects the main positive and negative social impacts.

Specific objective 4:

To develop an understanding of the influence of geographies of settlements (circumferential or radial) around the Kafue and South Luangwa national parks through the positive/negative impacts of the protected areas and the consumption of natural resources by the locals.

Related questions

d) How do settlements near the national parks which are affected by the main positive and negative social impacts relate to the parks?
e) How does location of settlements near parks influence the consumption of natural resources?
f) How does the location of settlements near parks influence the well-being of locals?

6.2 Research methods

The methods applied to understand the influence of geographies of settlements around the Kafue and the South Luangwa national parks on the social impacts and consumption of natural resources of locals in the settlements near these protected areas, are outlined in Chapter 2 (Research methods). Specifically, the following methods were applied:

- The Focus Group Discussions (FGDs) or community workshops were conducted in two selected VAGs from each chiefdom or CRB in the KNP and in two selected VAGs for combined chiefdoms or CRBs in the SLNP to identify significant resources consumed and the benefits and costs in the settlements.
- The household survey with a questionnaire which focused on the positive and negative social impacts and the consumption of resources from primary sources in settlements near the KNP and the SLNP
- Geographical/physical features common to all the selected settlements near PAs were identified and their distances from selected households determined.
- Interviews with some key informants in the communities were also conducted with selected community leaders to gather additional data on the characteristics of settlements near the parks.
- Several statistical analyses and some validation tests were conducted to analyse the data collected through the focus group discussions, household surveys and interviews.

6.3 Results and discussion

6.3.1 Descriptive statistics

Households' basic socio-economic characteristics and natural resource consumption in settlements near the Kafue and the South Luangwa national parks

The map below (Figure 6.1) reflects GPS points of the 468 sampled households from the settlements near the Kafue National Park in the Mumbwa district. These settlements are the

Kabulwebulwe chiefdom in the Mumbwa GMA and the Kaindu chiefdom in the Kaindu Open Area.

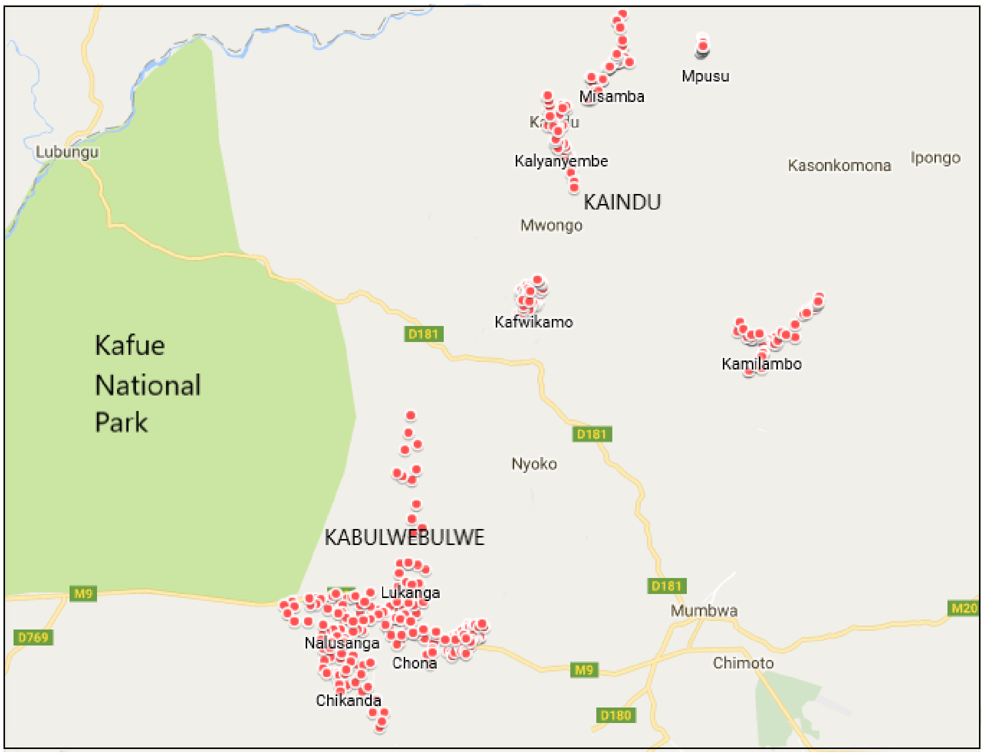

Figure 6.1: Sampled households in Kabulwebulwe and Kaindu settlements near Kafue NP
Source: GoogleMaps, 2020a

The map below (Figure 6.2) shows GPS points of the 419 sampled households from the settlements near the South Luangwa National Park in the Mambwe district. These settlements include the Kakumbi, the Malama, the Mnkhanya and the Nsefu chiefdoms from the Lupande GMA and the Mwanya chiefdom from the Lumimba GMA.

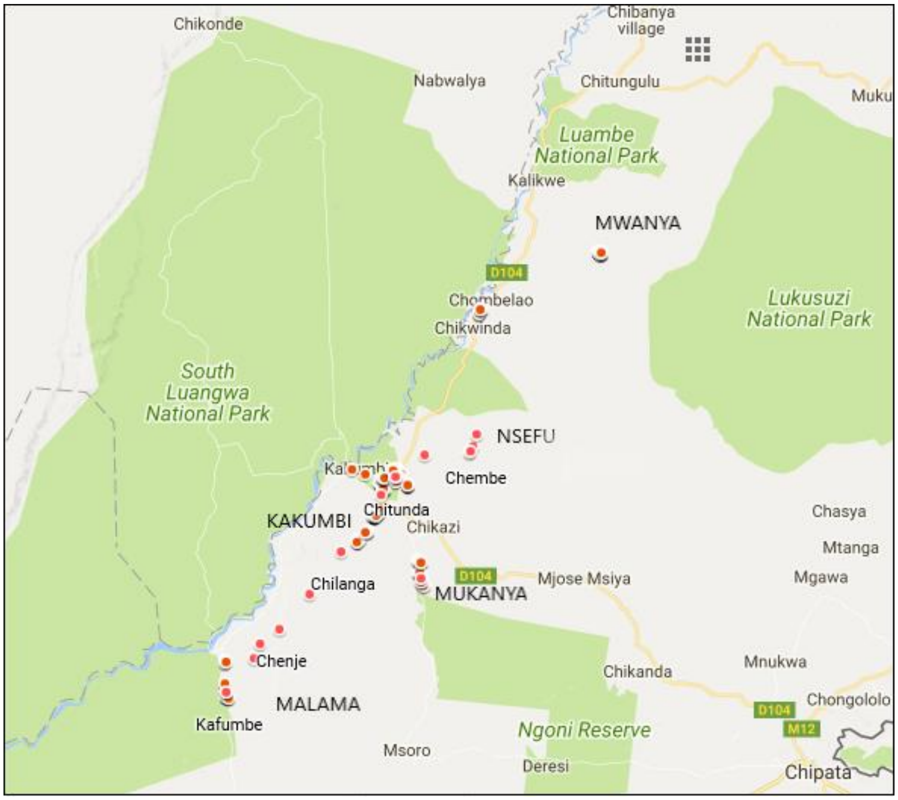

Figure 6.2: South Luangwa NP and the surrounding Game Management Areas and other NPs
Source: GoogleMaps, 2020b

Table 6.1 and Figure 6.3 below compare the average households' distances from selected geographical features, in settlements near the KNP and the SLNP, which were perceived to affect the households' socio-economic status in some ways. The differences of households' average distances from selected geographical features between households from the KNP and those from the SLNP, are also indicated in the Table below:

Table 6.1: Sampled households' average distances from selected geographical features

	Household distance from Geographical feature (Km)							
Geographical feature	NP	OPAs	Gates	V/centres	Roads	AMU	CBD	River
KNP	23.6	18.7	27.8	2.7	2.0	40.3	40.3	39.4
SLNP	10.5	11.9	18.0	11.9	1.1	26.9	38.1	10.9
Difference	13.1	6.8	9.8	9.2	0.9	13.4	2.2	28.5

Apart from the village centres, all the other measured average household distances from selected geographical features in the settlements near the South Luangwa NP were comparatively shorter than the average household distances from the settlements near the Kafue NP (Table 6.1). This means that households in the settlements near the South Luangwa NP were closer to PAs' boundaries and other selected geographical features than the households in the settlements near the Kafue NP. In the Kafue NP, the average household distance from the park boundary was slightly longer than the average household distance from 'other' PAs' boundaries (e.g., conservation zones of GMAs and community/private game ranches), while in the South Luangwa NP, the opposite was true where the household distance from the 'other' PAs' boundaries was longer (Figure 6.3).

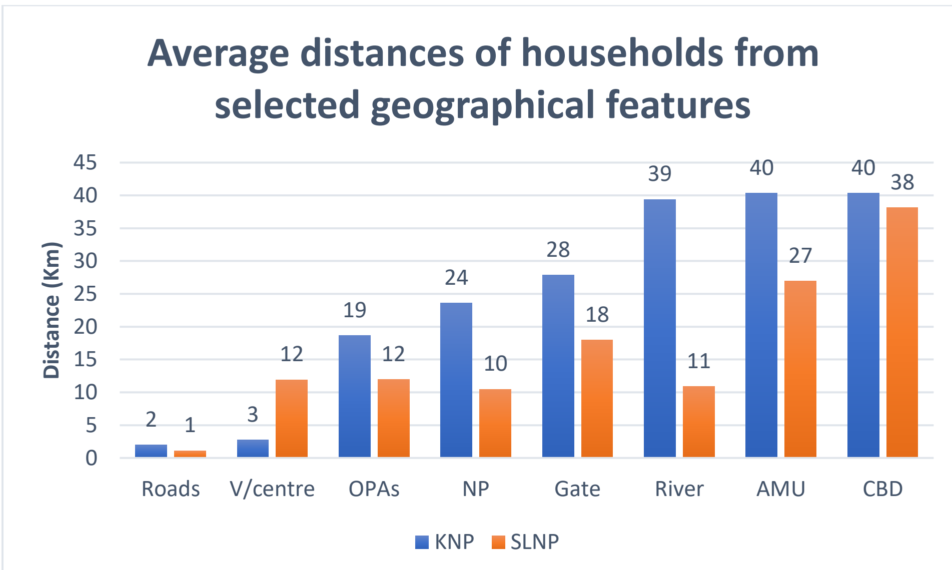

Figure 6.3: Comparison of the average distances of households from selected geographical features in the KNP and the SLNP

In the KNP, the households consumed much greater quantities of the 'firewood' at USD$262 (ZMW2,263.87)[13] than any other resource, followed by the fish resources at USD$173 (ZMW1,499.04), the charcoal (an indirect natural resource) at USD$106 (ZMW920.16) and the building materials at USD$88 (ZMW762.05). Additional major resources consumed were game meat, wild food, crafts and equipment, and the medicinal plants. Others included wild birds, small wild animals, edible insects, and edible roots. In the analysis, the natural resources mentioned above were arranged according to their types into three main groups namely: 'firewood', 'material and fibre', and 'foods and medicines' (Figures 6.4 and 6.5).

[13] ZMW stands for Zambian Kwacha currency: US$1.00 = ZMW8.64 in 2015

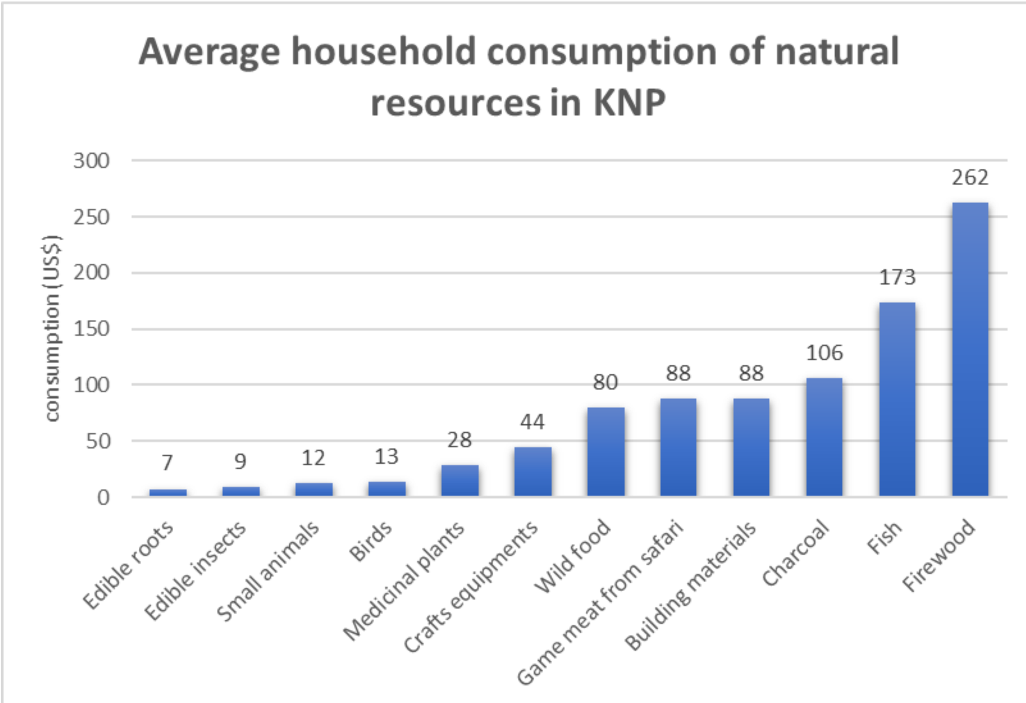

Figure 6.4: Households' average natural resources consumption in the KNP (USD)

In the SLNP, the natural resource consumption data were collected directly in the categories of 'firewood', 'material and fibre', and 'food and medicines' (Figure 6.5). On average, the households in the SLNP consumed mostly the firewood at USD$109 (ZMW942.14), followed by the material and fibre at USD$124 (ZMW1,071.62) and then the foods and medicines at USD$82 (ZMW708.64).

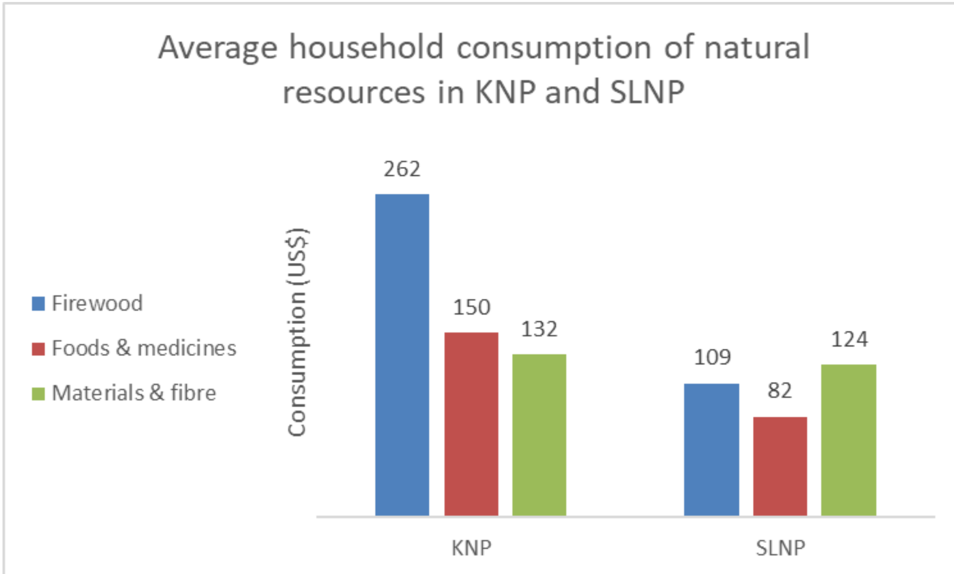

Figure 6.5: Comparison of average consumption of natural resources in the KNP and SLNP (USD)

The socio-economic household surveys conducted in the KNP and the SLNP, with focus on GMAs and OAs, established some similarities and some differences between the two NPs' settlements situated near them. Some 468 and 419 households were sampled from the settlements near the KNP and the SLNP respectively. From the KNP, about half (47 percent) of all the interviewed households (or 220 households) were from Kabulwebulwe CRB settlement and the rest (248 households) were from Kaindu settlement. The Kabulwebulwe chiefdom is one of the three CRBs that form Mumbwa GMA, which is on the eastern boundary of the Kafue NP and covers 3,370 km^2 with a population of 33,176 (Namukonde & Kachali, 2015). The Nkoya people predominately make up the population of approximately between 10,000 and 12,000 people (CSO, 2010). On the other hand, the Kaonde people make up the Kaindu chiefdom in the northern part of the Mumbwa district. The chiefdom's size is 2,287 km^2 with an estimated population of between 23,000 and 25,000 people (CSO, 2010). In the South Luangwa NP, the 419 households of mostly Kunda people were sampled from the Kakumbi, Malama, Mnkhanya and Nsefu chiefdoms from the Lupande GMA and the Mwanya chiefdom from the Lumimba GMA. The Lupande GMA is 4,840km^2 in size and the 2010 census reported that the human population inhabiting the GMA, in 13,196 households, was estimated at some 68,918 people with an average of 3.8% as an annual population increase rate (CSO, 2014). The population densities were approximated at around 10, 11, and 14 people per square kilometre in Kabulwebulwe chiefdom, Kaindu chiefdom, and Lupande GMA respectively. This means that the settlements near the SLNP are slightly more densely populated than the settlements near the KNP.

The survey revealed that the number of household members, generally ranged from one (1) household member to thirty-six (36) household members per household, but on average the households had six to seven members for the SLNP's and the KNP's settlements respectively. With reference to the total estimated populations of the Kabulwebulwe and the Kaindu chiefdoms from the KNP and the Lupande GMA from the SLNP, the average number of household members gave the total households in respective settlements as 7,400 and 13,784. The female household heads were estimated at 22% of total household heads for settlements near the KNP. All the settlements were characterised by a mean age for respondents (household heads) of around 40 years old. Again, the households from the KNP were characterised by 51% household heads having had some primary school education or completed primary school education, while in settlements near the SLNP, 51% household members had attained some secondary school education or completed secondary school education. This means that household heads from settlements near the SLNP had on average attained higher education levels than those from settlements near the KNP. The education level for the working household members was on average a secondary school level education; it was higher among households in the settlements near the SLNP at 33% than among household in the settlements near the KNP at 26%. The households in the settlements near the KNP were found to have 17% households which had at least one household member working in tourism-related businesses, while settlements near the SLNP had 10% of similar households. With reference to the estimated total households from selected settlements from the KNP and from the SLNP, the abovementioned percentages reflected a total number of households, with at least one working member in the tourism sector, as 1,258 and 1,378 respectively.

The survey also revealed that most of the households in settlements near the SLNP owned the plots their houses stand on unlike households in settlements near the KNP. At the same time, there was a higher percentage of the relatively more valuable house-wall materials (concrete blocks and burnt bricks) for settlements near the SLNP than settlements near the KNP. However, comparatively, there was a higher percentage of more valuable house-roof materials (corrugated galvanised steel roofing sheets) for settlements near the KNP. The understanding of this is that the households in settlements near the SLNP could easily access building materials such as burnt bricks and concrete blocks because they were made locally. However, building materials such as corrugated galvanised steel roofing sheets, which were normally bought in large cities such as Lusaka, could only be accessed at a much higher cost, by the SLNP's households, than by the KNP's households because of the former's remoteness. The other data that the survey showed was that there was a higher percentage of households with toilets on their plots in the settlements near the SLNP than near the KNP.

In terms of households' natural resource consumption, the KNP's households had on average a higher rate than those of the SLNP's. Specifically, the households' firewood consumption was about 2.4 times higher, the wild foods and medicines 1.8 times higher, and the materials and fibre 1.1 times higher in the KNP than in the SLNP. Households in the KNP consumed more firewood than any other natural resource, while households in the SLNP consumed more wild materials and natural fibres than any other natural resource. In Zambia the traditional way of collecting firewood is from dead wood on the ground and the cutting of old dead trees, but live trees are cut for firewood nowadays due to the increased human population (Chomba, Nyirenda, & Silengo, 2013). This trend has contributed to the increase in deforestation, especially in areas around PAs as the case may be (Turpie, Warr, & Ingram, 2015). The lower rates of firewood consumption in the SLNP than in the KNP can partly be attributed to the policies governing the management of natural resources in the GMAs and OAs around these two PAs.

Perceptions of social impacts in settlements around PAs

Perceived positive social impacts

The outcome of the analyses for perceptions of positive social impacts in settlements near both the Kafue and South Luangwa NPs is presented in Figure 6.6 and Figure 6.7. The survey responses are summarised to highlight some of the important positive impacts the households in the KNP perceived:

- 403 of 468 households did not fully agree that there were projects funded by tourists (rated zero to low).

- 339 households did not fully agree that safari hunting (outfitters) create jobs (rated zero to low).
- 300 households agreed that they had access to natural resources (rated medium to high).
- 289 households did not fully agree that wildlife conservation created jobs (zero to low).
- 278 households agreed that they had access to fertile land for their farming (medium to high).
- On average 278 households did not fully agree, while 190 households agreed that there were positive social impacts (Figure 6.6).

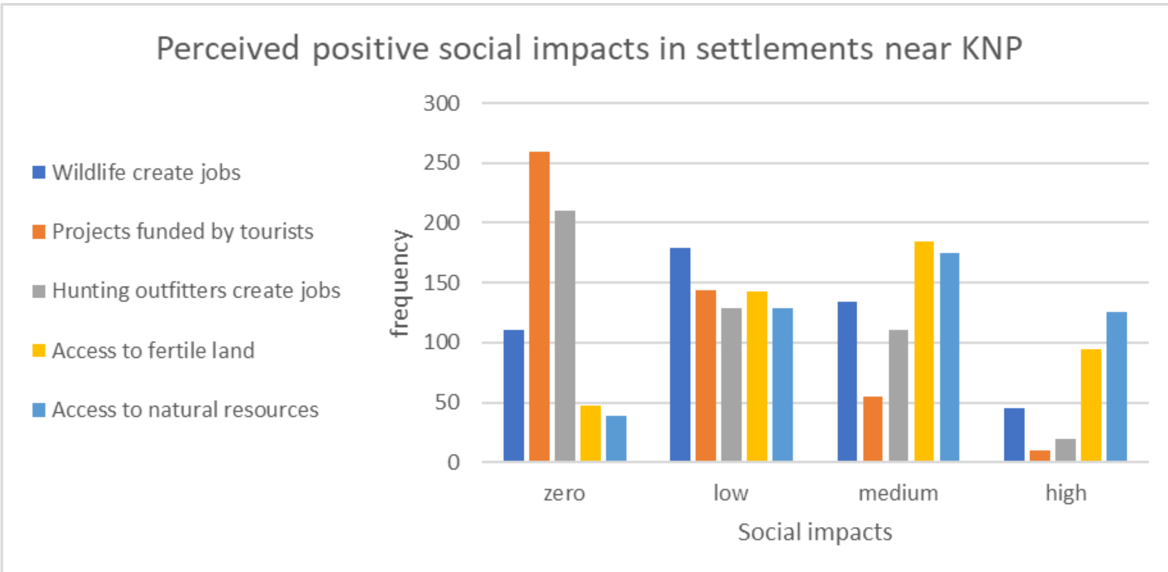

Figure 6.6: Positive social impacts in settlements near the KNP

In SLNP the most important positive impacts were:

- 221 out of 361 households did not fully agree that there were markets for their local products (rated zero to low).
- 214 households did not fully agree that there was income from traditional dances and cultural activities (rated zero to low).
- 190 households agreed that there were employment opportunities in tourism (rated medium to high).
- On average 202 households did not fully agree, while 159 households agreed that there were positive social impacts.

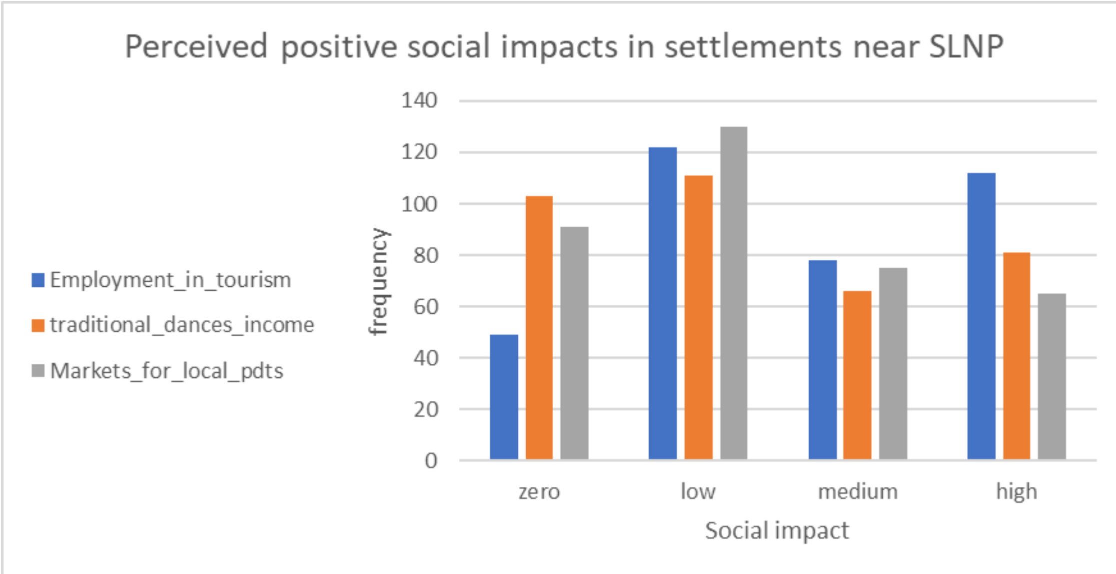

Figure 6.7: Positive social impacts in settlements near the SLNP

These perceived positive social impacts emanate from a combination of positive management practices identified below (Figure 6.8). The management practices that impacted positively on the locals in KNP can be summarised from the following survey responses:

- 75% of households did not fully agree that training was being organised for local people (rated zero to low).
- 73% of households did not fully agree that bona fide hunting licences were available for local people (rated zero to low).
- 65% of households did not fully agree that there were wildlife conservation-funded projects in their communities (zero to low).
- On average 64% of households did not fully agree about the perceived positive management practices.
- A trendline on averages shows a negative gradient from zero to high ratings of positive management practices by locals (Figure 6.8).

In SLNP:

- 79% of households agreed that there was a programme supporting girls to attend school throughout the year (rated medium to high).
- 76% of households agreed that a conservation education programme in schools was a good thing (rated medium to high).
- 74% of households agreed that wildlife conservation in PAs was a good thing (rated medium to high).
- 72% of households agreed that there was support for school infrastructure in their communities (rated medium to high).
- 63% of households agreed that there were education sponsorship programmes in their communities (rated medium to high).
- 55% of households agreed that there was a programme supporting drilling of boreholes in their communities (rated medium to high).
- On average 66% of households agreed on the perceived positive management practices.
- A trendline on averages shows a positive gradient from zero to high ratings by locals of positive management practices (Figure 6.8).

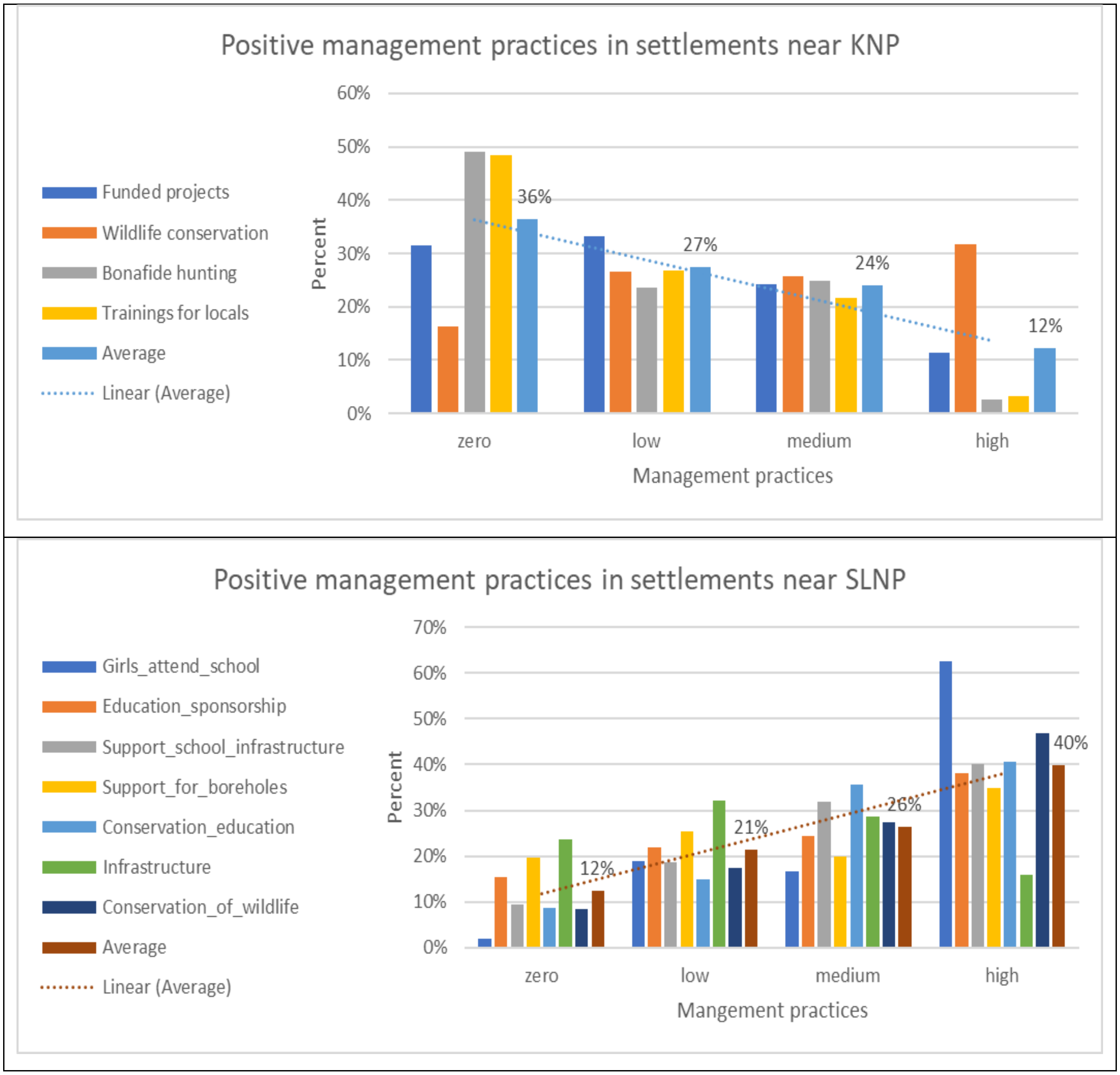

Figure 6.8: Positive social management practices in the settlements near the KNP and the SLNP

The positive social impacts on settlements around the NPs were identified and analysed in the study. The study confirmed that many of the households from both the Kafue and South Luangwa NPs pointed out the most important positive social impacts in these areas, which included: access to natural resources; access to fertile land for their farming in the KNP; and employment opportunities in the tourism sector in the SLNP. In the Kafue NP, the survey found that 278 (59%) of the households did not fully agree about the perceived positive social impacts such as availability of community projects funded by tourists, that hunting safari tourism created jobs for the locals, and wildlife conservation created jobs for the local. In the South Luangwa NP 202 (56%) of the households did not fully agree also about the perceived positive social impacts, such as the availability of markets for their tourism products, and that traditional dances and cultural activities generated income for them.

The perceived access to natural resources and access to fertile land for local people's farming in the Kafue NP and the employment opportunities in the tourism sector in the South Luangwa NP benefitted 41% and 44% of local people respectively. However, the locals from the two NPs were seeing the benefits these PAs were offering differently. Locals from the Kafue NP were interested in the natural resources they could obtain from the existence of the park, while those from the South Luangwa NP were interested in the jobs that could be created from tourism. Although PAs were intended primarily for biodiversity conservation studies have attested that PAs were more and more seen as both providers and drivers of economic and social benefits (Brandon, Redford, & Sanderson, 1998).

The study established that the most important positive social impacts emanated from a combination of identified positive management practices. In the Kafue NP, the survey found that 64% of the households did not fully agree that the perceived positive management practices such as 'wildlife conservation was a good thing' (or was being done in the right way), that 'there were available community projects funded through community-based organisation (CBOs) such as the community resource boards (CRBs) working under the auspices of community-based natural resources management (CBNRM)', that 'bona fide hunting licences (local hunting licences) were available for locals', and that 'community training was part of the community projects'. In the South Luangwa NP, 66% of the households fully agreed that the perceived management practices such as 'arrangements for schoolgirls to attend school throughout the year were in place', 'conservation education programmes in schools were a good thing', 'conservation of wildlife was a good thing (or was done in the right way)', and 'support for school infrastructure was available'. All the stated management practices are overseen by CRBs on behalf of local communities through a model known as CBNRM, which is expected to be an inclusive model with more devolved approaches in conservation. In this model the local groups of people or collective institutions are organised formally or informally to manage and utilise their resources, lands, and common property (Charles, 2011; Charles & Wilson, 2009; Kothari et al., 2015). In the Kafue NP, with 64% of the households not fully agreeing with the perceived positive management practices, it meant that most of the locals in the Kafue NP did not appreciate what their CRBs were doing in the GMAs or the OAs. However, the 66% of the households in the South Luangwa NP that fully agreed with the perceived positive management practices meant that most of the locals in the South Luangwa NP were happy with the performance of their CRBs.

There were more households from the Kafue NP (73%) than the South Luangwa NP (53%) that complained that the “bona fide hunting licences were not available for the locals”. Bushmeat or wild game had long been an important source of protein and income for rural communities, and both the KNP and the SLNP, just like many other PAs, permitted limited subsistence hunting, known as bona fide hunting, and fishing in the GMAs. The survey data were unable to provide useful information on the bona fide or traditional hunting as an economic activity. However, enough evidence from the other studies supported the notion that hunting was an important economic justification for retaining PAs as wildlife habitat by the locals (Kothari et al., 2015; Leader-Williams, Baldus, & Smith, 2009; Lindsey et al., 2014; Nelson, Lindsey, & Balme, 2013). In both the Kafue NP and the South Luangwa NP, poaching of wildlife took place because of some groups of people who relied on the illegal use of wildlife or poached wildlife and created conditions for other groups of local people to poach as they attempted to make up for the livelihood shortfalls (Simasiku et al., 2008). That condition was recently exacerbated by a significant rise in demand for poached wildlife products from consumers in Asia (Duffy, 2016; Montesh, 2013; Vandergrift, 2013). If well managed, the bona fide and the safari hunting could be sustainable and be able to contribute income to PA management and conservation (Kothari et al., 2015; Nasi et al., 2008). Other studies had shown that that was achieved elsewhere by making wildlife management the responsibility of the local communities through bilateral or multilateral agreements with all stakeholders (Kothari et al., 2015).

Consequently, the locals from settlements near both parks were not satisfied with their current arrangements on bona fide licensing. Households in the South Luangwa NP were happy with the programme that supported the keeping of the ‘girl children’ in school throughout the year. That arrangement was similar to other community initiatives which advocated for the girl children to be in schools rather than engaging them in house chores, agriculture, cattle grazing and other rustic chores, as had been happening in other areas (Zeeshan, Prusty, & Azeez, 2017). Literacy and further education empowered local people and provided them with alternative livelihoods to improve their lifestyles without so much direct dependency on the natural resources around the NPs.

Perceived negative social impacts

The outcome of the analysis for perceived negative social impacts is presented in Figures 6.9 and 6.10. The analysis (Figure 6.9) confirmed that the most important perceived negative social impacts in the KNP is summarised from respondents' responses:

- 380 out of 468 households did not fully agree that wild animals were contaminating their drinking water sources (rated zero to low).
- 251 households did not fully agree that wild animals were damaging their crops and killing their animals (rated zero to low).
- On average 316 households did not fully agree, while 153 households agreed about the perceived negative social impacts (Figure 6.9).

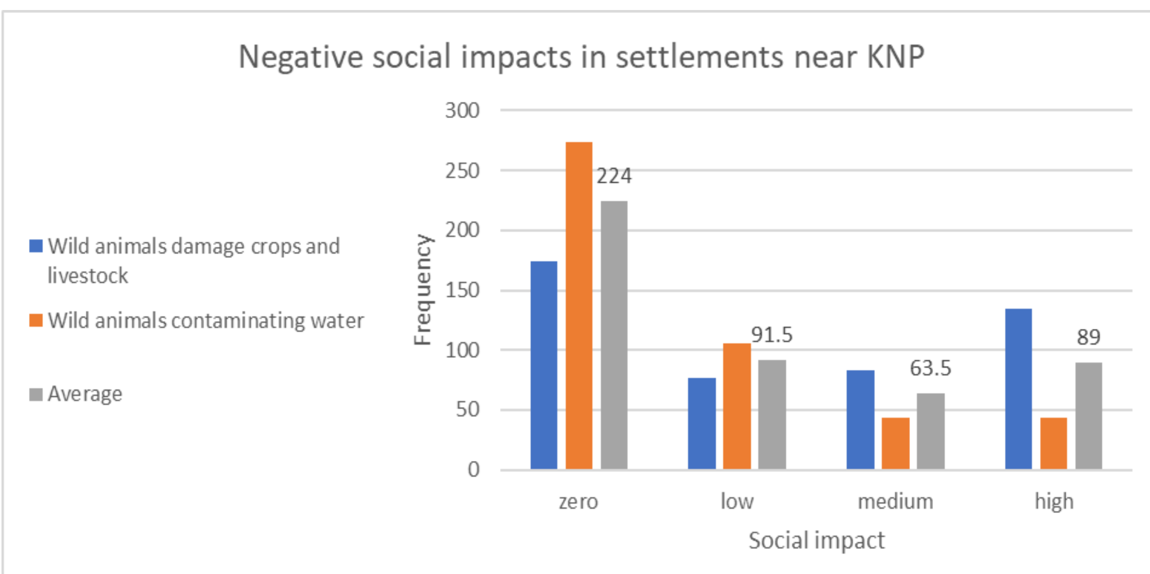

Figure 6.9: Negative social impacts in settlements near the KNP

In SLNP:

- 339 out of 361 households agreed that wild animals were damaging their crops (medium to high).
- 320 households agreed that wild animals were killing people (rated medium to high).
- 295 households agreed that wild animals were killing their livestock (medium to high); and
- on average 318 households agreed, while 43 households did not fully agree about the perceived negative social impacts (Figure 6.10).

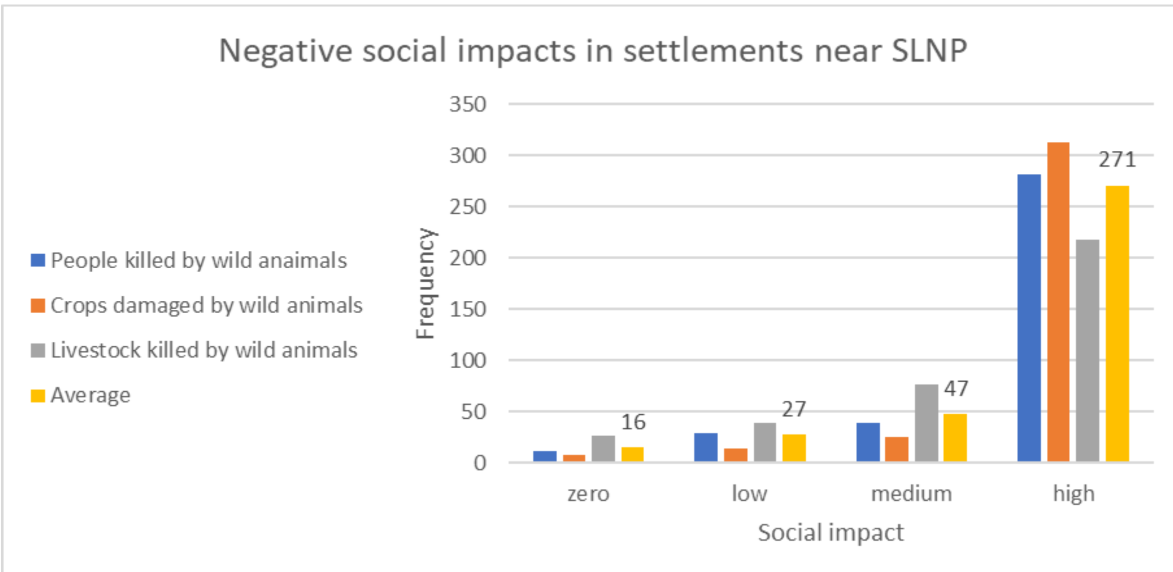

Figure 6.10: Negative social impacts in settlements near the SLNP

These negative social impacts also emanated from a combination of the negative management practices identified below (Figure 6.11). The survey found that in the KNP:

- 77% of households agreed that local people were being arrested for having bought bushmeat in their possession (rated medium to high).
- 57% of households agreed that local people's catch from the Kafue River was being confiscated by park officials (rated medium to high).
- 56% of households did not fully agree that there were no benefits from wildlife conservation projects in their communities (zero to low).

- 54% of households agreed that there were no available natural resources for local people's consumption (rated medium to high).
- On average 58% of households agreed about the perceived negative management practices in their communities.
- A trendline on averages shows a positive gradient from zero to high ratings by locals of perceived negative management practices (Figure 6.11).

In the SLNP:

- 97% of households agreed that there was harassment of locals by park authorities when a dead wild animal was found in the area (rated medium to high).
- 90% of households agreed that there were restrictions on natural resources extraction in their settlements (rated medium to high).
- 89% of households agreed that there was lack of positive response by park authorities to human-wildlife conflicts (HWC) in their settlements (rated medium to high).
- 88% of households agreed that there was no compensation from park authorities for crops damaged and livestock killed by wild animals (rated medium to high).
- 87% of households agreed that there were restrictions on firewood collections by park authorities (rated medium to high).
- 60% of households agreed that there was no hunting revenue being received by households in their communities (rated medium to high).
- 53% of households agreed that there were no *bona fide* hunting licences available for local people (rated medium to high).
- On average 81% of households agreed about the perceived negative management practices in their settlement.
- A trendline on averages shows a positive gradient from zero to high ratings by locals of perceived negative management practices (Figure 6.11).

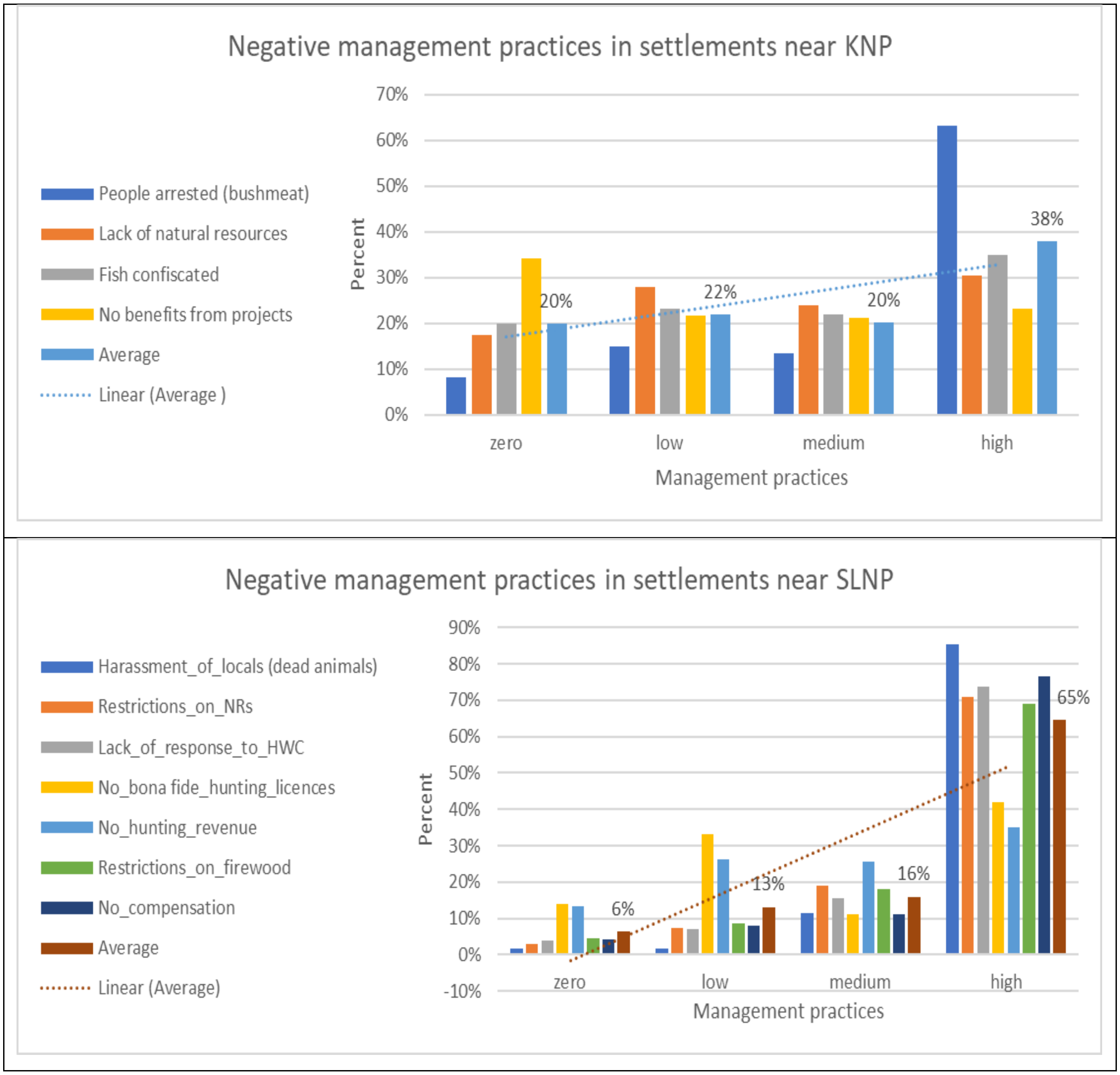

Figure 6.11: Negative social management practices in settlements near the KNP and the SLNP

The analysis of negative social impacts confirmed that the most important perceived negative impacts in the Kafue NP did not actually affect many households as evidenced by the following: about 380 (81%) households did not fully agree that 'there was contamination of drinking water sources by wildlife', and about 251 (54%) households did not fully agree to 'the damage of crops and killing of livestock by wildlife'. On the other hand, in the SLNP, the perceived negative impacts affected many households as evidenced by the following: about 339 (94%) households agreed to 'the damage of crops by wildlife', about 320 (89%) households agreed to 'the killing of people by wildlife' and about 295 (82%) households agreed to 'the killing of livestock by wildlife'. The study established that the most important perceived negative social impacts emanated from a combination of negative management practices. In the Kafue NP, the survey found that 77% of the households agreed that 'households found with legally bought bushmeat were being arrested', 57% of the households agreed that 'fish was being confiscated from fishers', and 54% agreed that 'there was a lack of natural resources in their areas'. In South Luangwa, 53% to 97% of the households fully agreed that 'all the perceived negative management practices occurred', such as 'harassment of locals by park authorities when a dead wild animal was found in their area', 'restrictions on natural resources extraction in their settlements', 'lack of positive response by park authorities to human-wildlife conflicts (HWC) in their settlements' and that 'there was no compensation from park authorities for crops damaged and livestock killed by wild animals'. Other perceived negative management practices in the South Luangwa NP – agreed by households there – included the following: 'restrictions on firewood collections by park authorities', 'no hunting revenue received by households in their communities', and 'no *bona fide* hunting licences available for local people'. In the South Luangwa NP, the perceived negative management practices focused on human-wildlife conflicts (HWC) which was actually a very serious issue there. However, it was not only serious in that park, but in many other communities living in close proximity to protected areas. For example, in West Kilimanjaro National Park, the increase in wildlife numbers had brought about competition for water between livestock and people. Besides, the local people were not compensated for costs of conservation incurred, such as the loss of their livestock and crops due to wildlife raiding them (Mariki, 2016). The depredation of livestock by wild animals in those settlements around PAs had reduced the economic status of the locals.

Though settlements from both the Kafue NP and the South Luangwa NP experienced crop and livestock damage by wild animals, many more households in the South Luangwa NP agreed to the occurrence of HWC than in the Kafue NP. Unfortunately, as the current wildlife policies stand, compensation for any damage due to HWCs had not been provided for. That meant that there was a need to consider policies that prevented damage from HWCs or indeed policies that compensated loss (Fernandez et al., 2009). There was a linkage between poverty and the HWCs because when crops were destroyed the situation led to low agricultural productivity. A study by Simasiku et al., (2008) had shown that there was high food insecurity in some GMAs, from the

Luangwa Valley as well as Rufunsa, Luano, Chiawa and west Zambezi GMAs, with high populations of wild animals notorious for HWC, mainly elephant and hippo. In a good number of cases, such incidents of HWC resulted in loss of human lives. Also, these conflicts had led to low livestock productivity because domestic animals were killed by carnivores, were susceptible to disease outbreaks or they competed for grazing and water resources (Simasiku et al., 2008). That meant that – just as the results of the study had shown – settlements in the South Luangwa NP were expected to suffer more poverty, low crop productivity and livestock disease outbreaks than the Kafue NP settlements due to the higher incidence of HWCs there. It was presumed that the wildlife conservation, and indeed tourism development, could be sustainable and subsequently increase benefits to the locals if HWCs were managed properly or minimized in the areas.

6.3.2 Bivariate analyses

Households' basic socio-economic characteristics and natural resource consumption in the Kabulwebulwe and Kaindu settlements

Socio-economic household surveys were conducted concurrently with the households' natural resource consumption surveys, in settlements near the Kafue National Park with focus on GMAs and OAs in Mumbwa. The Kabulwebulwe chiefdom was selected from the Mumbwa GMA, while the Kaindu chiefdom was selected from the Mumbwa Open Area. During the surveys, 220 households from Kabulwebulwe and 248 households from Kaindu were sampled to understand some of the basic socio-economic characteristics and resource consumption in these settlements. To answer the research question on how households' main positive and negative social impacts – in settlements near the national parks – were affected in relation to the park, several bivariate analyses, such as the Pearson's Chi-squared test or the Fisher's Exact Test of Independence, the Student Two Sample t-test, or the Welch Two Sample t-test, and the Wilcoxon rank-sum tests were applied to selected socio-economic characteristics and resource consumption of households from the two settlements near the KNP. The F-test was performed to compare two variances of samples from Kabulwebulwe and Kaindu, prior to conducting either the Student Two Sample t-test or the Welch Two Sample t-test. The Two Sample t-tests were performed to determine significant differences between the samples with continuous data, while the Wilcoxon rank-sum tests were also performed to determine significant differences between the samples with ordinal data. The results of these analyses will contribute to the objective of developing an understanding of the influence of geographies of settlements around the Kafue National Park through the positive/negative impacts and the consumption of natural resources by the locals. Selected results of the abovementioned analyses are summarised in the table below:

Table 6.2: Socio-economic characteristics and resource consumption bivariate analyses for Kabulwebulwe's and Kaindu's households

Variable tested for HHs	Mean/Av (n = 468)	Kabulwebulwe (n = 220)	Kaindu (n = 248)	Significance	
		Number/percent/mean of sample			
Age for HHHs in years *(C)*	40.7	40.1	41.2	0.3917 (3)	
Number of HHMs *(D)*	7	8	6	0.006397 (4)	**
Number of female HHHs (%) *(B)*	22	22	22	-	-
Edu. levels for HHHs *(O)*				0.7563 (1)	
- None	23	24	22		
- Some/completed primary	88	82	94		
- Some/completed secondary	42.5	46	39		
- Tertiary	6	5	7		
HHs with employed HHMs (B)					
- Any employment	66	55	77	0.1775 (2)	
- Empl. in tourism	39.5	34	45	0.5144 (2)	
House-wall materials *(N)*				0.0001717 (1)	***
- Mud wattle	64	80	48		
- Unburnt bricks	104.5	91	118		
- Burnt bricks	62.5	48	77		
- Conc. Blocks	2	1	3		
- Other	1	0	2		
House-roof materials *(N)*				4.215×10^{-6} (1)	***
- Grass thatch	78.5	99	58		
- Corrug. galv. steel	155.5	121	190		
- Other	5.5	7	4		
Natural res. consumption (ZMW)					
- Firewood (C)	2,263.87	884.69	3,487.34	9.946×10^{-9} (3)	***
- Foods & meds (C)	1,296.41	896.27	1,651.37	0.03046 (3)	*
- Materials & fibres (C)	1,440.39	1,566.39	762.49	0.006092 (3)	**

*Signif. codes: '***'= 0.001, '**'= 0.01, '*'= 0.05, '.'= 0.1, ' '= 1*

<u>*Tables notes:*</u>

Abbreviations: HHs = Households; HHHs = Household heads; HHMs = Household members; ZMW = Zambian kwacha

Test: = (1) = Wilcoxon rank-sum test; (2) = Pearson chi-squared test; (3) = Welch Two Sample t-test; (4) = Fisher's Exact Test

Data type: (N) = Nominal; (B) = Binary; (C) = Continuous; (O) = Ordinal; (D) = Discrete.

The results of bivariate analyses were varied ranging from Kabulwebulwe households characterized by having a higher number of household heads occupied with farming to having a lower probability of educated household members than Kaindu households. There were significant differences between Kabulwebulwe and Kaindu settlements in the building materials used for houses construction. Significant differences in the natural resource consumption were also reported between the two settlements. However, there were no significant differences between Kabulwebulwe and Kaindu settlements regarding the number of households with employed household members or members. The details of these selected bivariate analyses for household socio-economic characteristics and natural resource consumption from the two settlements (Table 6.2) are explained below:

The occupation of household heads analysis was not included in the abovementioned table because of many levels of occupations identified but can be found in the appendices (Appendix 7.39). In summary, about 74% and 58% of the household heads were into farming followed by those running their own businesses with 16% in Kaindu and 8% in Kabulwebulwe, respectively. Employees in public institutions or private companies constituted 9% of household heads from Kaindu and 6% from Kabulwebulwe settlements. The rest of the household heads' occupation variability, that included pensioners, charcoal burners, fishers, and hunters, ranged from about 7% to about 1% of sampled households from both settlements. With two populations (Kabulwebulwe and Kaindu) and about fourteen (14) levels of occupation, the Fisher's Exact Test results showed that there was a significant relationship between the households' settlements and the occupation of household heads in the Kabulwebulwe and Kaindu settlements. This means that knowing the households' settlements would help to predict the household head's occupation for the Kabulwebulwe and Kaindu settlements (Connelly, 2016; Upton, 1992). Although most household heads from both settlements were occupied with farming practice, there was a need for the park authorities to monitor where these agriculture activities were taking place, especially in Mumbwa GMA, because agriculture had been reported to contribute to the deforestation and encroachment of protected areas (Turpie et al., 2015). For example, Mumbwa GMA has not been spared by human encroachment and in the last three decades it experienced one of its worst levels of encroachment and deforestation due to agricultural activities (Chemonics, 2011).

Table 6.2 shows that most household heads amounting to about 123 (56%) from Kabulwebulwe had had some primary education or they had completed primary education and similarly most household heads amounting to 152 (61%) from Kaindu had also had some primary education or completed primary education. About 66 (30%) of the household heads from Kabulwebulwe settlement and 52 (21%) from Kaindu settlement had some secondary education or completed secondary education. With two populations (Kabulwebulwe and Kaindu) and about four ordinal education levels, the result for the Wilcoxon rank-sum test result showed that there were no significant differences between Kabulwebulwe and Kaindu settlements with regard to the education levels of household heads. The results also indicated that household heads from Kaindu had attained higher education levels than their counterparts from Kabulwebulwe (Cuzick, 1985; Lam & Longnecker, 1983; Saha, Seal, Ghosh, & Dey, 2016).

The analysed household data from settlements in the Kabulwebulwe and Kaindu chiefdoms showed that 55 (25%) and 77 (31%) of households respectively, had one or more household members in formal employment. With two populations and binary treatment on households' employment data, the Pearson chi-squared test results (Table 6.2) showed that there was no significant relationship between the households' settlements (Kabulwebulwe and Kaindu) and the households with one or more employed members. This means being aware that the household's settlements would not be of assistance to predict the number of households with one or more employed members (McHugh, 2013; Sharpe, 2015). Moreover, households with one or more members employed in the tourism sector were recorded as 34 (15%) households from the Kabulwebulwe settlement and 45 (18%) from the Kaindu settlement. Similarly, with two populations and binary data on households' members' employment, the Pearson chi-squared test result (Table 6.2) showed that there was no significant relationship between the households' settlements and the households with one or more members working in the local tourism sector. This means also being aware that the household's settlements would not help to predict the number of households with employed members working in the tourism sector (Sharpe, 2015). Based on 2010 census data, the estimated total households in the two settlements were found to be 2,000 and 4,167 from Kabulwebulwe and Kaindu settlements respectively. Taking population densities for the Kabulwebulwe chiefdom and the Kaindu chiefdom as approximately 10 and 11 people per square kilometre, would mean that the estimated total households, with one or more members working in the tourism sector, stood at

300 and 750 respectively. This means that the Kaindu chiefdom, an OA settlement, was enjoying more benefits of tourism employment than the Kabulwebulwe chiefdom, a GMA settlement.

About 91 (41%) sampled houses from the Kabulwebulwe settlement and 118 (48%) from the Kaindu settlements were made of unburnt bricks building material. The houses made of mud-wattle materials from these settlements represented 36% (80) and 19% (48) of the samples respectively. This means that the relatively higher value of wall building materials (concrete blocks and burnt bricks) constituted only 22% and 32% of the sample in the Kabulwebulwe and Kaindu settlements respectively. The results indicated that the Kaindu houses were made with slightly higher value of wall building materials than the Kabulwebulwe houses. With two populations (Kabulwebulwe and Kaindu) and about five ordinal/nominal house-wall building materials, the Wilcoxon rank-sum test result (Table 6.2) showed that there were significant differences between the Kabulwebulwe and Kaindu settlements with regards to the building materials used to construct walls of their houses (Saha et al., 2016). Moreover, the data analyses of roof building materials for houses from the Kabulwebulwe and Kaindu settlements showed that most of those houses' roofs were made of corrugated galvanised steel represented 58% (121) and 77% (190) of households respectively. Grass-thatched houses were represented as 42% (92) and 22% (54) for Kabulwebulwe and Kaindu households respectively. That meant that Kaindu households had a higher percentage of houses with relatively more valuable roof building materials (corrugated galvanised steel roofing sheets) than households from the Kabulwebulwe settlement. Similarly, with two populations (Kabulwebulwe and Kaindu) and about three nominal house-wall building materials, the Wilcoxon rank-sum test result (Table 6.2) showed that there were significant differences between the Kabulwebulwe and Kaindu settlements in the building materials used to construct roofs of houses, which is in line with an analysis conducted by Sokal and Rohlf (1981: p. 432). With reference to the estimated total households in the two settlements, total households from the Kabulwebulwe and Kaindu settlements translated into 820 and 2,000 houses made of unburnt bricks respectively. This means that most of the households in the two settlements could not afford good quality building materials and this was supported by other researchers who indicated that communities settled in areas around PAs had high poverty levels among the poorest rural small-scale farmers of Zambia (Simasiku et al., 2008). Again, households numbering about 1,160 from the Kabulwebulwe and 3,208 from theKaindu settlements had their houses' roofs made of corrugated galvanised steel roofing sheets. That meant that more than half of the total households, from the abovementioned settlements, could afford high quality roof building materials. Unlike the Kabulwebulwe chiefdom, the Kaindu chiefdom accommodated several commercial farmers, private game ranches and some mining activities in its area (ZAWA, 2012) indicating several employment opportunities for the locals. That was probably one of the reasons why houses made of valuable building materials numbered more in the Kaindu than in the Kabulwebulwe settlement.

The households in the Kabulwebulwe settlement were reported to have collected and consumed firewood valued at ZMW884.69 in a year, while households from the Kaindu settlement collected and consumed firewood valued at ZMW3,487.34. This means that households from Kaindu consumed four times more firewood than households from Kabulwebulwe. The Welch Two Sample t-test result (Table 6.2) showed that there were significant differences between the Kabulwebulwe and Kaindu settlements in the value or quantity of firewood collected and consumed by households (Keselman, Othman, Wilcox, & Fradette, 2004; Sakai, 2016; Yuen, 1974). The households from the Kabulwebulwe settlement were reported to have collected and consumed wild foods and medicines valued at ZMW896.27 in a year, while households from the Kaindu settlement collected and consumed wild foods and medicines valued at ZMW1,651.37. If the abovementioned consumption rates, expressed as per household values, are extrapolated to a settlement, then this would imply aggregate consumption rates of ZMW1.79 million and ZMW6.88 million for Kabulwebulwe and Kaindu, respectively (based on the 2010 census data). This means that households from Kaindu consumed twice as much wild foods and medicines than households from Kabulwebulwe, while the aggregate consumption rates were four times more for the former than the latter. The Welch Two Sample t-test result (Table 6.2) showed that there were significant differences between the Kabulwebulwe and Kaindu settlements in the value or quantity of wild foods and medicines collected and consumed by households (Sakai, 2016). The households from the Kabulwebulwe settlement were reported to have collected and consumed wild materials and natural fibres valued at ZMW1,566.39 in a year, while the collection and consumption by households from Kaindu was valued at ZMW762.49. The Welch Two Sample t-test result (Table 6.2) showed that there were significant differences between the Kabulwebulwe and Kaindu settlements in the value or quantity of wild materials and natural fibres collected and consumed by households. This means that households from Kaindu consumed half as much wild materials and natural fibres than households in Kabulwebulwe (Keselman et al., 2004; Sakai, 2016).

The inhabitants of both the Kabulwebulwe and Kaindu chiefdoms consumed large quantities of wood fuel (firewood and charcoal), for subsistence and commercial use, obviously necessitated by their proximity to the ready urban market in the nearby city of Lusaka (Bunonge, Jintana, & Onprom, 2020; Bwalya, 2011; Dlamini & Samboko, 2017). Although wood fuel utilisation by households in Zambia was estimated at about 80%, rural areas mainly used firewood, while the urban areas mainly used charcoal for their daily energy needs (Kalinda, Bwalya, Mulolwa, & Haantuba, 2008; Turpie et al., 2015). That was supported by Kalinda (2008) who found that over 86-90% of Zambia's rural households' energy needs originated from firewood (Kalinda et al., 2008). However, the rural households had been involved in commercial charcoal production because they took advantage of the ready markets in urban centres (Kothari et al., 2015; Simasiku et al., 2008).

According to Bwalya (2011), in most rural communities, wild foods such as mushrooms, caterpillars, and fruits and medicinal products, gained little household income when compared to other forest-based commodities such as timber, construction poles, charcoal, thatching grass and reed mats. Researchers had reported that there was gender differentiation in natural resources collection, where men harvested mainly wood products, wild honey, and some wild fruits to sell, while women mainly collected NTFPs such mushrooms, edible caterpillars, and some wild fruits for subsistence use (Bwalya, 2011; Kalaba, Quinn, & Dougill, 2013; Ng'andwe, Muima-Kankolongo, Banda, Mwitwa, & Shakacite, 2006). Key factors such as proximity to market centres and PAs, availability of natural resources and populations, for the two settlements, seemed to be similar. However, one difference that separated the two was that households from the GMAs tended to be more cautious in their collection and consumption of natural resources than their counterparts from OAs, probably because of the active CBNRM programmes in the GMAs. High consumption rate of wild materials and natural fibres, especially the thatching grass material, was attributed to Kabulwebulwe households as compared to Kaindu households, and according to Bwalya (2011), thatching grass was among known forest products that gained locals more household income. The understanding attributed to that, in view of a GMA settlement, was that households were freer to collect thatching grass at will than collection of other natural resources. That explained why there were more houses (by percentage) in Kabulwebulwe roofed with thatching grass than in Kaindu. At the same time, some households interviewed, during data collection in Kaindu, complained of lost opportunities over some land sold to commercial farmers onwhich they used to collect thatching grass. In that kind of scenario, where commercial farmers took over huge quantities of land in rural areas, the poorer households ended up being affected because of their reliance on NTFPs from those lands (Dewees et al., 2011; Mulenga, Richardson, & Tembo, 2012).

Households' basic socio-economic characteristics and natural resource consumption in settlements near the Kafue and the South Luangwa national parks

Settlements near the Kafue National Park (KNP) and the South Luangwa National Park (SLNP) were compared by means of socio-economic household surveys, that were conducted concurrently with households' natural resource consumption surveys, and the focus being on GMAs and OAs. During the surveys, 468 households from the KNP and 419 households from the SLNP were sampled to understand some of the basic socio-economic characteristics and resource consumption relationships in these settlements. To help answer the research question on how households' socio-economic characteristics and resource consumption are affected in relation to their proximity to parks, different statistical tests that included the Pearson's Chi-squared test, the Fisher's Exact Test of independence, the Student Two Sample t-test or the Welch Two Sample t-test and the Wilcoxon rank sum tests, were applied to the collected data. The F-test was performed to compare variances of two samples from the KNP and the SLNP prior to conducting either the Student Two Sample t-test or the Welch Two Sample t-test. The Two Sample t-tests were performed to determine significant differences between the samples with continuous data. The Wilcoxon rank sum tests were also performed to determine significant differences between the samples with ordinal data. The results of the analyses showed that the households' settlements and some basic socio-economic characteristics or resource consumption were significantly related, while others were not (the results of their analyses are summarised below). The results contributed to the objective of developing an understanding of the influence of geographies of settlements around the Kafue and the South Luangwa national parks through the positive/negative impacts and the consumption of natural resources by the locals. Selected results of the abovementioned analyses are summarised in the table below:

Table 6.3: Socio-economic characteristics and resource consumption bivariate analyses for KNP's and SLNP's households

Variable tested for HHs	Mean/Av (n = 887)	KNP (n = 468)	SLNP (n = 419)	Significance	
		Number/percent/mean of sample			
Number of HHMs per HH *(D)*	6	7	6	0.001126 (4)	**
Edu. levels for HHHs *(O)*				0.267 (1)	
- None	73.5	46	101		
- Some/completed primary	130	176	84		
- Some/completed secondary	150.5	85	216		
- Tertiary	15	12	18		
HHs with employed HHMs (B)					
- Any employment	103.5	132	75	0.0003955 (2)	***
- Empl. in tourism	60	79	41	0.002826 (2)	**
House-wall materials *(N)*				2.484×10^{-5} (1)	***
- Mud wattle	127.5	128	127		
- Unburnt bricks	146.5	209	84		
- Burnt bricks	160.5	125	196		
- Conc. Blocks	9.5	4	15		
- Other	1	2	0		
House-roof materials *(N)*				0.003292 (1)	*
- Grass thatch	158.5	146	171		
- Corrug. galv. steel	279.5	311	248		
- Other	5.5	11	0		
Natural res. consumption (ZMW)					
- Firewood (C)	1,641.70	2,263.87	946.78	2.462×10^{-6} (3)	***
- Foods & med.s (C)	1,019.97	1,296.41	711.20	0.0002735 (5)	***
- Materials & fibres (C)	1,109.97	1,140.39	1,075.99	0.7496 (3)	

*Signif. codes: '***'= 0.001, '**'= 0.01, '*'= 0.05, '.'= 0.1, ' '= 1*

Tables notes:

Abbreviations: HHs = Households; HHHs = Household heads; HHMs = Household members; ZMW = Zambian kwacha

Test: = (1) = Wilcoxon rank-sum test; (2) = Pearson chi-squared test; (3) = Welch Two Sample t-test; (4) = Fisher's Exact Test; (5) = Two sample t-test

Data type: (N) = Nominal; (B) = Binary; (C) = Continuous; (O) = Ordinal; (D) = Discrete.

The results indicated that there were significant differences between households in settlements near the KNP and those near the SLNP in all the selected variables except for the 'wild material and natural fibres' collected. The detailed results of the selected households' socio-economic characteristics and natural resource consumption analyses (Table 6.3) for the two settlements are explained below:

The variables on HHHs' age, HHHs' occupation and female HHHs were omitted from the analysis because the SLNP's data did not collect data on the abovementioned variables. The education levels of most of household heads that had attained some primary, or completed primary education, amounted to about 275 households (59% of the sample) and 87 households (21% of the sample) from the KNP and the SLNP respectively. However, the opposite was also true for the household heads who had had some secondary, or completed secondary education, amounting to 118 (25%) households from the KNP and 216 (51%) households from the SLNP. Four percent (4%) of the household heads from the SLNP had had tertiary, or completed, tertiary education (college or university) while in the KNP only 3% of them had attained that. With two populations (KNP and SLNP) and about four ordinal education levels, the result for the Wilcoxon rank sum test with continuity correction (Table 6.3) showed that there were significant differences between settlements near the KNP and settlements near the SLNP in the education levels attained by household heads (Cuzick, 1985; Lam & Longnecker, 1983; Saha et al., 2016). Although the education levels of household respondents from the SLNP were slightly higher than their counterparts from the KNP, the education levels attained by respondents from both settlements reflected that more than half of the household heads – from the entire population in the settlements – would read and understand information on the importance of conservation of wildlife. With the attained education levels, the household respondents would be able to pass on the important knowledge about conservation to other community members who were not educated.

Sampled households with at least one or more employed members were 132 (28%) and 75 (18%) respectively for the KNP and the SLNP. According to the Fisher's Exact Test for Count Data result there was a significant relationship between the settlements and the number of households which had at least one employed household member. This means that once the settlement is known, it is possible to predict the number of households which have at least one employed member in their ranks (Connelly, 2016; Upton, 1992). Similarly, from the survey household members employed under the tourism sector were found to be 79 (17%) from the KNP and 41 (10%) from the SLNP. Again, the Fisher's Exact Test for Count Data result (Table 6.3) showed that there was a significant relationship between the settlements and the households with one or more members employed in the tourism sector (Connelly, 2016). The total households in the two settlements were estimated at 7,400 and 13,784 from the KNP and the SLNP respectively, based on 2010 census data. For example, the population densities in the Lupande GMA and in the Kabulwebulwe and Kaindu settlements, for households with one or more members working in the tourism sector, were estimated at 14 and 10 people per square kilometre translating into 1,258 and 1,378 households, respectively. That was also translated into 28 and 37 households for every 100 square kilometres – in the Lupande GMA and in the Kabulwebulwe and Kaindu settlements respectively. Tourism activities were much more visible in the Lupande GMA than in the Kabulwebulwe and Kaindu settlements because the tourism activities were concentrated along the Luangwa River, unlike in the KNP where they were spread out widely inside and outside the park (Chemonics, 2011). Generally, the main kind of jobs for locals in both settlements fell within the safari tourist lodges and camps. As noted by Mvula (2001), the managerial positions of these tourism facilities are usually taken up by non-locals (especially foreign nationals), while the locals would take up jobs such as gardeners, watchmen, cleaners, kitchen hands, cooks, waiters, barmen, laundry workers, bedroom attendants, and receptionists. However, the job of safari guides would go to both locals and non-locals (Mvula, 2001).

Construction materials for the houses from both parks were assessed and the house-wall building materials showed that houses made of unburnt bricks accounted to 209 (45%) houses from the KNP and 84 (20%) houses from the SLNP. Houses made of burnt bricks were 196 (46%) from the SLNP and 125 (27%) from the KNP, while houses made of mud-wattle represented 30% and 27% of the total households respectively. These results mean that relatively higher value house-wall building materials (concrete blocks and burnt bricks) constituted only 28% and 50% of houses in the KNP and the SLNP respectively. The Wilcoxon rank sum test result showed that there were significant differences in house-wall building materials between the settlements near the KNP and the settlements near the SLNP (Cuzick, 1985; Lam & Longnecker, 1983; Saha et al., 2016). The building material for roofs in the areas were also assessed and the results of the survey showed that most of the houses from the KNP and the SLNP were made of corrugated galvanised steel roofing sheets with 321 (69%) and 249 (59%) houses respectively, while the grass thatched roof materials represented 146 (31%) and 173 (41%) houses respectively. The Wilcoxon rank sum test result (Table 6.3) showed that there were significant differences in roof building materials between the settlements near the KNP and the settlements near the SLNP (Sokal & Rohlf, 1981). This also means that there are more houses with relatively higher value roof materials (corrugated galvanised steel roofing sheets) in the KNP than the SLNP. Based on the estimated total household population in each settlement, most houses from Kabulwebulwe and Kaindu – about 3,330 – were made of unburnt bricks, while most houses from the Lupande GMA – about 6,340 – were made of burnt bricks. These results implied that there were a lot more households from the SLNP than from the KNP that could afford higher value houses made of burnt bricks. The differences between the two settlements in the building materials of their houses could be due to differences in average income levels of households from the respective settlements. Additionally, most households of some 5,106 from the KNP and 8,132 from the SLNP settlements had their houses' roofs made of corrugated galvanised steel roofing sheets. However, as already alluded to earlier, building materials such as the corrugated galvanised steel roofing sheets, which are normally bought from large cities such as Lusaka, can only be accessed at a much higher cost by the SLNP's households than by the KNP's households because of the former's remoteness.

Natural resources collection and consumption – in the previous year – by households from the two national parks were assessed and the results showed that those that collected and consumed firewood accounted for 293 (63%) from the KNP and 381 (90%) from the SLNP. Data analysis indicated that the household's mean consumption of firewood was higher in the KNP at ZMW2,263.87 than in the SLNP at ZMW942.14. The Welch Two Sample t-test result (Table 6.3) showed that there were significant differences between the settlements near the KNP and the settlements near the SLNP in the households' collection and consumption of firewood (Keselman et al., 2004; Sakai, 2016; Yuen, 1974). The households that collected and consumed wild foods and medicines – in the previous year – accounted for 448 (96%) of households from the KNP and 240 (57%) of households from the SLNP. The household's mean consumption of wild foods and medicines was higher at ZMW1,296.41 in the KNP than in the SLNP at ZMW708.64. The Two Sample t-test result (Table 6.3) showed that there were significant differences in the households' collection and consumption of wild foods and medicines, between the settlements near the KNP and the settlements near the SLNP (Sakai, 2016). And the households that collected and consumed wild materials and natural fibres – in the previous year – accounted for 374 (80%) of households from the KNP and 312 (74%) of households from the SLNP. The household's mean consumption was higher at ZMW1,140.39 in the KNP than in the SLNP at ZMW1,071.62. The Welch Two Sample t-test result (Table 6.3) showed that there were no significant differences in the households' collection and consumption of wild materials and natural fibres between the settlements near the KNP and the settlements near the SLNP (Keselman et al., 2004).

When the consumption rates for firewood – expressed per household values – are extrapolated to a settlement level, then this would imply aggregate consumption rates of ZMW16.75 million for the KNP and ZMW12.99 million for the SLNP settlements (based on 2010 census data). The inhabitants of settlements near the KNP consumed more quantities than inhabitants of settlements near the SLNP of wood fuel, a combination of firewood and charcoal, for subsistence and commercial use, obviously necessitated by their proximity to the ready urban market in nearby Lusaka (Bunonge et al., 2020; Dlamini & Samboko, 2017). Generally, the poorer households tend to target the production of charcoal and the gathering of foods and other resources, while the richer households are involved in harvesting high value forest products such as timber (Bwalya, 2011). Similarly, the aggregate consumption rates of wild foods and medicines – extrapolated to the settlement level – were ZMW9.59 million for the KNP and ZMW9.77 million for the SLNP settlements. The higher average consumption rate of foods and medicines by households from the KNP could have been influenced, as stipulated by Bwalya (2011), by key factors such as low household income from other sources, the stock, opportunity cost of labour, availability of PA exit options, and access to markets. When the abovementioned consumption rates of wild materials and natural fibres are extrapolated to a settlement level, aggregate consumption rates of ZMW8.44 million and ZMW14.77 million were obtained for the KNP and the SLNP settlements respectively. Although the household consumption of natural resources varies geographically, temporally, and across households, there were no significant differences in the household consumption rates of wild material and natural fibres between the KNP and the SLNP settlements. Deductions from all the data analyses presented above, suggest that settlements located closer to PAs, especially to areas of high tourism activities, consumed fewer natural resources, obtained more benefits from tourism and their well-being was better than settlements further away from these areas.

6.3.3 Multivariate analyses

Effect of geographical locations on natural resources consumption

Households' natural resource consumption surveys were conducted in settlements near the Kafue National Park (KNP) and the South Luangwa National Park (SLNP). The surveys were conducted in villages near the parks of which the geographical locations were perceived to be affected in some way(s) by the nearby PA and/or other geographical features in close proximity. From the settlements near the KNP, 468 households were sampled, while 419 households were sampled from the settlements near the SLNP. The surveys focused on the collection of data, on natural resources consumption from primary sources – measured in terms of quantities – and later the data were monetarised into household income. To answer the research question on how location of settlements near parks influenced households' consumption of natural resources, the multiple linear regression analyses were performed by regressing the households' consumption of natural resources against the distances between households and the selected geographical features. The GPS points for every household were saved during household surveys, using ODK – the online survey platform – and later used on Google maps/QGIS maps to estimate the distances between households and the selected geographical features. The selected geographical features included the following: National Park boundaries (NP/bound), other PAs' boundaries (OPAs/bound), national park gates (NP/gate), village centres or village marketplaces (V/centres), all-weather roads (A/W/road), DNPW Area Management Units for the KNP and the SLNP (AMU), Mumbwa or Mambwe Central Business Districts (CBD), and the Kafue River, or the Luangwa River (main fisheries in the respective areas) (M/fishery). The multiple linear regression analyses were performed to determine whether there were relationships between the households' consumption rates of natural resources and the households' location in relation to the selected geographical features near the parks. The significances of the results were determined from the analysis output which included the least square coefficient estimates, standard errors, t-statistics, and the p-values.

During data collection there is a risk of sample selection bias when testing the hypothesis, and in this case the sampling biases could have been contributed by the process of sampling households instead of just considering an entire population. However, the other causes of sample selection bias could have come about due to the missing values in the dependent variables used. Again, the collected data were subjected to multi-collinearity testing of independent variables. The methods applied in the testing of multi-collinearity included the tolerance calculation and the Variance Inflation Factor (VIF) calculation as outlined below.

Multi-collinearity testing of independent variables

Observations for KNP data

Multi-collinearity verification procedures included the following:

- Regression of dependent variables against independent variables

Observations:

- Firewood (Appendix 7.31):
  - F value is significant at the 0.05 level
  - Most t-values are significant, but the multiple R-squared was very low
  - NP/bound was expected to be negative
  - These inconsistencies suggested multi-collinearity
- Food and medicines (Appendix 7.33):
  - F value is significant at the 0.05 level
  - Most t-values are significant, but the multiple R-squared was very low
  - NP/bound was expected to be negative
  - These inconsistencies suggested multi-collinearity
- Material and fibre (Appendix 7.35):
  - F value is significant at the 0.05 level
  - Most of the t-values are not significant; only A/W/road is statistically significant
  - NP/bound was expected to be negative
  - These inconsistencies suggested multi-collinearity

- Correlation testing of the independent variables:
  - Almost perfect high correlations were observed between NP/bound and NP/gate, OPAs/bound and AMU/CBD, NP/gate and M/fishery, and OPAs/bound and M/fishery suggesting multi-collinearity (Appendix 7.37).
  - Similar multi-collinearity observations and procedures were performed for the data from the SLNP (Appendix 7.38).

The solution to the multi-collinearity problem was done by dropping variables causing problems (tolerance > 0.2 or VIF < 10.0) through a stepwise regression process of variable determination.

Tolerance = $1 - R^2$

$$VIF = \frac{1}{(1-R^2)}$$

Table 6.4: Multiple R-squared, tolerance and VIF for KNP data

Independent variable	R^2	Tolerance	VIF	Comment
NP/bound	0.7022	0.30	3.36	
OPAs/bound	0.4017	0.60	1.67	
NP/gate				Redundant variable dropped
V/centre	0.3063	0.69	1.44	
A/W/road	0.3845	0.62	1.62	
AMU/CBD				Redundant variable dropped
M/fishery	0.7473	0.25	3.96	

Table 6.5: Multiple R-squared, tolerance and VIF for SLNP data

Independent variable	R^2	Tolerance	VIF	Comment
NP/bound	0.3484	0.65	1.53	
OPAs/bound	0.4279	0.57	1.75	
NP/gate	0.7638	0.24	4.23	
V/centre				Redundant variable dropped
A/W/road	0.6712	0.33	3.04	
AMU				Redundant variable dropped
CBD				Redundant variable dropped
M/fishery				Redundant variable dropped

1. Firewood

The distribution of ‘firewood’ consumption rates by households in settlements near the Kafue NP is shown in Figure 6.12 below, with the Nalusanga and Kalyanyembe villages at opposite ends of consumption range. Households in the Nalusanga village consumed the lowest quantities of ‘firewood’ (about half as many as those from the Kamilambo village – the second-lowest ranked settlement), while in the Kalyanyembe village the households consumed the highest quantities of ‘firewood’ (slightly more than those from the Kafwikamo village – the second-highest ranked settlement).

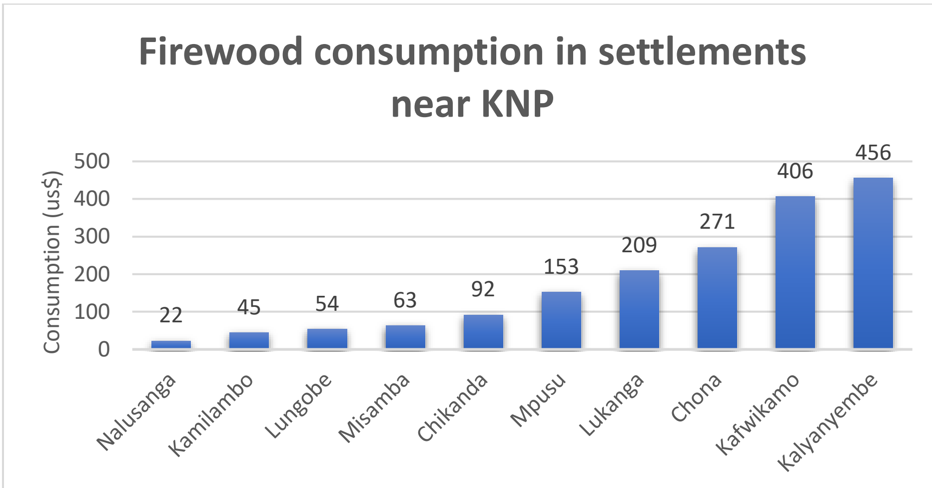

Figure 6.12: The distribution of firewood consumption in settlements near the KNP

In the South Luangwa NP, the distribution of ‘firewood’ consumption levels in different settlements are shown in Figure 6.13 below, with the Kamanga and Malama villages at opposite ends of the consumption range. Households from the Kamanga and Chipako villages consumed the lowest quantities of firewood, while in the Kalyanyembe village the households consumed the highest quantities of firewood (about three times that of the Kuwaza village households – the second-highest ranked firewood consumer settlement).

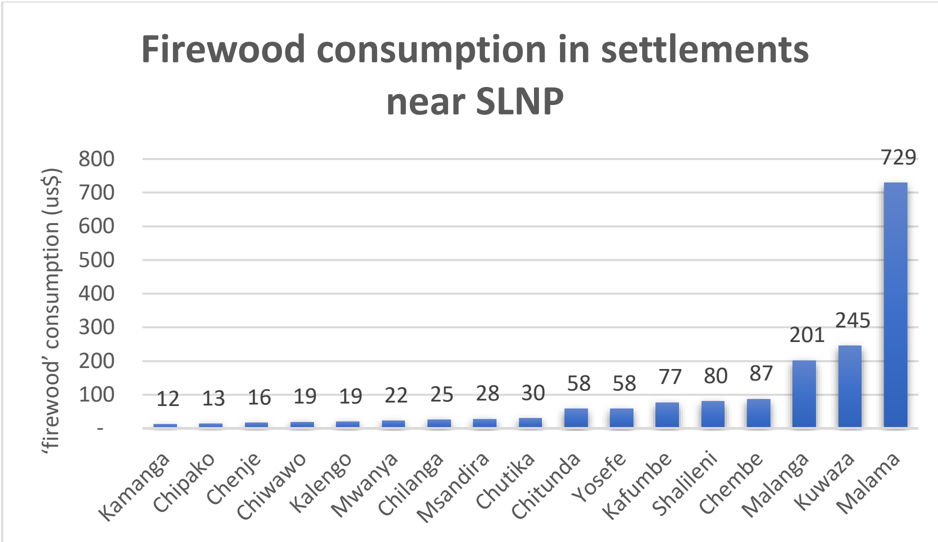

Figure 6.13: The distribution of firewood consumption in settlements near the SLNP

A multiple linear regression of firewood consumption by households was analysed against distances of different geographical features near the Kafue and South Luangwa NPs. Multi-collinearity and heteroscedasticity tests were performed on predictor variables before fitting the Ordinary least Squares (OLS) models with firewood consumption as a dependent variable. In the Kafue NP data, two of the seven predictors (NP/gate and AMU/CBD) with high collinearity values were dropped. The dependent variable (firewood consumption) of the fitted model was transformed with logarithm of firewood (logFirewood), because it provided a higher homoscedasticity (equal variance) of the error term (Appendix 7.31). The transformed OLS model was fitted with five predictors as shown below:

OLS1_KNP = lm(logFirewood ~ NP/bound + OPAs/bound + V/centre + A/W/road + M/fishery)

In the South Luangwa NP data, four of the eight predictors (V/centre, AMU, CBD and M/fishery) with high collinearity values were also dropped. The dependent variable (firewood consumption) of the fitted model was transformed by reciprocating its value (reciprocal of Firewood), because it provided a higher homoscedasticity (equal variance) of the error term (Appendix 7.31). The transformed OLS model was fitted with four predictors as shown below:

OLS1_SLNP = lm(recipFirewood ~ NP/bound + OPAs/bound + NP/gate + A/W/road)

Estimating the firewood regression model with corrections for sample selection

To correct for sample selection bias due to sampling or missing values in the dependent valuable, the Heckman two-step estimation model for the firewood consumers (FWC) was modelled as outlined in the logarithm transformed selection equation for the KNP. A dummy predicator variable for the Mumbwa Game Management Area (GMA) was included in the first part of the equation.

heckit (FWC ~ NP/bound + OPAs/bound + V/centre + A/W/road + M/fishery + M/GMA, outcome = logFirewood ~ NP/bound + OPAs/bound + V/centre + A/W/road + M/fishery, data = KNP/Analysis)

The output of the Heckman two-step estimation model for firewood consumption in the KNP analysis output can be viewed in the appendix (Appendix 7.31).

For the SLNP data the Heckman two-step estimation model for firewood consumers was modelled as a reciprocal transformed selection equation. A dummy predicator variable of the Lupande Game Management Area (GMA) was included in the first part of the equation.

heckit (FWC ~ NP/bound + OPAs/bound + V/centre + A/W/road + M/fishery + L/GMA, outcome = recipFirewood ~ NP/bound + OPAs/bound + NP/Gate + A/W/road, data = SLNP Analysis)

The output of the Heckman two-step estimation model and the Stargazer table for firewood consumption in the SLNP analysis output can be viewed in the appendix (Appendix 7.32).

Comparison between the OLS and the Heckman two-step correction models' output was done through the stargazer command as shown in the table for the KNP (Appendix 7.31). The Heckman selection model estimated the logarithm of firewood (log of Firewood) consumption regression with corrections for sample selection for the first five (5) observations. The Heckman's output and the Stargazer output table (Appendix 7.31) show estimates for *rho (ρ)*(-0.507) and the Inverse Mills Ratio (IMR) (-0.909 (1.206)) in the selection model. The estimate for *rho (ρ)* provides a correlation of the errors between the selection and the regression (log of firewood consumption) equations, while the IMR is the probability density function and the tail function of the standard normal distribution (Pinelis, 2019). Null hypotheses for *rho* and *IMR* were tested and, in this case, the *rho* and *IMR* were not statistically significant and hence the null hypothesis could not be rejected The conclusion was that there was no bias in samples for the OLS regression equation. This suggests that the application of the sample selection model would not be appropriate, and it also means that the OLS regression equation for firewood consumption did not have serious bias issues. The interpretation of the regression coefficients for the regression equation (OLS equation) was treated in the same manner as that used for any regression model outlined under the 'Selected regression model output' section (in the next section).

For the South Luangwa NP data, analysis for the Heckman selection model also showed that the *rho* and *IMR* were not statistically significant and hence the null hypothesis could not be rejected, and the conclusion was that there was no bias in samples for the OLS regression equation (Appendix 7.32). This also means that the OLS regression equation for firewood consumption did not have serious bias issues. The interpretation of the regression coefficients for the regression equation (OLS equation) was also treated in the same way as that used for any regression model (outlined in the next section).

Selected regression model output

The output of the transformed OLS multiple linear regression model for firewood consumption (log of Firewood) against geographical features, showing the least square coefficients, standard errors, t-statistics and p-values is attached in the appendix (Appendix 7.32). The p-values and significance comments for the multiple linear regression models of firewood consumption against geographical features of the KNP data were compared with those from the SLNP and the results are displayed in Table 6.6 below. All the independent variables (distance variables) in the KNP data were statistically significant, while in the SLNP only the all-weather road (A/W/Road) was significant for firewood consumption (Appendices 7.33 and 7.34).

Table 6.6: Least square coefficient estimates of the multiple linear regression of firewood consumption against household distances from different geographical features in the Kafue NP.

	Estimate	Std. Error	t-value	Pr(>|t|)	
NP/bound	0.046625	0.012112	3.849	0.000146	***
OPAs/bound	0.026618	0.015493	1.718	0.086851	.
V/centre	-0.198105	0.061630	-3.214	0.001456	**
A/W/Road	0.214822	0.040897	5.253	2.92 x 10-07	***
M/fishery	-0.024233	0.007979	-3.037	0.002607	**

*Signif. codes: '***'= 0.001, '**'= 0.01, '*'= 0.05, '.'= 0.1, ' '= 1*

Residual standard error: 1.69 on 288 degrees of freedom (167 observations deleted due to missingness)
Multiple R-squared: 0.2156, Adjusted R-squared: 0.2019
F-statistic: 15.83 on 5 and 288 DF, p-value: 8.981 x 10^{-14}

Table 6.7: Least square coefficient estimates of the multiple linear regression of firewood consumption against household distances from different geographical features in the South Luangwa NP.

	Estimate	Std. Error	t-value	Pr(>|t|)	
NP/bound	0.0006783	0.0036067	0.188	0.8510	
OPAs/bound	0.0038653	0.0030025	1.287	0.1989	
A/W/Road	-0.0218666	0.0104568	-2.091	0.0373	*
NP/gate	0.0036108	0.0028116	1.284	0.2000	

*Signif. codes: '***'= 0.001, '**'= 0.01, '*'= 0.05, '.'= 0.1, ' '= 1*

Residual standard error: 0.3833 on 308 degrees of freedom (16 observations deleted due to missingness)
Multiple R-squared: 0.03751, Adjusted R-squared: 0.02501
F-statistic: 3.001 on 4 and 308 DF, p-value: 0.0188

Interpretation of the results

In Tables 6.7 and 6.8 above, the significant results with P-value equal, or less than 0.05, mean that there is linear relationship between the response variable in the model and at least one of the predictors. Under the KNP data, the results confirmed that all five selected predictor variables, except the 'other PAs', were statistically significant for log firewood consumption. This means that household firewood consumption in the Kafue had strong linear relationships with the distances from the national park boundary, village centres, all-weather roads, and the main fishery in the area. On the other hand, the results under the SLNP data confirm that only the 'all-weather road' variable was statistically significant for the reciprocal of firewood consumption. This means that household consumption of firewood in the South Luangwa NP data had a strong linear relationship with the distance from the all-weather roads. These results will help to develop an understanding of the influence of geographies of settlements (circumferential or radial) around the Kafue and South Luangwa national parks through the consumption of firewood by the locals.

The multiple regression analysis of the households' firewood consumption against the distances from selected geographical features around the Kafue NP, showed that there was a strong linear relationship between the logarithm of households' firewood consumption and their distances from the national park boundary, village centres, all-weather roads, and the main fishery in the area. For the South Luangwa NP, the results confirmed that the reciprocal of households' firewood consumption had a strong linear relationship with the households' distances from the all-weather roads only. The least square coefficient estimates in Table 6.7 above also meant that, if a household's distance from the NP boundary or the all-weather roads increased by 1km, while holding other variables constant, the logarithm of household's firewood consumption would also increase by US\$0.05 or US\$0.21 respectively. This means that the log of household's firewood consumption had direct linear relationships with the households' distances from the KNP boundary and the all-weather roads. The obtained firewood consumption results for the households' distance from NP boundary were not as expected. One logical explanation to this contrary result is that households closer to the PAs boundaries have limited space in their immediate surroundings from which they can extract firewood. They are also prohibited from extracting any resource from inside the NP. Another explanation is that there is strict monitoring of buffer zones around PAs – by authorities for resource destruction – especially in places where settlements are closer to the PA boundaries. There are some PAs in Africa which have access restrictions to natural resources against local communities – this action is believed to perpetuate conservation costs. For example, the non-availability of these restricted natural resource products had increased the time spent and labour required of individuals seeking such resources in West Kilimanjaro (Mariki, 2016). In some cases, hatred and enmity between PA staff and communities had come about by the inability to access natural resources, harassments and punishments, and the lack of positive interaction between them. In other cases, the cost of living had increased due to many reasons, including the high price of firewood necessitated by the harsh conditions of where it is collected from (Mariki, 2016).

The results for the households' distance from the all-weather roads are logical because the resources for firewood in these areas tend to increase as one moves away from the all-weather roads. Other research studies have also shown that the distance to the roads, or other developed infrastructure, was inversely related to the consumption of natural resources (Bandyopadhyay & Tembo, 2010). Again, if the household's distance from the village centres, or the main fishery in the area, increased by 1km, while other variables remained constant, the log of households' firewood consumption would reduce by US$0.20 and US$0.02 respectively. This means that the household's log of firewood consumption was inversely related to households' distances from the village centres and the main fishery in the area. This is logical, because households which are closer to the village centre are expected to consume more firewood for economic reasons and other purposes than households further away. In the same vein, at the main fishery, households consume much firewood for smoking fish and other purposes. Other research studies have also shown that the distance to the roads, or other developed infrastructure, was inversely related to the consumption of natural resources (Bandyopadhyay & Tembo, 2010). The multiple R-squared obtained in the output means that only 22% of the variability between households' firewood consumption and their distances from selected geographical features around the park is explained by the model. Hence, households' distances from the national park boundary, village centres, all-weather roads, or the main fishery in the area, in settlements near the Kafue National Park, can be used to predict households' consumption rate of firewood.

In the South Luangwa NP – if the households' distance from the all-weather roads increased by 1km, while other variables remained constant, the reciprocal of households' firewood consumption would reduce by US$0.02 (Table 6.8). This means that the reciprocal of households' firewood consumption was inversely related to the households' distance from the all-weather roads. This is also logical because the households which are closer to the roads are expected to consume more firewood for many purposes such as the economic activities taking place near roads. Hence, households' distances from the all-weather roads, in settlements near the South Luangwa National Park, could be used to predict households' consumption rate of firewood.

All the abovementioned highlighted results confirm that a wide range of benefits to poor people living in settlements near PAs included firewood, NTFPs and agricultural land (Vedeld, Angelsen, Bojö, Sjaastad, & Berg, 2007). To varying degrees, the livelihoods of more than 1.6 billion people living in settlements near PAs, are dependent on these PAs (Pouliot & Treue, 2013; Wasiq & Ahmad, 2004). Specifically, poor people living in these settlements, every so often, depend on non-cultivated resources in these areas. According to studies from a few countries (or regions) suggest that the number of people who currently use resources such as firewood within protected areas, or in settlements near protected areas, is said to be at least several tens of millions (Kothari et al., 2015). However, this study has provided us with the information that households' firewood consumption, in settlements near KNP and SLNP, is radially influenced by the households' geographical location.

2. Foods and medicines

A multiple linear regression of food and medicine consumption by households was analysed against distances of different geographical features near the Kafue and South Luangwa NPs. The dependent variable (food and medicine consumption) of the fitted model was transformed by reciprocating the food and medicine consumption (reciprocal of Food and medicine) because it provided a higher homoscedasticity (equal variance) of the error term (Appendix 7.33). The transformed OLS model was fitted with five predictors as shown below:

OLS2_KNP = lm(recipFood and medicine ~ NP/bound + OPAs/bound + V/centre + A/W/road + M/fishery)

Similarly, in the South Luangwa data, food and medicine consumption, the dependent variable of the fitted model, was fitted with the four predictors as it provided a higher homoscedasticity (equal variance) of the error term when compared to other transformations (Appendix 7.33). The fitted OLS model is shown below:

OLS2_SLNP = lm(Food and medicine ~ NP/bound + OPAs/bound + NP/gate + A/W/road)

Estimating the food and medicines regression model with corrections for sample selection

To correct for sample selection bias due to sampling or missing values in the dependent valuable, the Heckman two-step estimation model for the food and medicine consumers (FMC) was modelled, as outlined below, for the KNP data. A dummy predicator variable of the Mumbwa Game Management Area (GMA) was included in the first part of the equation.

heckit (FMC ~ NP/bound + OPAs/bound + V/centre + A/W/road + M/fishery + M/GMA, outcome = recipFood and medicine ~ NP/bound + OPAs/bound + V/centre + A/W/road + M/fishery, data = KNP/Analysis)

The output of the Heckman two-step estimation model for food and medicine consumption in the KNP data analysis can be viewed in Appendix 7.33.

For the SLNP data, the Heckman two-step estimation model for food and medicine consumers was modelled as shown in the selection equation below. A dummy predicator variable of the Lupande Game Management Area (GMA) was included in the first part of the equation.

heckit (FMC ~ NP/bound + OPAs/bound + V/centre + A/W/road + M/fishery + L/GMA, outcome = Food and medicine ~ NP/bound + OPAs/bound + NP/Gate + A/W/road, data = SLNP Analysis)

The statistical output of the Heckman two-step estimation model and the Stargazer table for food and medicine consumption in the SLNP data analysis, is attached in Appendix 7.34. A comparison between the OLS and the Heckman two-step correction models' output was done through the stargazer command as indicated in Appendix 7.34. The stargazer table (Appendix 7.34) shows the Heckman selection model results for estimating the reciprocal of food and medicine consumption regression with corrections for sample selection for the first five (5) observations in the Kafue NP data. The Heckman's output and the Stargazer table in Appendix 7.33 estimates for *rho (ρ)* (-0.770) and the Inverse Mills Ratio (IMR) (-0.749) in the selection model. Null hypotheses for *rho* and *IMR* were tested and – in this case – the *rho* and *IMR* were not statistically significant – hence the null hypothesis could not be rejected, and the conclusion was that there was no bias in samples for the OLS regression equation. This suggests that the application of the sample selection model would not be appropriate, and it also means that the OLS regression equation for food and medicine consumption did not have serious bias issues. Therefore, the interpretation of the regression coefficients for the regression equation (OLS equation) was treated in the same manner as that used for any regression model (outlined in the next section).

For the South Luangwa NP data, analysis for Heckman selection model also showed that the *rho* and *IMR* were not statistically significant – hence the null hypothesis could not be rejected, and conclusion was that there was no bias in samples for the OLS regression equation (Appendix 7.34). This also means that the OLS regression equation for food and medicine consumption did not have serious bias issues. The interpretation of the regression coefficients for the regression equation (OLS equation) was also treated in the same manner as that used for any regression model (outlined in the next section).

Selected regression model output

The summarised output of the transformed OLS multiple linear regression model for food and medicine consumption (reciprocal of food and medicine) against geographical features showing the least square coefficients, standard errors, t-statistics, and p-values is attached in Appendix 7.33. The p-values and significance comments for the multiple linear regression models of food and medicine consumption against geographical features, were compared between household data in settlements near the KNP and those from households in settlements near the SLNP, as outlined in Table 6.8 below. In settlements near the KNP only the V/centre and the A/W/road were statistically significant, while in the SLNP none of the independent variables was significant for food and medicine consumption (Appendices 7.35 and 7.36).

Table 6.8: Least square coefficient estimates of the multiple linear regression of food and medicines consumption against household distances from different geographical features in the Kafue NP.

	Estimate	Std. Error	t-value	Pr(>|t|)	
NP/bound	-0.007380	0.005374	-1.373	0.17047	
OPAs/bound	0.003349	0.005622	0.596	0.55176	
V/centre	0.060545	0.025522	2.372	0.01816	*
A/W/Road	-0.061801	0.019916	-3.103	0.00205	**
M/fishery	0.003294	0.003923	0.840	0.40168	

*Signif. codes: ‘***’= 0.001, ‘**’= 0.01, ‘*’= 0.05, ‘.’= 0.1, ‘ ’= 1*

Residual standard error: 0.8957 on 393 degrees of freedom (62 observations deleted due to missingness)
Multiple R-squared: 0.04072, Adjusted R-squared: 0.02852
F-statistic: 3.336 on 5 and 393 DF, p-value: 0.00579

Table 6.9: Least square coefficient estimates of the multiple linear regression of food and medicines consumption against household distances from different geographical features in the South Luangwa NP.

	Estimate	Std. Error	t-value	Pr(>|t|)
NP/bound	0.132911	0.131373	1.012	0.312641
OPAs/bound	-0.058607	0.114920	-0.510	0.610506
NP/gate	-0.005213	0.106440	-0.049	0.960974
A/W/Road	-0.208441	0.390963	-0.533	0.594397

*Signif. codes: '***'= 0.001, '**'= 0.01, '*'= 0.05, '.'= 0.1, ' '= 1*

Residual standard error: 12.86 on 254 degrees of freedom (70 observations deleted due to missingness)
Multiple R-squared: 0.01202, Adjusted R-squared: -0.003535
F-statistic: 0.7728 on 4 and 254 DF, p-value: 0.5438

Interpretation of the results

Tables 6.8 and 6.9 above show the results of the multiple linear regression model analyses for the KNP and the results confirm that only the V/centre and the A/W/road predictor variables were statistically significant for the reciprocal of food and medicine consumption. This means that food and medicine consumption by households in settlements near the KNP had strong linear relationships with the distances from the village centres and the all-weather roads in the area. On the other hand, the results in the SLNP data confirm that none of the selected predictor variables was statistically significant for the food and medicine consumption. This means that consumption of food and medicine by households from settlements in the SLNP data analysis had no linear relationship with the distance of any of the selected geographical features. These results will help to develop an understanding of the influence of geographies of settlements (circumferential or radial) around Kafue and South Luangwa national parks through the consumption of food and medicines by the locals.

The multiple regression analysis of the households' foods and medicines consumption against the households' distances from selected geographical features in settlements near the Kafue NP, showed that there were linear relationships between households' consumption and households' distances from the village centres and the all-weather roads. The obtained results (Table 6.9) meant that if households' distance from the village centres increased by 1km, while other variables remained constant, the reciprocal of households' foods and medicines consumption would increase by US$0.06. This means that the reciprocal of households' foods and medicines consumption had direct linear relationships with the households' distances from the village centres. Again, on another geographical feature, the results meant that if households' distances from the all-weather roads increased by 1km, while other variables remained constant, the reciprocal of households' foods and medicines consumption would reduce by US$0.06. This means that the reciprocal of households' food and medicines consumption is inversely related to the households' distances from the all-weather roads. This could be ascribed to the increase in marketing opportunities for these resources as one gets closer to the all-weather roads. The relationship between the reciprocal of households' consumption of foods and medicines and the households' distances from the village centres, is also a logical relationship because of the expected increase in the demand for natural foods and medicines as one moves further away from the village centres. Considering the multiple linear regression analysis of the South Luangwa NP data, the results showed that the households' foods and medicines consumption had no significant linear relationship with the households' distances from any of the geographical features under consideration.

This study has shown that the households in settlements near the Kafue NP consumed twice the quantity of food and medicines than was consumed by households in settlements near the South Luangwa NP. About 87% of the households from settlements near the SLNP stated that the restrictions on resource access by park authorities was largely contributing to the reduction in households' income. Restrictions on access to natural resources was compounded by the fact that the park managers could not be held responsible for the human-wildlife conflicts taking place in settlements near the KNP and the SLNP. Access to resources and the income they generated played an important role in the rural livelihoods because they acted as safety nets and were used to overcome unexpected income shortfalls or cash needs (Dorward, Anderson, Clark, Keane, & Moguel, 2001; Vedeld et al., 2007). Other studies have also shown that the GMAs, or buffer zones, existing in most PAs, were created primarily for providing products of use or value to local people, especially the customary rights holders (Namukonde & Kachali, 2015). The system of customary rights holders had been implemented successfully in protected forests of some nations, where 60 – 80% of the proceeds from resources extraction, such as timber harvesting and gathering of the NTFPs, go to the customary rights holders. For example, it has been demonstrated by studies that local people, in many places, were employed by agents to harvest wild medicinal plants in an organised commercial venture, since an estimated 80% of the world's population depended on locally available plants, as the major form of medicine (Bhattarai, Ojha, Banjade, & Luintel, 2003; Kamboj, 2000; Kothari et al., 2015; Trosper & Parrotta, 2012).

The food and medicines and other NTFPs are of major economic and livelihood value worldwide and research has shown that in 2005 the global value of the foods and medicines or the NTFPs, which included extensive and widespread use in and around PAs, totalled US$16.839 billion. It was also estimated that about 20% of the estimated global flora – up to about 70 000 species of higher plants – were used as medicine worldwide (Food, 2010; Kothari et al., 2015; Schippmann, Leaman, & Cunningham, 2006). However, the major cause of habitat destruction in settlements near PAs, was not the households' consumption of foods and medicines, but more often related to the commercial charcoal production which had been taking advantage of ready markets in urban centres (Kothari et al., 2015; Simasiku et al., 2008). In summary one can say that the households' foods and medicines consumption in settlements near the Kafue NP were radially influenced by households' distance from the village centres and the all-weather roads. The households' foods and medicines consumption in settlements near the South Luangwa NP were not radially influenced by households' distance from any of the geographical features studied above. Hence, households' distances from the village centres, or all-weather roads, in settlements near the Kafue National Park, could be used to predict households' consumption rate of foods and medicines. However, one cannot use households' distances from any of the geographical features mentioned above in settlements near the South Luangwa national park to predict households' consumption rate of foods and medicines.

3. Material and fibre

A multiple linear regression of material and fibre consumption by households was analysed against distances of different geographical features in settlements near the Kafue and South Luangwa NPs. The dependent variable (material and fibre consumption) of the fitted model was transformed by reciprocating the material and fibre consumption (reciprocal of material and fibre) as it provided a higher homoscedasticity (equal variances) of the error term (Appendix 7.35). The transformed OLS model was fitted with five predictors as shown below:

OLS3_KNP = lm(recipMaterial and fibre ~ NP/bound + OPAs/bound + V/centre + A/W/road + M/fishery)

In the South Luangwa NP data, material and fibre consumption, the dependent variable, was transformed to its square root and regressed with the selected four predictors that provided a higher homoscedasticity (equal variance) of the error term when compared to other transformations (Appendix 7.36). The fitted OLS model is shown below:

OLS3_SLNP = lm(sqrtMaterial and fibre ~ NP/bound + OPAs/bound + NP/gate + A/W/road)

Estimating the material and fibre regression model with corrections for sample selection

To correct for sample selection bias due to sampling or missing values in the dependent valuable, the Heckman two-step estimation model for the material and fibre consumers (MFC) was modelled as outlined below for the KNP data. A dummy predicator variable of the Mumbwa Game Management Area (GMA) was included in the first part of the equation.

heckit (MFC ~ NP/bound + OPAs/bound + V/centre + A/W/road + M/fishery + M/GMA, outcome = recipMaterial and fibre ~ NP/bound + OPAs/bound + V/centre + A/W/road + M/fishery, data = KNP/Analysis)

The output of the Heckman two-step estimation model for material and fibre consumption in the KNP data analysis is attached in Appendix 7.35.

For the SLNP data, the Heckman two-step estimation model for material and fibre consumers (MFC) was modelled as shown in the selection equation below. A dummy predicator variable of the Lupande Game Management Area (GMA) was included in the first part of the equation.

heckit (MFC ~ NP/bound + OPAs/bound + V/centre + A/W/road + M/fishery + L/GMA, outcome = Material and fibre ~ NP/bound + OPAs/bound + NP/Gate + A/W/road, data = SLNP Analysis)

The output of the Heckman two-step estimation model and the Stargazer table for material and fibre consumption in the SLNP data analysis are attached in Appendix 7.36. A comparison between the OLS and the Heckman two-step correction models' output was done through the stargazer command (Appendix 7.36). The stargazer table shows the Heckman selection model results for estimating the reciprocal of material and fibre consumption regression with corrections for sample selection for the first five (5) observations in the KNP data. The

Heckman's output and the Stargazer table (Appendix 7.35) show estimates for *rho (ρ)* (1.112) and the Inverse Mills Ratio (IMR) (0.761) in the selection model. Null hypotheses for *rho* and *IMR* were tested and, in this case, the *IMR* was statistically significant – hence the null hypothesis was rejected, and the conclusion was that there was bias in samples for the OLS regression equation. This suggests that the application of the sample selection model would be appropriate, and it also means that the OLS regression equation for material and fibre consumption had serious bias issues. Therefore, the interpretation of the regression coefficients was based on the Heckman selection model and then treated in the same way as that used for any regression model (outlined in the next section).

Selected regression model output

The output of the transformed Heckman selection model for material and fibre (reciprocal of material and fibre) consumption against geographical features showing the least square coefficients, standard errors, t-statistics, and p-values is attached in Appendix 7.35. The p-values and significance comments for the multiple linear regression models of material and fibre consumption against geographical features by households in settlements near the KNP, were compared with those from households in settlements near the SLNP and the results are displayed in Table 6.10 below. In the Kafue NP data, only the NP/bound and the OPAs/bound – the independent variables – were statistically significant, while in the SLNP only the NP/gate was significant for material and fibre consumption (Appendices 7.37 and 7.38).

Table 6.10: Least square coefficient estimates of the multiple linear regression of material and fibre consumption against household distances from different geographical features in the Kafue NP.

	Estimate	Std. Error	t-value	Pr(>|t|)	
NP/bound	0.005494	0.003331	1.649	0.099941	.
OPAs/bound	0.011937	0.003488	3.422	0.000692	***
V/centre	-0.015361	0.015560	-0.987	-0.987	
A/W/Road	-0.016004	0.011724	-1.365	0.173066	
M/fishery	0.001452	0.002391	0.607	0.544038	

*Signif. codes: '***'= 0.001, '**'= 0.01, '*'= 0.05, '.'= 0.1, ' '= 1*

Residual standard error: 0.5227 on 368 degrees of freedom (87 observations deleted due to missingness)
Multiple R-squared: 0.07856, Adjusted R-squared: 0.06604
F-statistic: 6.275 on 5 and 368 DF, p-value: 1.329 x 10^{-05}

Table 6.11: Least square coefficient estimates of the multiple linear regression of material and fibre consumption against household distances from different geographical features in the South Luangwa NP.

	Estimate	Std. Error	t-value	Pr(>|t|)	
NP/bound	0.01785	0.01586	1.126	0.2613	
OPAs/bound	0.02564	0.01349	1.901	0.0584	.
A/W/Road	0.05011	0.04565	1.098	0.2733	
NP/gate	-0.02487	0.01249	-1.992	0.0474	*

*Signif. codes: '***'= 0.001, '**'= 0.01, '*'= 0.05, '.'= 0.1, ' '= 1*

Residual standard error: 1.613 on 279 degrees of freedom (45 observations deleted due to absence)
Multiple R-squared: 0.01923, Adjusted R-squared: 0.00517
F-statistic: 1.368 on 4 and 279 DF, p-value: 0.2453

Interpretation of the results

Tables 6.10 and 6.11 above show the results of the multiple linear regression model analyses. In the KNP data, the results confirmed that only the NP/bound and the OPAs/bound predictor variables were statistically significant for the reciprocal of material and fibre consumption. This means that household material and fibre consumption in the Kafue NP data analysis had strong linear relationships with the distances from the national park boundary and the other PAs boundaries in the area. On the other hand, the results under the SLNP data confirm that only the national park entrance gate was statistically significant for the square root of material and fibre consumption. This means that household consumption of material and fibre in the South Luangwa NP had a linear relationship with the distance to any of the two national park's entrance gates. These results will help to develop an understanding of the influence of geographies of settlements (circumferential or radial) around Kafue and South Luangwa national parks through the consumption of material and fibre by the locals.

The multiple regression analysis for the reciprocal of households' materials and fibre consumption against the households' distances from selected geographical features in settlements near the Kafue NP, showed that only the boundary for the Kafue NP and the boundaries for the 'other' PAs close by were significant against the response factor (Table 6.11). The results meant that if a household's distance from the Kafue NP boundary, or a household's distance from the other Pas, increased by 1km, while other variables remained constant, the reciprocal of households' materials and fibre consumption would increase by US$0.02 and US$0.04 respectively. The increase in consumption of materials and fibre as one moves away from the boundaries of PAs could only mean that households in the buffer zones, or closer to the boundaries of Pas, were more careful not to deplete the resources than households further away. For the South Luangwa NP, the results for the multiple linear regression analysis showed that only the households' distances from the entrance gates of the South Luangwa NP were statistically significant to the square root of households' consumption of material and fibre (Table 6.12). The results showed that if a household's distance from the SLNP entrance gate increased by 1km, while other variables remained constant, the square root of household's materials and fibre consumption would reduce by US$0.02. This also means that the square root of household's consumption of material and fibre was inversely related with the household's distance from the entrance gates of the South Luangwa NP. The South Luangwa NP is protected by the Luangwa River and access to its materials and fibre was possibly and mostly accessed through the entrance gates. In both the Kafue NP and the South Luangwa NP, the households' consumption of materials and fibre were radially influenced by households' distances from selected geographic features (boundaries to PAs for KNP; entrance gates for SLNP). Generally, the households in settlements near the Kafue NP consumed slightly higher quantities of materials and fibre than consumed by households in settlements near the South Luangwa NP.

These results prove that the local human communities in settlements near PAs (GMAs or OAs) are involved in the consumption of available natural resources in their settlements, although the major sources of income for households in settlements near PAs included agriculture, livestock and salary or wages, while the resource-use stands at several tens of millions people from a few regions or countries (Kothari et al., 2015; Zeeshan et al., 2017). The zoning demarcations found in some GMAs separated conservation areas from where agriculture and other land-use activities are permitted. In these areas the local human communities were the direct stewards of natural landscapes which, if not protected, would be transformed to urban or agricultural lands that would not be suitable for wildlife and the associated habitats (Musengezi, 2010). Some parks had made provision for neighbouring communities, at the level of local resource extraction, to extract some resources; for example, in Kasungu National Park in Malawi some communities harvested thatching grass, honey or caterpillars from the park (Cumming, 2004; Jones & Murphree, 2013). At the end of the 1990s around 70 per cent of the more than 30,000 sites on the United Nations' list of protected areas were found to permit some local use of resources, as reported in a global analysis of the situation by (Pretty, 2002) in Kothari et al., (2015). Currently local communities in settlements near the KNP and the SLNP have little in the way of formal legal rights that would enable them to fully benefit commercially from the protection of wildlife resources (DNPW, 2015). However, the current government's policy of devolution and decentralization, through the revised Wildlife Act (2015), provided the legislative framework for 'active' "participation of local communities in the management of the wildlife estate" (DNPW, 2016).

Some of the analysed data indicated that the households from settlements near the South Luangwa NP were, on average, characterised by being closer to the boundaries of both the NP and 'other' PAs than those from settlements near the Kafue NP. Again, the households from the SLNP were closer to the CBD, the AMU (SLAMU) and the park entrance gates than those in the KNP. Understandably these households from the SLNP were expected to consume more natural resources than those from the KNP (Bandyopadhyay & Tembo, 2010), but this study has demonstrated otherwise. These results are supported by other studies which state that access or consumption of resources mattered on how the settlements or households are located near PAs, but the consumption rates were dependent on the management of the individual PA (Mackenzie & Ahabyona, 2012; Sims, 2010). Human communities occupy PAs, or buffers zones around them, ranging from resident to seasonal and nomadic pastoralism, from sedentary agriculture to shifting cultivation and from permanent to seasonal settlements – and make use of the natural resources in them (Kothari et al., 2015).

Effect of geographical location on well-being of households

To answer the research question on how different geographical locations of settlements near national parks influenced the well-being of locals, the Principal Component Analysis (PCA) was performed by computing principal components in household survey data and then using them to understand the well-being of households. During the household surveys people were asked about specific impacts that had affected the well-being of their households in the preceding year, and in some cases up to five years, of living in their settlements. Observations of their dwellings for the types of construction materials used for the walls and roofs, were also recorded, and later used as proxies for household well-being. The PCA extracted important information from the household well-being data table and represented it as a set of new orthogonal variables called principal components.

Figures 6.15 and 6.16 and Table 6.12 show biplots of the Principal Component Analysis (PCA) of households' well-being and geographical locations using the combined data for the KNP and the SLNP. The 'directions' in which variability was largest were identified for geographical features and well-being variables. For each of the 10 settlements for Kafue and 17 for South Luangwa, the data set contained six ratings of households' well-being and eight geographical locations of settlements or villages. The principal component loading vectors have length: p = 14 and the principal component score (PC score) vectors have length: n = 27. The PCA was performed, following standardization of each variable to have a standard deviation equal to one and a mean equal to zero. The loadings are given in bi-plot (James et al., 2013) Table 6.12 below (also in Appendix 7.27).

Table 6.12: The principal component standard deviations, proportion of variance and cumulative proportion for the combined data on well-being of households in settlements near the Kafue and the South Luangwa NPs.

	PC1	PC2	PC3	PC4	PC5	PC6	PC7	PC8	PC9	PC10	PC11	PC12	PC13	PC14
Standard deviation	2.13	1.54	1.32	1.21	1.01	0.94	0.85	0.64	0.55	0.45	0.36	0.32	0.27	0.19
Proportion of variance	0.32	0.17	0.12	0.10	0.07	0.06	0.05	0.03	0.02	0.01	0.01	0.01	0.01	0.00
Cumulative proportion	0.32	0.49	0.62	0.72	0.80	0.86	0.91	0.94	0.96	0.98	0.98	0.99	1.00	1.00

A scree plot below (Figure 6.14) displays the proportion of the total variation in a dataset on well-being of households in settlements near the KNP and the SLNP, that is explained by each of the components in a principal component analysis. In this analysis, a fair amount of variance is explained by the first four principal components, and that there is a kink after the fourth component. The fifth principal component explains about 20 percent of the variance in the data (Table 6.12), and the sixth principal component explains less than 15 percent and so on and so forth. Therefore, four components accounting for more than 72% in the data, are needed to summarise the data.

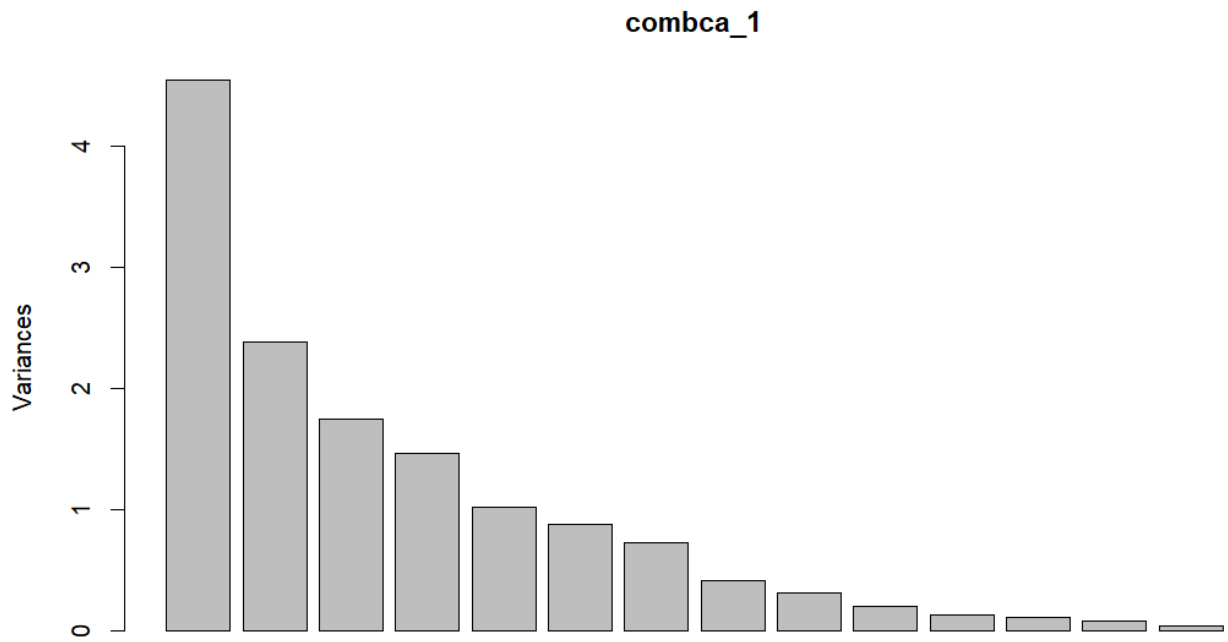

Figure 6.14: Scree plot for the principal component loadings vectors for the combined data on the well-being of households in settlements near the Kafue and South Luangwa NPs.

The first four principal components of the data are plotted in Figure 6.15 below. In the figure both the PC scores and the loading vectors are represented in a single bi-plot display (James et al., 2013).

- The first loading vector approximately places equal weight on the distances from the rivers (Kafue and Luangwa), the houses made of fired bricks and the experience of increase in well-being by locals, with slightly less weight on boundaries of NPs, NP gates and the all-weather roads. The loading vectors illustrate that settlements (PC scores) with higher positive scores on the first loading vector are the Kalengo and Kafumbe villages, both from the SLNP, while the settlement with high negative scores on the first loading vector was the Lungobe village in the KNP. The second-placed settlements, with higher positive scores on the first loading vector, are the Chitunda and Chenje villages and they are also both from the SLNP (James et al., 2013).
- The second loading vector places most of its weight on plot ownership and slightly less weight on AMU (James et al., 2013), availability of toilets and distance from village centres. Settlements such as the Kuwaza and the Msandira villages, in the SLNP, had high positive

scores, while the Malanga village from the SLNP was close to zero on both loading vectors, indicating that it had approximately average levels of all the variables with high positive and negative scores.

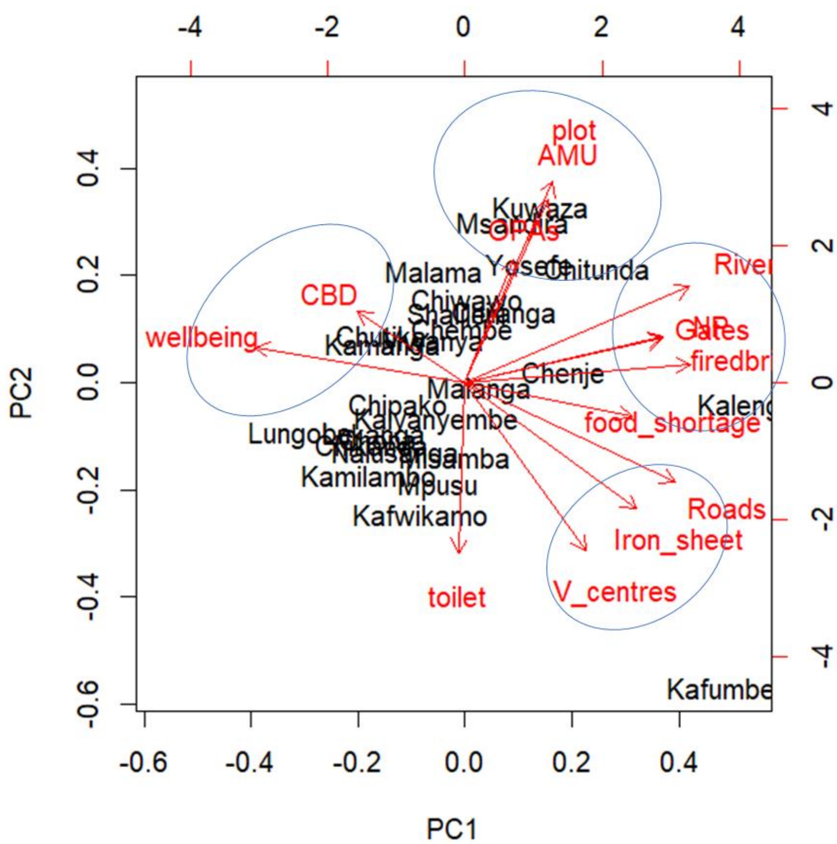

Figure 6.15: Settlement’s version of principal component analysis bi-plot output for well-being in settlements near both the Kafue and South Luangwa NPs

Figure 6.16 had the same data as Figure 6.15 but focuses on NPs instead of settlements. Both the PC scores and the loading vectors, in a single bi-plot display, are represented in the figure (James et al., 2013) and suggests that, on average, all the settlements in the KNP had higher negative scores on both the first and second vector loadings, with correlations to principal components on ‘availability of toilet’ and ‘well-being experience’. On the other hand, settlements in the SLNP were balanced with both positive and negative scores on the first vector loadings but had higher positive scores and lower negative scores on the second vector loading. The scenario showed that settlements (PC scores) in the KNP did not correlate strongly with the geographical features being studied, or with proxy variables for well-being – except for 'well-being increase experience' and 'toilets on plots'. These results obtained here will contribute towards developing an understanding of the influence of geographies of settlements (circumferential or radial) around Kafue and South Luangwa national parks through the positive/negative impacts by the locals.

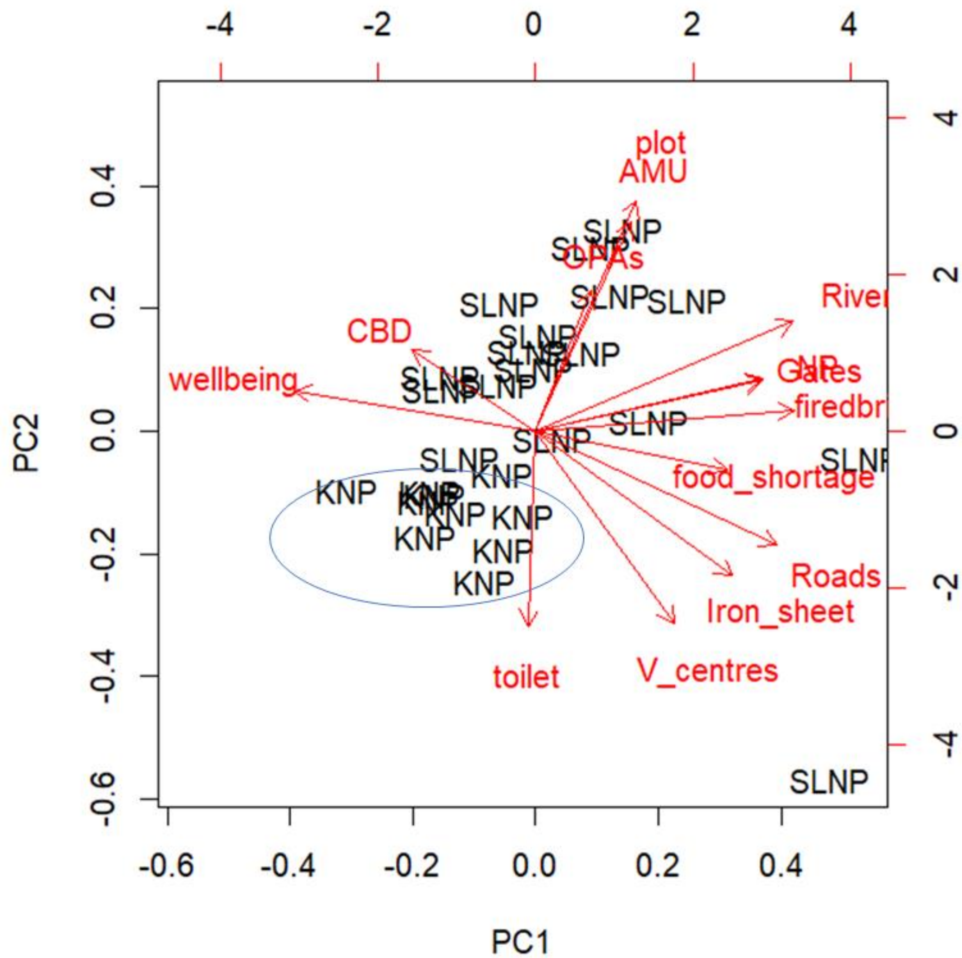

Figure 6.16: NPs version of principal component analysis bi-plot output for well-being in settlements near both the Kafue and South Luangwa NPs.

Household surveys of socio-economic characteristics of households were conducted in settlements near the Kafue and South Luangwa national parks. In these settlements 468 and 419 households were surveyed, with the focus on households' well-being in relation to their geographical locations, respectively for the Kafue National Park (KNP) and the South Luangwa National Park (SLNP). To do this, the Principal Component Analysis (PCA) was performed by computing the principal components in the household survey data and then using them to understand the well-being of households in different geographical locations. For example, observations of dwellings for the types of building materials used (walls and roofs for example) were also recorded and later used as proxies for household well-being. The PCA was then performed to extract important information from the household well-being data table and represent it as a set of new orthogonal variables referred to as principal components.

The first loading vector under the PCA analysis placed approximately equal weight on the principal components (PCs) corresponding to distances from the rivers (Kafue and Luangwa), the houses made of fired bricks and the experience of increase in well-being. Slightly less weight was placed on PCs such as boundaries of NPs, NP gates and the all-weather roads. Thus, under this loading vector, the principal components roughly correlated to:

- a count of overall number of houses made of fired-brick or concrete-block walls, while
- the opposite to this response was true for households that experienced an increase in their well-being in the past one to five years.

The second loading vector placed most of its weight on the PC corresponding to 'plot' and slightly less weight on PCs corresponding to 'AMU', 'toilet' and 'V/centres'. Thus, under this loading vector, the principal components roughly correlated to:

- ownership of plots, where the main houses are situated,
- availability of toilets on the plot, within 50m from the main houses, park area management units (AMU); and
- village centres.

The variables rivers, NP, gates and fired brick were positively located close to each other in the SLNP, which indicated:

- Settlements (loading scores) with houses built of fired-brick, or concrete-block walls, were correlated with the Luangwa River (the main fishery in the area), the SLNP boundary and the entrance gates to the SLNP,
- Settlements with houses built of fired-brick, or concrete-block walls, were negatively correlated with the distances from CBD and 'other' PAs'.

The variables: plot, AMU and OPAs located close to each other, in the SLNP, again indicated that:

- settlements with households owning a plot or land, where their current houses are situated, were positively correlated with the SLNP, AMU (or SLAMU = South Luangwa National Park Area Management Unit) and 'other' PAs,
- while the opposite is true for households owning a plot or land, which was negatively correlated with having a toilet on the plot.

Again, we saw that the settlements with houses made of galvanised iron-sheet roofs correlated positively with the all-weather roads and village centres in the SLNP.

And finally, the settlements with households which experienced an increase in their well-being over the past one to five years were:

- correlated with the distance from the central business district (CBD),
- while the opposite was true for settlements with more fired-brick houses, iron-sheet roof houses and households which experienced a food shortage in the past one to five years.

The second biplot depicting NPs (loading scores) rather than settlements, illustrated that those settlements from the KNP did not correlate strongly with the geographical features being studied and proxy variables for well-being, except households which experienced 'well-being increase' over the past one to five years and had availability of a toilet on a plot.

The results have illustrated how the households from the SLNP are correlated to plot ownership. However, in rural areas such as GMAs, most settlements are built on traditional lands and ownership of land is granted through traditional authorities. This means that there are more households in SLNP owning traditional land than in the KNP. The survey also revealed that there were more houses made of fired-brick walls in the SLNP than in the KNP. Houses made of mud walls and grass thatched roofs belonged to poorer segments of the society, while houses made of mud-brick walls and iron-sheet roofing were owned by lower middle-class people, and houses made of fired-brick or concrete-block walls and iron-sheet roofing were owned by middle to upper class people. The rate of households owning plots on the land where their current houses are situated was three times higher in settlements near the SLNP than in settlements near the KNP. This means that the well-being of households in GMAs near the SLNP can be said to be slightly higher than those in GMAs near the KNP. The GMAs and the Community-Based Natural Resource Management (CBNRM) programmes' main focus has been to encourage local human communities, living in areas around PAs, to participate in wildlife conservation activities that would consequently uplift the general social welfare of the locals (Mbaiwa, 2017). And this has indeed increasingly expanded the mission of PAs from focusing on biodiversity conservation alone to considerations of incorporating aspects of improving human well-being (Kothari et al., 2015). Recently the results of such efforts have been a shift towards PAs allowing sustainable consumption of natural resources in certain areas (Naughton-Treves, Holland, & Brandon, 2005), or allowing the use of other forms of natural resources that benefit local people and communities. Namibia's communal conservancy model is one example where local communities have been generating revenue through hunting and photographic tourism, sales of live game and 'game cropping' for meat and skins (Kothari et al., 2015; Naidoo, Weaver, Stuart-Hill, & Tagg, 2011; Nelson et al., 2013). This communal conservancy approach strikingly led to the recovery of populations for species such as black and white rhino and elephant and at the same, had led to the increase in local people's social and economic value for wildlife (Kothari et al., 2015). However, the assumption has always been that local human communities are likely to manage their natural resource base sustainably when they are receiving direct benefits – which must exceed the perceived costs – from conservation efforts of PAs (Leach, Mearns, & Scoones, 1999; Tsing, Brosius, & Zerner, 1999). However, with increasing wildlife populations, care must be taken in some NPs as a threshold may be reached beyond which damage caused by wildlife could reverse the positive gains for the GMAs thereby reducing the locals' well-being (Fernandez et al., 2009).

About 72% of households from the SLNP and 53% from the KNP stated that their social well-being was 'good', while fewer than 24% and 41% respectively felt that their general well-being had become 'better' or 'improved' over the last one to five years. This is in line with the fact that the well-being in GMAs or settlements near Zambia's NPs is about 70% of the national rural average (Office, 2005). One of the reasons for the adverse effect on the well-being of households in GMAs is that there is generally low agricultural potential in these areas which is one of the reasons for their demarcation (Simasiku et al., 2008). According to the Living Conditions Monitoring Survey in 2004, the incidence of poverty was highest among households where the household head had less than seven years of formal basic education and among large households of seven or more members (Office, 2005). Studies have also revealed that the poorer people in GMAs are more worried about GMA encroachment while wealthier people are more worried about the hunting ban and the proportion of the benefits from fishing that goes to DNPW. About 75% of the households in GMAs mentioned that their well-being had slightly increased, while in OAs only 33% of the households mentioned this. The respondents felt that their general well-being had improved over the last one to five years. Generally, the results from the study implied that PAs had positive impacts on the well-being of locals in GMAs. This result was against the background of poverty trends reported in the Fifth National Development Plan that GMA communities had high poverty levels among the poorest rural small-scale farmers of Zambia (Simasiku et al., 2008).

According to the UN, (2015) in (Laurance et al., 2014) the human population is projected to reach 10 billion by the end of this century with the greatest increases expected in tropical developing countries, especially in Africa. It is argued that the primary justifications for the existence PAs or NPs are mostly economic, if they are taken as common-pool resources that should provide societal rather than individual benefit (Cumming, 2004). There are many benefits and services generated by many PAs, which are enjoyed by national and international elites (Balmford et al., 2002; Kumar, 2010), while the local people bear most of the conservation costs, especially the poor and the politically weak groups (Adams & Hutton, 2007; West et al., 2006). For example, according to the information from Davis, (2000) in (Cumming, 2004) a provincial park agency in South Africa which is known as the North West Parks, has adopted the view that NPs are common property regimes that should serve the needs of their constituent communities before others, albeit with a proviso that ecological management should be sustainable. Researchers have supported the idea that social objectives focused on settlements around PAs must not be conflated with environmental goals because they may compromise the economic efficiency of the PA (Pascual et al., 2014; Wunder, Engel, & Pagiola, 2008). Intangible values, such as biodiversity, as the predominant grounds for justifying nature protection, often do not count for locals – since they have to bear the greatest material costs because of constraints in use (Job, 2008). Globally PAs have been traditionally used or inhabited by humans for the most part before the onset of separating them from PAs. However, the conventional ways restricting resource use and other approaches of separating people and Pas, have begun to give way to more inclusive approaches (Kothari et al., 2015). Oldekop et al. (2015) and Andrade and Rhodes,

(2012) – in the global assessments of PAs – have concluded that PAs that are more effective at achieving both the biological conservation and the socio-economic development outcomes, are those that explicitly integrate local people as stakeholders (Andrade & Rhodes, 2012; Oldekop et al., 2016). Although settlements located closer to PAs, especially to areas of high tourism activities, experienced high incidences of HWC, they consumed fewer natural resources, obtained more benefits from tourism and their well-being was better than settlements further away from these areas.

6.4 Conclusions and recommendations

1. Perceptions of social impacts and management practices

The local communities in GMAs and OAs around the Kafue and the South Luangwa NPs were socially negatively impacted by the park officials', representing the government, and or the CRBs' (representing the communities) failure to positively respond to human-wildlife conflicts, or instances of HWC. The officials restricting them from natural resource extraction, from within the GMAs and OAs, not providing them with bona fide licences and not sharing hunting revenue with some households, also contributed to their negative social impacts. On the other hand, the local communities were socially positively impacted by the government's continued support of the wildlife conservation programme in PAs for the benefit of future generations, and the CRBs' sponsoring of education support programmes in their schools, especially for the marginalised, and social welfare support programmes such as the drilling of boreholes in their communities. The conclusions of the assessments for the social impacts perceptions and management practices are outlined below:

- ❖ In the Kafue NP, the important perceived social impacts that positively affected the households in the Mumbwa GMA and the Mumbwa Open Area were:
  - ✓ access to natural resources and
  - ✓ access to fertile land for farming.

- ❖ The important perceived management practice that positively influenced the locals in the Mumbwa GMA and the Mumbwa Open Area were:

- ✓ the conservation of wildlife for the benefit of future generations.

- ❖ There were no important perceived social impacts that negatively affected the households in the Mumbwa GMA and the Mumbwa Open Area.

- ❖ The important perceived management practices that negatively affected the locals in the Mumbwa GMA, and the Mumbwa Open Area were:
  - ✓ arrest of locals found with bushmeat,
  - ✓ confiscation of fish from fishers and
  - ✓ restrictions on natural resources extraction in the surroundings of their settlements.

- ❖ In the South Luangwa NP, the important perceived social impact that positively affected the households in the Lupande and Lumimba GMAs was:
  - ✓ the employment opportunities available in the tourism industry for the locals.

- ❖ The important perceived management practices that positively influenced the locals in the Lupande and Lumimba GMAs included:
  - ✓ a programme supporting girls to attend school throughout the year,
  - ✓ the conservation education programme in schools,
  - ✓ the wildlife conservation in PAs,
  - ✓ a programme supporting construction of school infrastructure in their communities,
  - ✓ education sponsorship programmes, and
  - ✓ a programme supporting drilling of boreholes in their communities.

- ❖ The important perceived social impact that negatively affected the households in the Lupande and Lumimba GMAs included:
  - ✓ the damage to crops by wild animals, and
  - ✓ the killing of people and livestock by wild animals.

- ❖ The important perceived management practices that negatively affected the households in the Lupande and Lumimba GMAs included:
  - ✓ harassment of locals by park officials when a dead wild animal was found in the area,
  - ✓ restrictions on natural resource extraction in the immediate surroundings of their settlements,
  - ✓ lack of positive response by park officials to human-wildlife conflict (HWC) cases in their settlements,
  - ✓ no compensation from park authorities for crops damaged and livestock killed by wild animals,
  - ✓ restrictions on firewood collections by park officials,
  - ✓ no hunting revenue being received by households in their communities,
  - ✓ no bona fide hunting licences available for local people.

2. Natural resource consumption

The local communities' consumption of natural resources, from within the GMAs and OAs, was much higher from the Kafue NP than from the South Luangwa NP per household consumption. The households' consumption of natural resources was radially influenced by the households' geographical locations in settlements near the Kafue NP and the South Luangwa NP. The conclusions of the analysis for the natural resource consumption are outlined below:

- ✓ In settlements near the Kafue NP the household's annual consumption of firewood (ZMW2,263.87) was significantly higher than from household's consumption in settlement near the South Luangwa NP (ZMW942.14). In the KNP the firewood consumption had a linear relationship with the distances from the national park boundary, village centres, all-weather roads, and the main fishery in the area. For the South Luangwa NP, the results confirmed that firewood consumption had a linear relationship with the household distance from the all-weather roads only. This means that household's firewood consumption rate was radially influenced by the household's distances to the following geographic features: the national park boundaries, the village centres, the all-weather roads and the main fishery in settlements near the Kafue NP. Only the household's distance from the all-weather roads radially influenced the household's firewood consumption in settlements near the South Luangwa NP.

- ✓ Households in settlement near the Kafue NP consumed on average ZMW1,296.41 of foods and medicines annually, which was significantly higher than the consumption of households in settlements near the South Luangwa NP of about ZMW708.64. The household's foods and medicines consumption, in settlements near the KNP, had a linear relationship with the household's distances from the village centres and the all-weather roads. For the South Luangwa NP, the results confirmed that the household's consumption of foods and medicines had no linear relationship with any of the selected geographical features. Which means that the household's foods and medicines consumption rate was radially influenced by the household's distances from the village centres and the all-weather roads in settlements near the Kafue NP.
- ✓ Households in settlements near the KNP consumed on average ZMW1,140.39 of material and fibre annually, which was significantly higher than the consumption of households in settlements near the SLNP of about ZMW1,071.62. For the KNP, the household's material and fibre consumption had a linear relationship with the household's distance from the Kafue national park boundary and other PAs boundaries in the area. For the South Luangwa NP, the results confirmed that the household's material and fibre consumption had a linear relationship with the household's distance from the South Luangwa NP entrance gates only. This means that household's material and fibre consumption rates were radially influenced by the household's distances from the national park boundaries and the other PAs boundaries in settlements near the Kafue NP. In settlements near the South Luangwa NP, household's material and fibre consumption rates were radially influenced by the household's distance from the national park entrance gates.

3. Well-being of locals

The estimated local communities' well-being, from within the GMAs and OAs, was much higher from the South Luangwa NP than from the Kafue NP. The well-being of households was circumferentially influenced by the distance to the following geographic features: the all-weather roads, the NP boundary, the NP entrance gates, the village centres, the main fishery and the AMU as exhibited in the South Luangwa NP. The conclusions of the analysis for the well-being of households near the Kafue and the South Luangwa NPs are outlined below:

- ✓ Geographical locations of settlements near the South Luangwa NP were more correlated to the all-weather roads, the NP boundary, the NP entrance gates, the village centres, the main fishery, and the AMU than those in the Kafue NP. On the other hand, the geographical location of settlements near the Kafue NP were more correlated to the CBD and the ‘other’ PAs boundaries than those in the SLNP.
- ✓ Again, the households near the South Luangwa NP were more correlated to houses made of fired-brick or concrete-block walls, ownership of plots and houses with galvanised iron-sheet roofs than those in the Kafue NP.
- ✓ Hence, the households in the South Luangwa NP reflect a higher level of well-being than those in the Kafue NP. On the other hand, households near the KNP were more correlated to ‘availability of a toilet’ and ‘households experiencing an increase in well-being’ than those in the SLNP.
- ✓ Although settlements located closer to PAs, especially to areas with high tourism activities, experienced high incidences of HWC, they consumed fewer natural resources, obtained more benefits from tourism and their well-being was better than settlements further away from these areas.

Study outcomes

Specific objective 4:

To develop an understanding of the influence of geographies of settlements (circumferential or radial) around Kafue and South Luangwa national parks through the positive/negative impacts of the protected areas and the consumption of natural resources by the locals.

Related question and outcomes:

a) How are settlements near the national parks affected by the main positive and negative social impacts related to the parks?

The outcome of the study showed that the households in settlements near the Kafue NP (Kabulwebulwe chiefdom in Mumbwa GMA and Kaindu chiefdom in Mumbwa Open Area) were both positively and negatively affected by the perceived social impacts. The social impacts and the management practices that affected the households in settlements near the KNP included the following:

- ✓ access to natural resources (Figure 6.6).
- ✓ access to fertile land for farming (Figure 6.6).
- ✓ the conservation of wildlife for the benefit of future generations (Figure 6.8).
- ✓ arrest of locals found with bushmeat (Figure 6.11)
- ✓ confiscation of fish from fishers (Figure 6.11)
- ✓ restrictions on natural resources extraction in surroundings of their settlements (Figure 6.11).

b) How does location of settlements near parks influence the consumption of natural resources?

The consumption of most of the natural resources by households located near the KNP and the SLNP were radially influenced by the household's distances to some of the selected geographic features. The study outcome means that households in settlements near NPs are not only radially influenced by the selected geographical features, but different NPs affected them differently – also as outlined below:

- Firewood consumption by households in settlements near the KNP was influenced by the national park boundaries, the village centres, the all-weather roads, and the main fishery in settlements near the Kafue NP. While the consumption of firewood by households in settlements near the SLNP was influenced by the household's distance from the all-weather roads only (Tables 6.6 and 6.7).
- Consumption of foods and medicines by households in settlements near the KNP was influenced by the nearby village centres and the all-weather roads in settlements close to the Kafue NP. The consumption of foods and medicines by households in settlements near the SLNP was not influenced by the household's distance from any of the selected geographical features (Tables 6.8 and 6.9).
- Materials and natural fibres consumption by households in settlements near the KNP was influenced by the national park boundaries and boundaries of other PAs in settlements near the Kafue NP. The consumption of materials and natural fibres by households in settlements near

the SLNP was influenced by the household's distance from the national park entrance gates only (Tables 6.10 and 6.11).

c) How does the location of settlements near parks influence the wellbeing of locals?

The study outcome showed that the well-being of households in settlements near the SLNP was much higher than those near the Kafue NP. The findings mean that the households in settlements near NPs were not only circumferentially influenced by the selected geographical features, but different NPs affected them differently. Households in settlements near the South Luangwa NP were more correlated to a higher number of proxies of well-being, such as houses made of fired-brick or concrete-block walls, ownership of plots and houses with galvanised iron-sheet roofs. This compared to households in settlements near the Kafue NP (Figures 6.15 and 6.16).

Going forward: Based on the findings, insights from literature and the author's analyses of the influence of geographies of settlements (circumferential or radial) around Kafue and South Luangwa national parks the following recommendations would hopefully assist policy makers, stakeholders, local leadership, and the government agencies to improve the management of settlements near NPs:

- There is a need to enact policies that empower locals with the skills of managing natural resources that will enable them to help develop mechanisms that monitor the sustainable consumption of natural resources in GMAs and OAs. This would in due course contribute to the conservation of natural resources and reduce incidences such as bushmeat meat poaching, as alluded to by about 76% of households from the KNP.
- Local community programmes on education that are aimed at benefiting many people in GMAs and OAs have positive social impacts on households and should be supported.
- The human-wildlife conflict is a serious problem in the SLNP, as mentioned by about 90% of households in the area, and this should be addressed by creating a system that responds to such cases with the urgency they deserve.
- To improve the outlook in the Kafue NP over the perceived social impacts on households in Mumbwa GMA and Mumbwa Open Area, the perceived positive management practices from the South Luangwa NP should be adopted.

- To address the high poverty levels in the settlements near PAs, the households that are furtherest from the following geographical features: the all-weather roads, the NP boundaries, the NP entrance gates, the village centres, the main fishery in the area and the AMU, should be prioritised.

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Chapter 7 GENERAL CONCLUSION

7.1 Introduction

This study evaluated the economic impacts of the Kafue and South Luangwa national parks on their local economies, as well as the influence of NPs on locals in different geographical settlements. Several sources of data were used in this dissertation to investigate the impacts of park visitor spending and the influence of NPs on locals in geography of settlements. To start with, the chapters in this dissertation described the Kafue National Park as being generally less popular than the South Luangwa National Park notwithstanding the fact that the two NPs rated similarly. The example given was that in 2015 the Kafue NP received a total of 16,203 party overnight stays of visitors while the South Luangwa received four times more, with 59,721 overnight stays despite both parks rated the same as being among Africa's socio-ecologically important conservation areas boasting a high diversity of wildlife.

The literature review section of Chapter 1 covered topics such as the tourism economic impacts, the tourism economic leakage, the multipliers, and the I-O model, among many others. Chapter 2 covered the methodologies of data collection for all the chapters in this dissertation. The data collection methods that were covered in this chapter included the economic multipliers, visitor spending surveys and interviews, selection of tourists' facilities, selection of tourism operators and ownership analysis, estimation of total tourism impacts and total leakage of visitor spending, and resource consumption as well as social impact analysis. The data analysis in this chapter covered the application of the money generation models and the application of different statistical analyses, such as the multiple linear regression models and the principal component analysis.

Chapter 3 of this dissertation described how the national multipliers were derived from the Zambia's Input-Output Tables for 2010, which were published by the Central Statistics Office (CSO) of Zambia (CSO, 2017), and how they were rescaled to rural area level. Chapters 4 and 5 elaborated on the two on-site visitor intercept surveys that were conducted during the study, with one survey conducted in the Kafue National Park and the other one in the South Luangwa National Park. The intercept surveys focused on visitors' daily expenditures, and they were conducted at randomly selected tourism facilities – namely the various accommodation facilities and the park gates of the NPs. The same data and model that was applied to estimate the total economic impacts of tourism – by applying the MGM2 on visitor spending – in Chapter 4 was applied in Chapter 5 to estimate the total leakage of tourism by applying the MGM2 on visitor spending. One of the outcomes in Chapter 5 was that the supply of goods and services for park visitors by non-local suppliers and the lack of strong local business linkages contributed to both internal and external leakages for both national parks.

Chapter 6 elaborated on the fact that before the questionnaires could be formulated and the household surveys be conducted, the Focus Group Discussions (FGDs), or community workshops, were conducted in the two selected VAGs from each chiefdom in the KNP and the two selected VAGs for the combined chiefdoms in the SLNP. From the data that were collected from those FGDs, and household surveys, several statistical analyses and some validation tests were applied in the data analyses. The applied statistical analyses and other analyses on the collected data, performed with the R statistical package, included the descriptive statistics, the bivariate analyses, and the multivariate analyses. Several outcomes from the analyses are outlined in Chapter 6 and these included, but were not limited to park financial management analyses, ownership of tourism businesses analyses, positive and negative social impact analyses, household consumption of natural resources analyses and the well-being of households' analyses. A review of the findings is presented below.

7.2 Review of findings

Chapter 2 of this dissertation was the methodology section and it began by describing a multiple case study design which was chosen to assist in the theory-creation process for the performance of the two national parks (Eisenhardt, 1991; Yin, 2009). The use of case studies to build theory was considered advantageous to the development of novel theory that is valid and testable, and particularly relevant to situations in which current perspectives were inadequate. The section explained how the quantitative methodologies (Babbie & Mouton, 2001) would be applied to estimate the impacts of visitor spending on local economies and to understand the influence of the NPs on local settlements. Purposeful selection was also highlighted on how it was used to select the study areas from among the tourism destinations in both parks (Alston & Bowles, 2003; Bless, Higson-Smith, & Sithole, 2013).

The chapter highlighted the importance of both the Kafue National Park (KNP) and the South Luangwa National Park (SLNP) as Protected Areas (PAs) for the conservation of wildlife biodiversity, for the protection of large amounts of intact forests and as sources of water for the southern Africa region. It was outlined in the chapter that the study focused on local areas bordering and lying within 50-60km of the KNP and the SLNP. The study sites, purposively selected among the tourism destinations in the local economies, were either the Game Management Areas (GMAs) or the Open Areas (OAs) in the districts where the national parks were located. The chapter mentioned that the settlements that were selected near the KNP, for the geographical influence NPs analysis, were the Kabulwebulwe chiefdom in the Mumbwa GMA and the Kaindu chiefdom in the Mumbwa OA. In settlements near the SLNP, four chiefdoms (Kakumbi, Malama, Mnkhanya and Nsefu) in the Lupande GMA and one chiefdom (Mwanya) in the Lumimba GMA, were also selected.

The chapter described the KNP as Zambia's largest national park, covering a total area of 22,480 km^2 and that the covered area represented nine percent of the total land mass of Zambia. And if the park's nine surrounding GMAs, Mumbwa, Lunga-Luswishi, Kasonso-Busanga, Mufunta, Mulobezi, Bilili, Sichifulo, Nkala and Namwala, were also considered, the Greater Kafue National Park (GKNP) area would extend to approximately 68,000 km^2 (Milupi et al., 2017; Mwima, 2001; Namukonde & Kachali, 2015; ZAWA, 2011b). It was mentioned in the chapter that the selected Kabulwebulwe chiefdom, which is also one of the three Community Resource Boards (CRBs) that formed the Mumbwa GMA, was on the eastern boundary of the Kafue NP covering 3,370 $km^{2,}$ with an estimated population of 33,176 (Namukonde & Kachali, 2015; ZAWA, 2012). And the selected Kaindu chiefdom, which was categorised as a CRB, was also described as located in the northern part of the Mumbwa district in what was known as the Open Area or non-GMA area. The SLNP was also described as covering an area of approximately 9,050 km^2, that made it the second largest of the 20 NPs in Zambia (Child & Dalal-Clayton, 2004). The chapter was categorical in demonstrating that there were five GMAs surrounding the SLNP and those were Lumimba and Lupande in the east, Munyamadzi in the north, Chisomo in the southwest and Sandwe in the southeast (Child & Dalal-Clayton, 2004; Dalal-Clayton & Child, 2003; Musumali et al., 2007; Nyirenda et al., 2011; ZAWA, 2011). The five chiefdoms that were selected for the study because of their natural resource base, tourism opportunities and availabilities of alternative livelihood opportunities, included Kakumbi, Malama, Mnkhanya and

Nsefu from Lupande GMA and Mwanya from Lumimba GMA (Dalal-Clayton & Child, 2003; Nyirenda et al., 2011).

Chapter 2 went on to describe the process of data collection, by starting with the national multipliers which were derived from Zambia's Input-Output tables for 2010, published by the Central Statistics Office (CSO) of Zambia (CSO, 2017). The chapter then demonstrated how the national multipliers were rescaled to rural area multipliers and also how the process of collecting data on visitors daily expenditures, through a series of on-site intercept surveys was conducted (Colt et al., 2013). The surveys were conducted through randomly distributed questionnaires to parties of willing visitors present at tourism facilities and at the same time, the semi-structured interviews were conducted with managers of the same tourism facilities that included the safari lodges, safari camps, bush camps and safari hunting outfitters, (Driml & McLennan, 2010; Huhtala et al., 2010; Whitelaw et al., 2014). The chapter mentioned that 12 tourism accommodation facilities from the Kafue NP and 12 from the South Luangwa NP were selected to participate in the surveys. For the household surveys on the component of the NPs' influence on geographical settlements, the chapter demonstrated that before the questionnaires could be formulated, the focus group discussions or community workshops were conducted in selected Village Action Groups (VAGs) from each chiefdom or CRB (Kabulwebulwe and Kaindu) in the KNP and in the selected VAGs from two selected chiefdoms or CRBs (Kakumbi and Mwanya) in the SLNP. Then the developed questionnaires for the household surveys were administered by using an online open data kit (ODK) for mobile data (Brunette et al., 2013; Hartung et al., 2010) and the heads of the households were the core respondents, unless they were not available. The chapter also mentioned that the collected household data were supplemented by other sources of primary data such as interviews with key stakeholders, while the annual visitor records for both the KNP and the SLNP were obtained from the Department of National Parks and Wildlife (DNPW) offices.

The chapter finally described how data analysis was conducted on impacts of visitor spending, by starting with the application of the Money Generation Model 2 (MGM2) (Stynes et al., 2000), that was adapted to evaluate local economies with derived local multipliers to evaluation of the economic impacts of visitor spending around the national parks. For the data on the influence of NPs on households' settlements, it was analysed by using bivariate analyses, where the differences between sampled populations on socio-economic impacts, or on the consumption of natural resources, were tested. The multivariate analyses such as the multiple linear regression models were also conducted to predict the value of a dependent variable for each subject (natural resources) where two or more independent variables (distance to geographical features) were taken into consideration simultaneously (Crawley, 2012; Gollub et al., 2003). The principal component analysis was also employed to analyse the specific impacts that had affected the well-being of the households over the preceding year, and in some cases up to five years, of living near PAs. The chapter also identified the possible sources of errors, and the tolerable levels were estimated. It was mentioned that to reduce errors in the analysis because of the number of samples' failure to meet a threshold, the estimates of visitor spending were taken as ranges, between the lowest and highest values, rather than average point mark. What mattered, however, were not the exact values of estimates, but their relative magnitudes (Chidakel et al., 2018; Stynes, 1997b). And again, the chapter investigated all the benefits and costs realised by the locals living around the KNP and the SLNP in trying to understand the differences between the two parks.

Chapter 3 investigated the estimates of economic multipliers for economic impact assessments of wildlife-based tourism in rural areas of Zambia. The chapter demonstrated how the multipliers for tourism were derived by incorporating the tourism related five sectors of the economy that included the 'Wholesale and retail trade', 'Transportation and storage', 'Accommodation and food service activities', 'Arts, entertainment and recreation' and 'Other service activities'. Assumptions were made that all the tourism-related sectors produced identical products and employed the same production technology for the estimates of the I-O table analysis to be comparable at both rural area and national levels (Miller & Blair, 2009). More assumptions were made that economies or diseconomies of scale were not there in production or factor substitution for the derived multipliers to be comparable at both levels (Stynes, 1997a). The chapter demonstrated that the targeted region for the application of the derived rural area multipliers were the rural areas of Zambia – around national parks. The derived national, direct requirements coefficients were then disaggregated to rural area regional level to refine the calculation of multipliers, and that method was supported by the findings of other researchers who stated that higher multipliers were expected for larger and more diversified economies (D'Hernoncourt et al., 2011; Miller & Blair, 2009; SPICOSA, 2010). The derived and rescaled rural area multipliers were on average slightly lower than the derived national multipliers in almost all the sectors – just as was expected (Table 7.1).

Table 7.1: Derived national and rural area multipliers for selected tourism-related sectors in Zambia

	Industry/Sector	Output I	Personal Inc/sales	Jobs /MM sales	Value added/ sales	Output II	Inc II/sales	Jobs II /MM sales	VA II/sales
National multipliers	Wholesale and retail	1.32	0.08	36.91	0.91	1.50	0.09	44.36	1.02
	Transportation and storage	1.37	0.14	21.10	0.82	1.63	0.17	32.17	0.98
	Accommodation and food	1.51	0.09	56.23	1.02	1.82	0.12	69.50	1.22
	Arts	1.32	0.20	23.35	0.97	1.94	0.26	49.53	1.36
	Other service activities	1.81	0.11	52.44	0.85	2.40	0.16	77.14	1.22
Rural area multipliers	Wholesale and retail	1.10	0.05	12.98	0.71	1.12	0.05	13.65	0.72
	Transportation and storage	1.12	0.04	9.37	0.52	1.15	0.04	10.44	0.54
	Accommodation and food	1.20	0.20	22.33	0.67	1.23	0.20	23.64	0.69
	Arts	1.11	0.16	6.01	0.55	1.19	0.16	8.94	0.59
	Other service activities	1.27	0.04	35.81	0.53	1.33	0.05	38.06	0.57

The chapter demonstrated further that the output or sales multipliers in the study were found to be higher under the ‘Other service activities’ sector for both type I and type II multipliers than for any of the other four tourism-related sectors. Again, personal income in rural areas would be captured more under the ‘Accommodation’ sector, while at national level it would be captured more under the ‘Arts’ sector. At the rural area level, higher value-addition was obtained under the ‘Wholesale’ sector, while at the national level it was obtained under the ‘Accommodation’ sector. The commonly used measure for the contribution of a sector to gross national or gross state product – through personal income plus rents and profits – plus indirect business taxes, was the value-added multiplier (Stynes et al., 2000). From the chapter’s analysis of both the national and the rural area levels, not many clear differences were found between the derived type I and type II multipliers for all the tourism-related sectors (Table 7.1). That meant that not many of the tourism spending activities would be captured by households as induced effects at local level. In other words, not much of the income from tourists spending was translated into personal income, jobs and creation of tourism value-added for households among the rural area regions of Zambia because of the possibility of leakage.

Chapter 4 investigated various parameters concerning the assessment of the economic impacts of park visitor spending on the local economies of both the Kafue and the South Luangwa national parks. The combined total tourist annual arrivals to both national parks for the year 2016 was 65,609 compared to 35,412 recorded in the year 2008, indicating an increase of about 85% in eight years, but still among the lowest in the region. The chapter demonstrated that the Department of National Parks and Wildlife (DNPW) records of annual park visits were recorded as person entries, and to obtain the party day/night entries, they were converted by multiplication with the average party sizes, park re-entry factors and length of stay ratio (Cui et al., 2013; Stynes & Sun, 2003). A series of visitor intercept surveys, conducted to determine spending averages, did not collect large enough sample size to determine party sizes, re-entry factors and length of stay factors, but what were applied in the study were adapted from the Millennium Challenge Corporation (MCC) supply survey and backed by expert advice on tourists' visitation numbers (Cui et al., 2013). The average visitor spending per party between similar segments for the Kafue and the South Luangwa national parks was not similar – in some aspects – because of the differences in local pricing and spending opportunities (Caspi et al., 2017), but generally the Kafue NP was more expensive than the South Luangwa NP in all respects. There were a bit more spending opportunities in the South Luangwa NP for the visitors, with more local businesses providing for visitors' needs, than there was in the Kafue NP. The average visitor spending per party for both the Kafue and the South Luangwa ranged from ZMW2,115 to ZMW9,218, which could be slightly higher than other regional national park tourism destinations (Chirenje et al., 2013). Total visitor spending in the South Luangwa NP ranged between ZMW111.6 million and ZMW498.3 million – about three times higher than the total visitor spending in the Kafue NP, but that was still lower than total visitor spending in other regional national parks. The interpretation of the obtained results, should be done with caution because the use of interval estimates instead of the point (mean) estimates, applied to reduce the margin of error, was more likely to have had affected the accuracy of the obtained interval results.

Chapter 4 further demonstrated the process of determining the economic significances and impacts of visitor spending for both the Kafue and the South Luangwa national parks. The visitor spending, in the local economies around the national parks, was captured as total economic significance/impact through the activities of local tourism businesses, households through tourism businesses' employees, the government agencies and other businesses, not directly involved in tourism. The ripple effects included indirect effects of backward business linkages and induced effects of local employee households' spending (Cullinane & Koontz, 2014; Thomas et al., 2015; Van Der Merwe & Saayman, 2008). Although the total economic significances for the South Luangwa NP (ZMW120.66 million – ZMW547.64 million) was four times higher than for the Kafue NP (ZMW28.08 million – ZMW135.91 million), their average sales multipliers were on average the same, 1.24 and 1.22 respectively. The chapter further reported that the South Luangwa National Park generated about five times more direct sales, five times more personal income, four times more value-added and four times more jobs than the Kafue National Park. It was noted that the direct sales effects was less than the visitor spending because most of the manufacturing share of retail purchases such as groceries, gas and other goods was not included in the direct sales (Cui et al., 2013). The local areas around the parks had almost no manufacturing companies for the goods needed to supply the local tourism industry. There were mostly retail trading and a few wholesales trading businesses within the local economies of both the Kafue and the South Luangwa national parks. The assumption was that there was immediate leakage for most of the producer price of retail purchases, out of the regions, to cover the costs of goods sold (Cui et al., 2013; Topuz et al., 2017). From the data analysis the estimated percentages of retail producer price leakages from the local areas were found to be 56% and 41% for the Kafue NP and the South Luangwa NP respectively. The estimated economic impacts of tourism due to visitor spending in local economies of both the Kafue and the South Luangwa national parks are displayed in Table 7.2 below.

Table 7.2: Economic significance of the Kafue and South Luangwa National Parks' visitor spending on local economies

Economic measure	Direct Sales (ZMW Millions)		Jobs		Personal Income (ZMW Millions)		Value Added (ZMW Millions)	
	KNP	SLNP	KNP	SLNP	KNP	SLNP	KNP	SLNP
Direct Effects	13.93 – 67.29	61.08 – 280.22	26 – 109	137 – 563	2.24 – 9.76	7.61 – 33.82	8.27 – 39.56	34.37 – 158.64
Secondary Effects	3.11 – 13.88	15.04 – 64.12	4 – 16	17 – 72	0.05 – 0.25	0.26 – 1.10	0.48 – 2.17	2.30 – 9.73
Total Effects	17.04 – 81.17	76.12 – 344.34	29 – 125	154 – 636	2.29 – 10.01	7.87 – 34.93	8.75 – 41.73	36.67 – 168.37

Table adapted from Stynes et al., (2003) and author's calculations

Chapter 4 further demonstrated that the amounts spent by the park visitors in the local areas, only 4% – 6% for the Kafue NP and only 1% for the South Luangwa NP, represented local spending. That meant that between 94% and 96% in the Kafue NP and 99% in the South Luangwa NP of the economic activities, due to visitor spending, estimated economic impacts or represented 'new money' to the local areas. The economic impacts estimated the losses in economic activities that were likely to be incurred, by the local areas, if the park did not exist. And so when estimating the Kafue and South Luangwa NPs' visitor spending impacts in the local areas, the spending by local residents on visits to the parks was excluded, because it did not represent 'new money' (Cui et al., 2013). In the Kafue National Park, the economic sectors mostly directly affected by non-local visitors' spending were animal fees, accommodation, meals (restaurants and bars) and park activities (guided tours), while in the South Luangwa NP, it was the admissions fees, animal fees, accommodation sector, park activities (guided tours) and meals (restaurants and bars). The South Luangwa National Park retained and utilized all the admission fees within the local region while in the Kafue NP; all the admission fees were paid or sent to the head office of the park agency in the country's capital city. And 50% of the animal fees and camping fees was also paid to the head office of the park agency. The transferring of tourism revenue from the local economies of the parks to the park agency head office in the capital city was assumed to be part of the visitor spending leakage which was more likely to have contributed to the under-performance of the Kafue National Park (Rogerson, 2011; Sandbrook, 2010).

Chapter 5 of this dissertation investigated the economic leakage of tourism impacts from the local areas around the Kafue and the South Luangwa national parks. The chapter demonstrated that the economic leakage of tourism impacts from the local areas could be estimated by reviewing the tourism operators and business ownerships (tourism business investments) in both national parks, as a first component of the total tourism leakage. Most of the tourism businesses operating lodges, campsites and other tourism services inside the national parks, which are the prime areas for non-consumptive tourism, were found to be in *joint venture ownership* arrangements between the private sector and the public sector only (PMTC-Zambia, 2008; Pope, 2005; ZAWA, 2011b). This meant that even though the local communities lived in settlements that shared their boundaries with the national parks, they were not involved in operating tourism businesses inside the national parks. The chapter revealed also that all the tourism businesses operating from inside the national parks had their head offices located more than 50km from the national park boundaries (which in this study was referred to as 'non-local' areas) where most bookings and payments for tourists are done. This meant that only the local communities were considered as locally based, since the DNPW headquarters, where most payments for tourism licences, permits, taxes and tourists' fees were done, or channelled to, was also located in a non-local area – a situation that normally led to tourism companies' failure to pay local taxes (Mbaiwa, 2017). The chapter also illustrated that the ownership of those tourism companies, operating under the *joint venture ownership* arrangements inside the national parks, were categorised as *non-local ownership* types of investments, about which is stated that 'one hundred percent ownership of equity was held by a non-local company or subsidiary for an unlimited period of time' (Anderson, 2013; Benavides, 2001; Chirenje et al., 2013; Ntibanyurwa, 2008; Supradist, 2004). The *non-local ownership* of tourism businesses accounted for 49% in the Kafue NP and 63% in the South Luangwa NP of all the randomly selected businesses. The *non-local ownership* investments benefitted the local tourism destinations with direct investments and did not pose financial risks to the local areas, but their major costs to the areas included the large outflow of tourism income. That large income outflows exacerbated external leakage effect and undermined the multiplier effects that could have occurred in local regions (Anderson, 2013; Benavides, 2001; Ntibanyurwa, 2008; Supradist, 2004). Although the local human communities did not directly benefit financially from the operations of *non-local ownership* tourism firms inside the national parks, many local people had employment opportunities, even though, generally these were the less specialised jobs (Chirenje et al., 2013). The number and type of tourism business ownership in both the Kafue and South Luangwa national parks is indicated in Table 7.3 below.

Table 7.3: Summary of tourism business ownership firms selected from the Kafue and South Luangwa NPs during the study.

Type of investment	Ownership	Park	
		KNP	SLNP
Joint venture ownership	Private sector and local community	1	0
	Private sector, public sector, and local community	3	6
	Private sector and public sector	20	33
	Public and local community	0	0
Total ownership	Private sector	17	13
	Local community	0	0
	Public sector	0	0
Total		41	52

Chapter 5 elaborated on the fact that inside the GMAs, the tourism businesses operating lodges, campsites, safari hunting and other tourism services were found to be operating under both the joint venture ownership and the total ownership investments (Table 7.3). The chapter highlighted that the GMAs were a prime area for consumptive tourism (Matlhola, 2016) and the companies operating that type of tourism business were found to be in a three-tier joint venture ownership investments involving the private sector, the public sector and the local community. The tourism businesses' joint venture ownership arrangements were categorised as *local* ownership type of investments because one of the three partners' head office was in the local area (Anderson, 2013; Benavides, 2001; Ntibanyurwa, 2008; Supradist, 2004). It was a public-private partnership (PPP) arrangement where the public sector was represented by the DNPW, and the private sector represented both the private companies and the local communities. In those partnerships, the tourism businesses – with their profits and losses – were solely run by private companies, while the DNPW and the local communities (represented by the CRBs), provided the landholdings and enabling environments. The number of selected companies that operated safari hunting operations under the *local ownership* investments were three in the Kafue National Park and six in the South Luangwa National Park and that accounted for 7% and 12% of all the companies sampled, respectively. A *joint venture* with local ownership was an advantage for the local region because it had access to international marketing networks and had access to extra capital and also shared the business risks, which can be considered as protection among partners (Supradist, 2004). However, external leakage, due to profit repatriations by non-local partners, reduced the income to the region. The chapter concluded from the analysis that the *local ownership* investments directly benefited the local human communities in the GMAs with opportunities of a good percentage share in business spin-off, or value added. The locals also benefitted from the available employment opportunities from the joint venture tourism businesses.

Chapter 5 elaborated further that another type of tourism business ownership operating from inside the GMAs was known as the *total ownership* investments, which was a full non-local ownership company. The non-local companies also operated businesses such as safari lodges, safari camps and bush camps. The number of selected *total ownership* investments in the Kafue National Park was eleven (11) and they accounted for 41% of all the selected companies – in the South Luangwa National Park there were thirteen (13) accounting for 25% of all the selected companies respectively. Similar to the *non-local ownership* companies, the *total ownership* companies benefitted the local regions with direct investments, and also did not pose financial risks to the local communities. However, the local regions lost tourism income through profit repatriations by non-local business owners and through remittances by non-local employees. In both the Kafue and the South Luangwa NPs, there were no companies that operated as a *full local ownership* investment – a local investment without foreign or non-local ownership links (Anderson, 2013; Supradist, 2004). In the OAs, both the *local* and the *non-local ownership* investments were also present. The total number of selected companies was seven (7) that accounted for 17% of all the selected companies, while in the South Luangwa no OA tourism company was considered. The *joint venture* partnerships, that fell under the local ownership companies, were partnered between the local communities and the private sector only (Ahmed, 2014). Most of the tourism investments in OAs, were on landholdings with the Ministry of Lands and they paid land rents to the government and rates to the local district council. They were also not levied by DNPW or the local community for fixed or variable operating fees. The benefits and costs of *local and non-local ownership* investments in the OAs to the local human communities were similar to what was obtained from the companies operating in the GMAs, except that the communities' share of tourism profits or value-added was expected to be higher for OAs.

Chapter 5 also reported that the total share of local owners in the *joint venture* investments was only 10% and 12% of all the selected companies or establishments in the Kafue and South Luangwa NP respectively. This meant that the companies or etsablishments which fell under non-local ownership, were as high as 90%. It also meant that the external economic leakage, due to *non-local ownership* of tourism businesses, was as high as much. The CRB's annual income from safari hunting was less than 50% of the hunting outfitter's spin-off and this meant that the local community's 'real' share of the national park's tourism profits or value-added was estimated at 5% and 6% for the Kafue and South Luangwa NP respectively. Therefore, with more inclusive economic policies for protected areas, the local human communities' participation in tourism businesses and wildlife conservation would positively be affected. The full local ownership investments would result in reduced external leakage, increased participation of locals in tourism enterprises and consequently enjoyment of the tourism industry benefits by the local communities (Hampton, 2013). Ultimately, full local ownership of tourism enterprises ought to be encouraged to operate in tandem with non-local ownership investments. The local and non-local tourism business ownership in both Kafue and South Luangwa national parks is indicated in Table 7.4 below.

Table 7.4: Summary of local and non-local tourism business ownerships selected from the Kafue and South Luangwa NPs during the study:

Type of ownership	Ownership	Tour operators (%)	
		KNP	SLNP
Local ownership	Private sector and local community	10	12
	Private sector, public sector, and local community		
Non-local ownership	Private sector and public sector	90	88
	Private sector		
Total		100	100

Chapter five further demonstrated that the second component of total tourism leakage was from visitor spending. Although tourism brought many economic benefits to the locals, such as income generation and employment creation from visitor spending, through the multiplier effect or various rounds of re-spending of tourism income (Souza Beraldo, 2017; Stynes et al., 2000; Supradist, 2004), leakage was assumed to cause overall negative economic impacts in the areas. The captured visitor spending impact of both national parks ranged between ZMW143 million and ZMW664 million, which accounted for about 50-53% of their total tourism economic impact. The chapter cautioned that the interpretation of the obtained results should be done with care because the interval estimates were applied instead of the point (mean) estimates. This was done to reduce the margin of error that was more likely to affect the accuracy of the obtained interval results. However, when the Kafue NPs' visitor spending impacts were considered separately, they accounted for about 41-43% while the South Luangwa NPs' accounted for some 53-56% of their total economic impacts of tourism. The results showed that in the Kafue National Park the total leakage (internal plus external) was clearly the more dominant component of the total economic impact of tourism. In the South Luangwa the more dominant component of the total economic impact of tourism was the captured economic impacts of tourism. That was translated from an amount ranging from ZMW57 to ZMW59 out of every ZMW100 spending by a party of tourists that did not benefit the locals in the Kafue National Park because of the leakage. In the South Luangwa NP, the amount that did not benefit the locals because of leakage ranged between ZMW 44 to ZMW47 out of every ZMW100 visitor spending. The captured visitor spending impact in the Kafue NP was about four times less than that for the South Luangwa NP. The number of new jobs captured, ranged between 31-37% of the total economic impact in the Kafue NP, while in the South Luangwa NP the captured jobs ranged between 51-59% of the total economic impact. In other words, there were more new jobs lost per visitor spending, probably due to higher internal leakage, in the Kafue NP than in the South Luangwa NP. That also meant that there were more tourism goods and services originating outside the local regions of the Kafue NP than was the case with the South Luangwa NP. The South Luangwa NP's retention of one hundred percent admission fees, fifty percent of the animal fees and at least fifty percent of camping fees, largely contributed to reduction of external tourism leakage. The estimated leakage of visitor spending from local economies of the Kafue and the South Luangwa national parks is displayed in Figure 7.1 below.

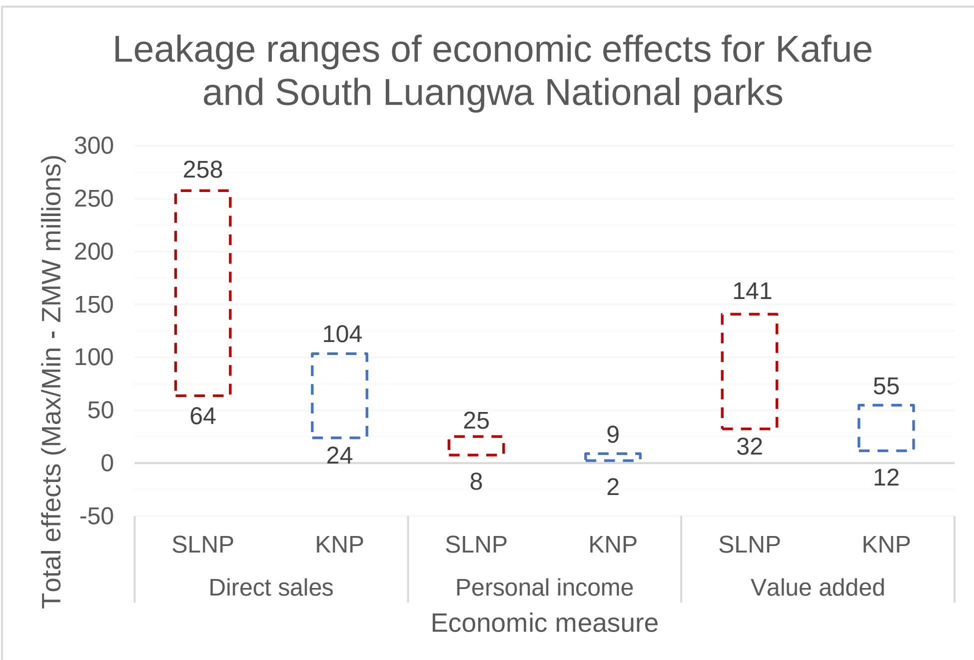

Figure 7.1: Leaked visitor spending impact in direct sales, personal income and value added on local economies of national parks.

Chapter 6 of this dissertation investigated the linkage between the geographical settlements around the national parks and the benefits and costs realised by the locals in both the Kafue and the South Luangwa national parks. The chapter began with a review of assessments of households in settlements around the Kafue and the South Luangwa NPs based on surveys conducted there. The chapter demonstrated that in the GMAs, female-headed households were found to be different from male-headed households in terms of how they consumed the available natural resources in their areas. On average female-headed households in the Kafue NP consumed 19% less per capita of natural resources than male-headed households. However, in the South Luangwa NP the female-headed households consumed more natural resources than their male-headed household counterparts. Perhaps there were more restrictions on natural resource extraction in the GMAs around the South Luangwa NP than in the GMAs around the Kafue NP. And perhaps it was easier for female-headed households, in the South Luangwa NP, to extract resources from their immediate surroundings than their male-headed household counterparts who would rather buy or use other alternative sources. The chapter revealed also that education was considered as important by households in the GMAs, even though the education levels of most employed household members were generally up to secondary school level. The attainment of secondary school level education took more than seven years but was less than twelve years of basic education. During the survey 80% of the households in the South Luangwa NP stated that ‘schoolgirls were able to attend schools throughout the year’, 70% said that ‘conservation education for their children was in place’, while 68% mentioned that ‘support for school infrastructure was available’. Those high percentage ratings of education interventions meant that the households in the South Luangwa NP considered education as important, more so for a rural area in Zambia where school attendance was rated lowly. The chapter exhibited that the household surveys had demonstrated that employment opportunities in the tourism sector were more in the South Luangwa NP than in the Kafue NP. Hence, the tourism sector, in terms of tourism jobs, in the GMAs of the South Luangwa NP, performed better than the GMAs and the OAs in the Kafue NP.

Chapter 6 further demonstrated that the all-weather roads in the GMAs were strongly correlated with houses made of corrugated iron-sheet roofs – more so in the Kafue NP than in the South Luangwa NP. This meant that the households in the Kafue NP had easier access to the building materials such as the corrugated roofing sheets than the households in the South Luangwa NP. And the average distance of households from the all-weather roads were at between 1.5km and 1.8km in both parks. It was established that the households located closer to ‘other’ PAs consumed more natural resources (ZMW7,479.39)[14] than households located closer to the boundaries of the NPs (ZMW2,504.65) in the Kafue NP. Perhaps the restrictions that prohibited extraction of resources from a NP contributed to the non-availabilities of resources in greater measure for the households closer to the Kafue NP's boundary than for the households further away (or closer to the other PAs). Ultimately, the natural resources around PAs were being consumed much faster in the Kafue NP than in the South Luangwa NP by households located closer to other PAs.

The chapter also identified and analysed the positive social impacts on settlements around the NPs. The chapter confirmed that the majority of the households from both the Kafue and South Luangwa NPs pointed out the most important positive social impacts in those areas included: access to natural resources; access to fertile land for their farming in the KNP; and employment opportunities in the tourism sector in the SLNP. In the Kafue NP, the survey found that 278 (59%) of the households did not fully agree on the perceived positive social impacts such as the availability of community projects funded by tourists, that hunting safari tourism created jobs for the locals, and that wildlife conservation created jobs for the locals. In South Luangwa 202 (56%) of the households did not fully agree on the perceived positive social impacts such as the availability of markets for their tourism products, and that traditional dances and cultural activities generated income for them. The perceived access to natural resources and access to fertile land for the local people's farming in the Kafue NP and the employment opportunities in the tourism sector in the South Luangwa NP, benefitted 41% and 44% of the local people respectively. However, the locals from the two NPs were receiving the benefits from their respective NPs differently. Locals from the Kafue NP were more interested in the natural resources they obtained from the existence of park, while those from the South Luangwa NP were showed greater interest in the job opportunities created from tourism.

Chapter 6 further revealed that the most important positive social impacts in settlements near the NPs emanated from a combination of identified positive management practices. In the Kafue NP, the survey found that 64% of the households did not fully agree that the perceived positive management practices such as 'wildlife conservation was a good thing' (or was being done in the correct way), that 'there were available community projects funded through community-based

[14] ZMW stands for Zambian Kwacha currency: US$1.00 = ZMW8.64 in 2015

organisation (CBOs), such as the community resource boards (CRBs), working under the auspices of community-based natural resources management (CBNRM)', that 'bona fide hunting licences (local hunting licences) were available for locals', and that 'community trainings were part of the community projects'. In South Luangwa, 66% of the households fully agreed that the perceived management practices such as 'arrangements for schoolgirls to attend school throughout the year were in place', 'a conservation education programme in schools was a good thing', 'conservation of wildlife was a good thing (or was done in the correct way)', and 'support for school infrastructure was available'. All the stated management practices were overseen by the CRBs, on behalf of the local communities, through a model known as CBNRM. In the Kafue NP, the 64% of the households that did not fully agree with the perceived positive management practices, meant that most of the locals in the Kafue NP did not appreciate what their CRBs were doing in the GMAs or the OAs. However, the 66% of the households in the South Luangwa NP that fully agreed with the perceived positive management practices meant that most of the locals in the South Luangwa NP were happy with the performance of their CRBs. The chapter further demonstrated that there were more households from the Kafue NP (73%) than from the South Luangwa NP (53%) which complained that "bona fide hunting licences were not available for the locals". Bushmeat or game meat had long been an important source of protein and income for rural communities, and both the KNP and the SLNP, similar to many other PAs, permitted limited subsistence hunting, known as bona fide hunting, and fishing in the GMAs. However, some locals from settlements near both parks, were not satisfied with the current arrangements on bona fide licensing. Households from the South Luangwa NP were happy with the programme that supported keeping 'girl children' in school throughout the year. Literacy and further education empowered local people and provided them with alternative livelihoods to improve their lifestyles without so much direct dependency on the natural resources around the NPs.

Chapter 6 also analysed the negative social impacts and confirmed that the most important perceived negative impacts in the Kafue NP did not affect many households, as evidenced by the following: some 380 (81%) households did not fully agree that 'there was contamination of drinking water sources by wildlife', and about 251 (54%) households did not fully agree to 'the damage of crops and killing of livestock by wildlife'. On the other hand, in the SLNP the perceived negative impacts affected many households as evidenced by the following: about 339

(94%) of the households agreed to 'the damage of crops by wildlife', some 320 (89%) of households agreed to 'the killing of people by wildlife' and roughly 295 (82%) of households agreed to 'the killing of livestock by wildlife'. The chapter established that the most important perceived negative social impact emanated from a combination of negative management practices. In the Kafue NP, the survey found that 77% of the households agreed that 'households found with legally bought bushmeat were being arrested', 57% of the households agreed that 'fish was being confiscated from fishers', and 54% agreed that 'there was a lack of natural resources in their settlement areas'. In the South Luangwa NP, 53% to 97% of the households fully agreed that 'all the perceived negative management practices occurred', such as 'harassment of locals by park authorities when a dead wild animal was found in their area', 'restrictions on natural resources extraction in their settlements', 'lack of positive response by park authorities to human-wildlife conflicts (HWC) in their settlements' and that 'there was no compensation from park authorities for crops damaged and livestock killed by wild animals'. Other perceived negative management practices in the South Luangwa NP with which many households agreed were: 'restrictions on firewood collections by park authorities', 'no hunting revenue being received by households in their communities', and 'no bona fide hunting licences available for local people'. Though settlements from both the Kafue NP and the South Luangwa NP experienced crop and livestock damage by wild animals, more households in the South Luangwa NP agreed to the occurrence of Human-Wildlife Conflicts (HWC) than in the Kafue NP. Unfortunately, in the current wildlife policies compensation for any damage due to HWC, had not been provided for. This meant that there was a need to consider policies that prevented damage from HWCs or indeed for policies that compensated loss (Fernandez et al., 2009). Therefore, the settlements in the South Luangwa NP were expected to suffer more poverty, low crop productivity and livestock disease outbreaks than the Kafue NP settlements because of the higher incidence of HWCs there. It was presumed that wildlife conservation, and indeed tourism development, could be sustainable and increase benefits to the locals if HWCs were minimized.

Chapter 6 went on to analyse the effect of geographical location on the natural resource consumption and established that the households from the South Luangwa NP were, on average, closer to the boundaries of both the NP and 'other' PAs than the households from the Kafue NP. The households from the SLNP were also closer to the CBD, the AMU (SLAMU) and the park entrance gates than those in the KNP. Logically those households from the SLNP were expected to consume more natural resources than those from the KNP (Bandyopadhyay & Tembo, 2010), but the study proved otherwise. The contrary results were supported by other studies which stated that access or consumption of resources hinged on how the settlements or households were located near PAs, but the consumption rates were dependent on the management of the individual PA (Mackenzie & Ahabyona, 2012; Sims, 2010). The comparison of natural resources consumption by households from both the Kafue NP and South Luangwa NP is seen in Figure 7.2 below:

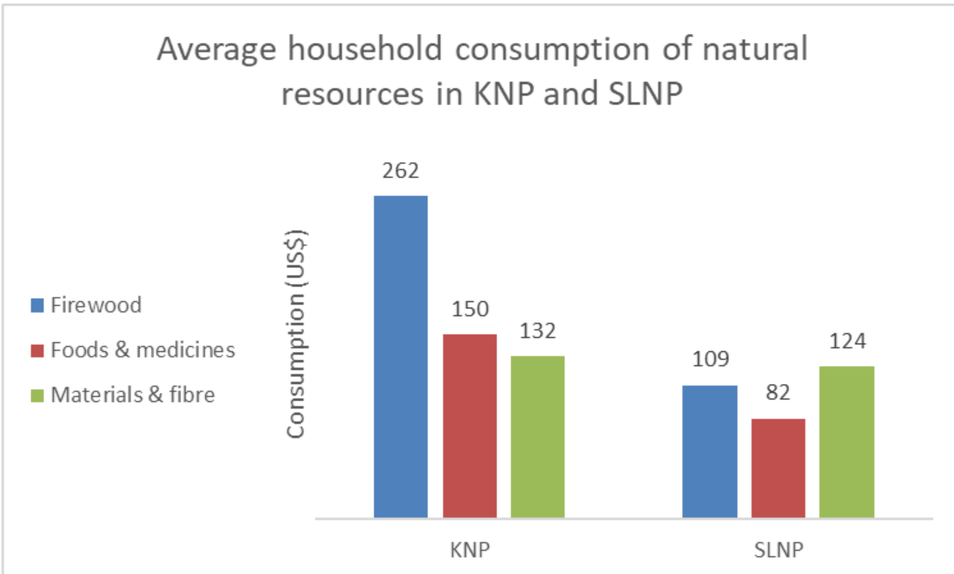

Figure 7.2: Comparison of average consumption of natural resources in the KNP and the SLNP

The chapter also analysed the multiple regression analysis of the firewood consumption against the distances of selected geographical features around the Kafue NP. The results of the analysis showed that there were linear relationships between the logarithm of firewood consumption and distances from the national park boundary, village centres, all-weather roads, and the main fishery in the area. For the South Luangwa NP, the results confirmed that the reciprocal of firewood consumption had a linear relationship with only the distance from the all-weather roads. Ultimately, the chapter concluded that the firewood consumption was radially influenced by geographic settlements because consumption was dependent on household distances from the national park boundary, the village centres, the all-weather roads and the main fishery near the Kafue NP and the all-weather roads near the South Luangwa NP.

Chapter 6 also demonstrated that the multiple regression analysis of the food and medicines consumption against the distances of selected geographical features around the Kafue NP, showed that there were linear relationships between consumption and distances from the village centres and the all-weather roads. The relationship between the reciprocal of consumption of foods and medicines and the household distances from the village centres was a logical result because the further one is removed from the village centres – where normally health facilities and shops are located – the increase in the demand for natural foods and medicines is higher. For the South Luangwa NP, the results from the multiple linear regression analysis showed that the households' food and medicines consumption had no linear relationship to any of the geographical features under consideration. In summary, the chapter stated that the households' food and medicines consumption in the Kafue NP was radially influenced by geographic settlements as consumption was dependent on the household distances from the village centres and the all-weather roads.

Moreover, the chapter demonstrated that the multiple regression analysis for the reciprocal of materials and fibre consumption against the household distances from selected geographical features around the Kafue NP, showed that only two predictors were significant against the response factor, namely: the boundaries for the NP and the 'other' PAs nearby. For the South Luangwa NP, the results for the multiple linear regression analysis showed that only the households' distance from the NP gate was statistically significant to the square root of households' consumption of material and fibre. In both parks, the materials and fibres consumption were radially influenced by geographic settlements as consumption was dependent on households' distances from selected geographic features (boundaries to PAs in KNP and NP gate in SLNP). Generally, the households in and around the Kafue NP consumed almost the same, but slightly higher, quantities of materials and fibre than those consumed by households in the South Luangwa NP.

Chapter 6 also investigated the effect of geographical location on the well-being of households around PAs through the Principal Component Analysis (PCA). The results illustrated how the households from the SLNP were more correlated to traditional land ownership than those in the KNP. The chapter also revealed that there were more houses made of fired (burnt)-brick walls in the SLNP than in the KNP. Houses made of mud walls and grass thatch roofs belonged to poorer segments of the society, while houses made of mud-brick walls and iron-sheet roofing were owned by lower middle-class people, and houses made of fired-brick or concrete-block walls and iron-sheet roofing were owned by middle- to upper-class people. That meant that the well-being of households in the GMAs, near the SLNP, were slightly higher than of those in the GMAs near the KNP. The PCA biplot output for well-being in settlements near both the Kafue and South Luangwa NPs is shown in Figure 7.3 below:

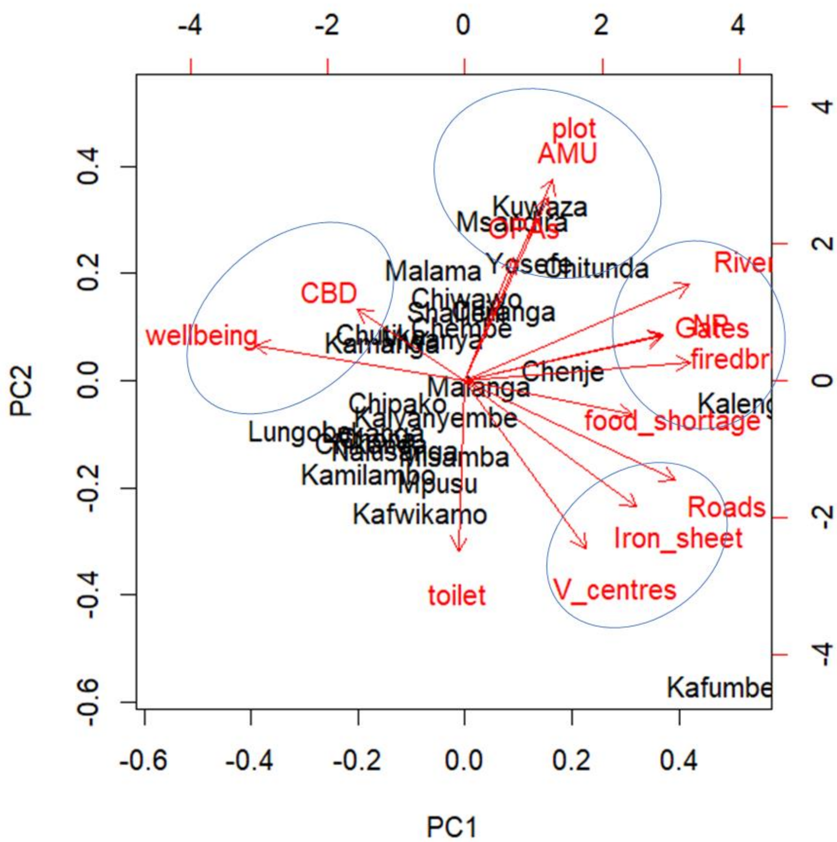

Figure 7.3: Settlements' version of principal component analysis biplot output for well-being in settlements near both the Kafue and the South Luangwa NPs.

About 72% of households from the SLNP and 53% from the KNP stated that their social well-being was 'good', while fewer than 24% and 41% respectively felt that their general well-being had become 'better' or 'improved' over the last one to five years. One of the reasons for the adverse effect on the well-being of households in the GMAs was that there was generally low agricultural potential in those areas which was one of the reasons for their demarcation

(Simasiku et al., 2008). About 75% of the households in the GMAs mentioned that their well-being had slightly increased, while in the OAs, only 33% of the households mentioned that fact. Generally, the results from the study implied that PAs had positive impacts on the well-being of locals in the GMAs.

7.3 Conclusions

The empirical analyses in this dissertation evaluated the economic impacts of tourism on the Kafue and South Luangwa National Parks and the influence of PAs on geographical settlements around both parks. The conclusions from various analyses on the effects and the impacts on the locals living around both national parks, such as estimation of regional multipliers, park visitor spending impacts, leakage estimation and geographical settlements analysis are summarised below:

1. The I-O tables for the year 2010 for Zambia developed by the Central Statistics office (CSO, 2014) were applied to derive the I-O model that was also applied to estimate the rural area region tourism multipliers for Zambia. The national technical coefficients were first derived from the 2010 national I-O tables and then rescaled to rural area regional level to identify multipliers that would enable quantification of the impacts on the local economy being studied, using sector-specific supply percentages. The obtained type I and type II rural area regional level tourism multipliers can be treated as estimates only and not as exact values of rural area multipliers because their accuracy could have been impacted upon during the process of adapting national I-O to rural area I-O. The derived estimates of type I and type II rural area regional level tourism multipliers are outlined in Table 7.5 below:

Table 7.5: Zambia's derived 2015 rural area multipliers for selected tourism-related sectors in Zambia:

Industry/Sector	Output I	Personal Inc/sales	Jobs /MM sales	Value added/ sales	Output II	Personal Inc II/sales	Jobs II /MM sales	VA II/sales
Wholesale and retail	1.10	0.05	12.98	0.71	1.12	0.05	13.65	0.72
Transportation and storage	1.12	0.04	9.37	0.52	1.15	0.04	10.44	0.54
Accommodation and food	1.20	0.20	22.33	0.67	1.23	0.20	23.64	0.69
Arts	1.11	0.16	6.01	0.55	1.19	0.16	8.94	0.59
Other service activities	1.27	0.04	35.81	0.53	1.33	0.05	38.06	0.57

Source: Author's own calculations

2. The derived rural area tourism multipliers were applied in the assessment of the economic significance/impact of national parks' visitor spending on local economies. The Kafue National Park is generally less popular than the South Luangwa National Park. In 2015 the Kafue received

a total of 16,203 party overnight stays of visitors, while the South Luangwa received four times more, with 59,721 overnight stays despite both parks being among Africa's socio-ecologically important conservation areas boasting a high diversity of wildlife. The good infrastructure status, especially the road network, in the South Luangwa NP, compared to what is currently existing in the Kafue NP, had contributed to its popularity. The location of the administration cost centre, within the local area around the park, is another reason that had contributed to the success of the SLNP.

3. The Kafue NP and the South Luangwa NP were treated for economic leakage of tourism through assessment of tourism business ownerships and the visitor spending impacts. Lack of an established local cost centre, which covers all park financial management, in the Kafue National Park contributed to the external leakage from the local economy. The non-ownership of tourism businesses by locals, such as the local communities in the GMAs and the OAs, also contributed to the external leakage from the local economies of both parks. The supply of goods and services for park visitors by non-local suppliers and the lack of strong local business linkages contributed to both internal and external leakages for both parks.
4. The effects of both the Kafue NP and the South Luangwa NP on the locals living in geographical settlements around those parks were analysed for the benefits and costs realised, the perceived social impacts affecting them and the well-being of households. The study found out that the local human communities in the GMAs and the OAs were socially influenced by the location and the management practices in place. Conclusions were based on various analyses as follows:
   - ✓ *Perceptions of social impacts and management practices:*

   The local communities in the GMAs and the OAs around the Kafue and the South Luangwa NPs were socially negatively impacted by the park officials' – representing the government – and or the CRBs' – representing the communities, failure to positively respond to HWC cases. The officials restricting them from natural resource extraction, from within the GMAs and OAs, not providing them with bona fide licences and not sharing hunting revenue with some households, also contributed to their negative social impacts. On the other hand, the local communities were socially positively impacted by the government's continued support of the wildlife conservation programme in PAs for the benefit of future generations, and the CRBs' sponsoring of education support programmes in their schools, especially for the marginalised, and social welfare support programme such as borehole drilling in their communities.

✓ *Natural resource consumption*

The local communities' consumption of natural resources, from within the GMAs and OAs, was much higher from the Kafue NP than from the South Luangwa NP. The consumption rates were radially affected by the location of the settlements and there were significance differences in consumption rates among the settlements from the Kafue NP, while those from the South Luangwa NP were not significantly affected.

✓ *Well-being of locals*

The local communities' well-being, from within the GMAs and OAs, was much higher from the South Luangwa NP than from the Kafue NP. The well-being of households was circumferentially influenced by the distance to the following geographic features: the all-weather roads, the NP boundary, the NP entrance gates, the village centres, the main fishery and the AMU as exhibited in the South Luangwa NP. Ultimately, although settlements located closer to PAs, especially to areas of high tourism activities, experienced high incidences of HWC, they consumed fewer natural resources, obtained more benefits from tourism and their well-being was better than settlements further away from these areas.

Recommendations

The results that were obtained revealed gaps in information concerning the valuation of the economic impacts of tourism to the NPs and the influence of NPs on the geographical settlements around NPs. The availability of this information will aid the policy makers, park managers and community leadership in understanding the effects of tourism and the settlement's geographical locations on locals. Therefore, a few recommendations are made below.

1. The derived tourism multipliers can be applied in the assessment of tourism impacts in any rural area region of Zambia. Such assessment can provide insight into the economic characteristics of the tourism structure in rural areas and can be useful in preliminary policy analysis, aiding in PA

management decisions, in research, and for government administrators when estimating the economic impacts for alternative policies or changes in the local economy.

2. Policies and developmental strategies that would lead to an increase in park visitors should be prioritised if the Kafue National Park tourism is to realise its potential and perform, as well as the South Luangwa National Park.
3. Encouraging or empowering local people – in settlements around the Kafue and South Luangwa NPs – to engage in local wildlife tourism enterprises would lead to park visitors spending more in local regions than is the case at present.
4. Allowing the KNP revenue to be managed by the established area management unit (AMU) as a local cost centre for most of the park financial management – such as the arrangement in the South Luangwa Area Management Unit (SLAMU) – would lead to financial stability for park management.
5. Securing land ownership to locals in the GMAs and the OAs would most likely lead to a reduction in tourism economic leakage and at the same time would provide protection for wildlife and other natural resources by the locals, because there would be an increased sense of ownership among the locals.
6. Formation of community partnership parks and other public-private/community partnerships (PPPs) would empower local communities to participate in wildlife management and enterprises, which would most likely contribute to reducing the tourism leakage.
7. Local communities' programmes that are aimed at benefiting the communities, such as the one on education for girls in the SLNP, should be prioritised for the locals to appreciate the benefits of wildlife conservation.
8. The human-wildlife conflicts in the SLNP and bushmeat poaching in the KNP were identified as some of the serious problems in the respective NPs, and government and park officials should prioritise programmes aimed at finding solutions to such cases.
9. Local community leadership from the settlements near the KNP in Mumbwa GMA and OAs should consider the adoption of the model for positive management practices, by the settlements near the SLNP, to improve on their positive social impacts.

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Appendices

Appendix 7.1: Zambia’s 2010 Industry by Industry Input-Output Table (I-O) (in K millions)

"2010 Industry by Industry domestic IOT (K'Million)

Industry (Row) Industry (Column)	Agriculture, forestry and fishing	Agriculture, forestry and fishing (green)	Mining and quarrying	Manufacturing	Manufacturing (green)	Electricity, gas, steam and air conditioning supply	Electricity, gas, steam and air conditioning supply (green)	Water supply; sewerage, waste management and	Construction	Wholesale and retail trade; repair of motor vehicles	Transportation and storage	Accommodation and food service activities	Accommodation and food service activities (green)	Information and communication	Financial and insurance activities	Real estate activities	Professional, scientific and technical activities	Administrative and support activities	Public administration and defense;	Education	Human health and social work activities	Arts, entertainment and recreation	Other service activities	Activities of households as employers; undifferentiated goods- and services-producing activities of households for	Total IC	Household final consumption expenditure	Government final consumption expenditure	NPISH final consumption expenditure	GFCF	Changes in inventories	Exports, fob	Total final use	Total use at basic prices
Agriculture, forestry and fishing	516.4	37.6		5,783.5								195.6	37.9							15.6	26.4				6,613.1	4,626.8			37.9	-54.8	1,105.0	5,714.9	12,328.0
Agriculture, forestry and fishing (green)	461.0	55.4	18.7	324.4	1,425.0	0.1	4.9	0.4	35.8	9.8	5.5	14.3	4.8	4.4	0.9	0.1	0.3	0.2	3.2	12.6	0.7	0.8	4.2		2,387.4	425.2			110.9	-4.1	44.6	576.7	2,964.1
Mining and quarrying	542.0	42.5	2,261.4	2,586.4	97.1	0.5	40.0	22.6	1,159.5	620.5	365.5	83.7	31.7	118.5	123.1	36.5	15.2	63.5	168.9	175.3	71.1	11.7	34.3		8,671.5	1,842.7	143.7		185.0	910.5	14,421.8	17,503.7	26,175.2
Manufacturing (green)	600.0	90.7	1,090.6	1,080.9	436.8	1.5	129.0	12.6	1,219.0	919.8	480.6	182.3	77.2	131.0	30.2	22.4	21.0	60.0	205.4	247.0	60.7	30.0	113.0		7,241.7	4,657.8	27.2		313.0	383.7	12,763.1	18,144.7	25,386.4
Manufacturing (green)	108.6	28.7	276.2	61.3	240.1	0.8	71.6	5.7	521.7	146.9	82.5	70.3	31.8	63.4	13.4	2.1	4.3	3.0	47.2	133.0	9.8	11.9	61.1		1,995.4	1,727.8	0.1		1.2	-54.9	724.9	2,399.1	4,394.5
Electricity, gas, steam and air conditioning supply				7.8																					7.8	17.4						17.4	25.3
Electricity, gas, steam and air conditioning supply (green)	67.2	9.8	1,207.6	332.5	61.7	0.0	0.0	16.0	7.9	35.3	8.4	11.7	2.2	22.0	28.4	9.2	24.4	9.3	51.9	13.2	12.8	1.8	3.8		1,937.0	96.2			3.4		93.5	193.1	2,130.1
Water supply; sewerage, waste management and remediation activities	23.7	3.7	318.5	114.2	26.6	0.0	0.3	6.1	2.8	85.4	42.2	4.2	1.1	1.8	1.4	3.7	3.2	12.8	10.8	5.8	2.2	3.0	2.6		676.1	235.0	0.0		3.0		0.0	238.1	914.1
Construction	139.8	23.2	472.6	33.2	26.3	1.0	84.7	33.8	82.2	171.4	194.4	7.8	2.7	44.6	20.4	1,515.2	4.6	3.3	64.4	50.9	23.9	13.9	208.1		3,222.4	321.0	8.0		14,011.8	-2.0	23.6	14,362.4	17,584.7
Wholesale and retail trade; repair of motor vehicles and motorcycles	328.1	64.0	933.3	1,615.3	389.4	0.5	45.7	9.7	679.7	371.1	198.6	107.2	40.7	164.0	25.0	32.4	129.3	55.2	148.4	164.3	121.4	14.9	62.7		5,700.9	13,001.3	15.6	414.7	3,011.9	9.8	1,913.0	18,366.3	24,067.2
Transportation and storage	253.9	25.6	951.4	601.6	213.7	0.4	36.2	13.0	753.8	426.5	234.4	58.5	19.7	242.2	14.3	36.4	80.8	51.4	179.5	105.9	93.1	9.6	315.3		4,717.1	2,259.5	9.6		134.6	-21.2	2,185.1	4,567.7	9,284.8
Accommodation and food service activities	23.2	10.6	193.3	170.3	42.3	0.1	8.1	1.8	74.3	121.3	45.5	4.4	1.5	36.5	19.4	14.1	10.0	8.1	43.6	19.7	14.3	1.2	11.1		874.7	583.1	6.9		63.9		688.9	1,342.8	2,217.5
Accommodation and food service activities (green)	34.7	2.4	41.7	59.4	10.4	0.0	1.6	0.3	22.7	17.9	9.5	1.2	0.4	9.8	3.6	2.8	3.0	2.1	18.0	4.7	4.6	0.3	3.8		255.0	209.3			24.3		250.9	484.5	739.6
Information and communication	118.4	9.4	259.3	201.1	47.7	0.1	5.8	5.1	102.2	681.9	152.1	11.1	4.0	188.7	16.4	25.4	57.9	42.9	23.8	16.2	44.2	1.0	57.1		2,071.6	1,854.5	141.4		20.8	4.2	150.6	2,171.5	4,243.1
Financial and insurance activities	517.5	0.6	158.9	334.1	22.2	0.5	43.2	6.9	1,047.8	517.9	248.5	26.0	5.0	65.4	556.3	86.6	56.9	62.7	109.8	7.6	9.1	2.8	124.8		4,011.2	980.0					272.8	1,252.8	5,263.9
Real estate activities	91.2	7.1	171.3	158.6	36.7	0.1	6.6	4.4	235.6	967.1	119.8	22.0	8.3	191.9	37.1	51.7	39.5	45.4	32.9	16.1	55.8	3.5	30.2		2,332.7	3,416.9	2.0		2.6	1.3	32.4	3,455.2	5,788.0
Professional, scientific and technical activities	285.2	1.0	368.4	203.9	79.8	0.5	42.1	35.8	48.1	38.7	60.8	10.1	2.9	186.6	215.3	44.0	14.6	26.3	79.1	245.2	63.3	1.3	31.2		2,084.2	150.5	231.3		86.8	0.0	6.0	474.6	2,558.7
Administrative and support service activities	711.4	32.6	910.8	10.4	2.1	0.5	45.2	20.3	44.3	102.1	47.5	1.4	0.5	18.4	121.2	0.0	0.9	3.6	4.5	0.0	0.0	0.0	0.0		2,078.0	5.4	339.8				4.8	350.1	2,428.0
Public administration and defense; compulsory social security	209.5	9.6	268.2	3.0	0.6	0.2	13.3	6.0	13.0	29.9	14.0	0.4	0.2	5.4	35.7		0.3	1.1	1.3						611.5	255.7	4,906.6				1.4	5,163.8	5,775.3
Education	171.3	13.3	208.1	411.5	48.7	0.1	9.4	7.0	192.0	91.1	58.6	7.1	2.1	59.3	23.5	17.0	25.3	18.4	87.9	68.9	80.0	2.9	83.4		1,686.8	2,801.9	2,094.3	1,690.1			164.7	6,751.0	8,437.8
Human health and social work activities	45.8	3.6	72.9	70.7	13.0	0.0	2.5	1.9	33.0	24.4	15.7	1.2	0.4	10.2	6.3	4.5	4.3	3.2	6.3	5.4	90.4	0.4	6.3		422.3	1,061.8	1,110.2	909.2				3,081.1	3,503.5
Arts, entertainment and recreation	9.5	0.5	12.7	1.6	26.7	0.0	0.6	0.3	1.3	3.2	0.9	3.6	1.4	1.4	1.6	0.2	3.9	6.6	14.7	0.1	0.2	0.0	0.1		91.2	246.0	81.6		2.9	0.0	41.6	372.2	463.3
Other service activities	14.6	3.9	37.3	7.5	32.5	0.1	9.7	0.8	70.3	19.3	10.8	9.5	4.3	29.1	1.9	0.3	104.7	0.4	87.5	18.0	1.3	1.6	84.8		550.1	367.1	0.2	1,091.6	0.7	-8.0	83.9	1,535.4	2,085.5
Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use services-producing activities of households for own use	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.1	4.2	0.0		0.0		0.0	4.2	4.3
Use at Basic Prices	5,272.9	475.6	10,232.9	14,173.4	3,279.6	6.8	600.7	210.4	6,347.0	5,401.5	2,395.9	833.5	280.7	1,594.7	1,295.5	1,904.5	604.5	479.4	1,389.1	1,325.4	785.3	112.5	1,238.0	0.0	60,239.8	41,147.1	9,118.5	4,105.6	18,014.7	1,164.5	34,972.7	108,523.0	168,762.9
CIF/FOB																									0.0						-881.1	-881.1	-881.1
Use at Basic Prices	5,272.9	475.6	10,232.9	14,173.4	3,279.6	6.8	600.7	210.4	6,347.0	5,401.5	2,395.9	833.5	280.7	1,594.7	1,295.5	1,904.5	604.5	479.4	1,389.1	1,325.4	785.3	112.5	1,238.0	0.0	60,239.8	41,147.1	9,118.5	4,105.6	18,014.7	1,164.5	34,091.6	107,642.0	167,881.8
Net Taxes	-696.7	88.4	530.5	-66.4	44.2	0.1	4.5	3.8	134.1	214.1	143.7	10.1	3.3	42.9	-0.3	12.3	7.8	28.9	35.6	22.3	37.7	9.9	10.9	0.0	621.5	3,619.3	0.0	0.0	999.8	-13.0	152.1	4,758.2	5,379.7
use of imports	957.6	125.4	2,554.5	4,233.0	177.7	1.2	103.4	15.1	660.9	801.6	534.4	114.5	45.2	1,027.5	151.1	259.4	910.7	304.2	445.2	282.6	924.6	51.7	48.1	0.0	14,729.8	4,212.3	0.0	0.0	6,111.5	850.5	1,751.4	12,925.7	27,655.5
Total Use at Purchasers Price	5,533.8	689.4	13,317.9	18,340.0	3,501.5	8.0	708.6	229.4	7,142.1	6,417.2	3,073.9	958.2	329.2	2,665.1	1,446.3	2,176.3	1,523.0	812.5	1,869.9	1,630.4	1,747.5	174.0	1,296.9	0.0	75,591.1	48,978.8	9,118.5	4,105.6	25,126.0	2,001.9	35,995.1	125,325.9	200,916.9
GVA at basic prices	6,794.2	2,274.8	12,857.3	7,046.4	893.0	17.2	1,421.4	684.7	10,442.7	17,650.0	6,210.8	1,259.4	410.4	1,578.0	3,817.6	3,611.7	1,035.8	1,615.5	3,905.4	6,807.5	1,756.0	289.3	788.6	4.3	93,171.8								
Wages and salaries	958.2	330.6	2,531.2	2,295.5	308.9	3.3	329.7	75.9	5,160.9	1,995.6	1,257.0	372.9	124.3	686.9	1,614.0	188.7	237.6	215.5	3,099.7	4,715.6	1,378.3	188.7	560.7	0.0	28,629.6								
Social contribution	12.3	4.3	389.2	80.6	10.8	0.4	40.3	1.6	18.9	42.8	20.6	7.8	2.6	0.0	267.5	6.0	5.5	4.9	547.0	378.2	171.6	13.1	32.0	0.0	2,057.9								
Consumption of fixed capital	0.0	0.0	1,945.9	1,063.7	143.1	0.0	2.8	26.4	538.7	915.2	108.0	157.9	52.6	1.0	160.1	65.9	0.1	0.1	258.7	327.3	141.0	35.3	13.4	0.0	5,957.1								
Other net taxes on production	0.9	0.3	5.8	0.0	0.0	0.0	0.0	0.0	0.0	-21.8	0.0	0.8	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-13.7								
Mixed Income	3,998.8	1,379.7	74.6	354.5	47.7	0.0	0.0	0.0	3,601.4	8,402.9	1,429.8	138.8	45.1	31.4	29.0	1,191.4	0.0	99.8	0.0	27.1	16.3	47.4	172.5	4.3	21,092.4								
Net Operating Surplus	1,823.9	559.9	7,910.6	3,252.1	382.4	13.5	1,048.7	580.9	1,122.8	6,315.3	3,395.5	581.1	185.5	858.7	1,747.0	2,159.6	792.6	1,295.3	0.0	1,359.3	48.8	4.8	10.0	0.0	35,448.4								
Output at basic prices"	12,328.0	2,964.1	26,175.2	25,386.4	4,394.5	25.3	2,130.1	914.1	17,584.7	24,067.2	9,284.8	2,217.5	739.6	4,243.1	5,263.9	5,788.0	2,558.7	2,428.0	5,775.3	8,437.8	3,503.5	463.3	2,085.5	4.3	168,762.9								

Source: CSO (2014)

Appendix 7.2: I-A inverse matrix (Leontief inverse matrix), type I (national)

I-A Inverse Matrix Type I

Industry (Row) Industry (Column)	Agriculture, forestry and fishing	Mining and quarrying	Manufacturing	Electricity, gas, steam and air conditioning supply	Water supply; sewerage, waste management and remediation activities	Construction	Wholesale and retail trade; repair of motor vehicles and motorcycles	Transportation and storage	Accommodation and food service activities	Information and communication	Financial and insurance activities	Real estate activities	Professional, scientific and technical activities	Administrative and support activities	Public administration and defense; compulsory social security	Education	Human health and social work activities	Arts, entertainment and recreation	Other service activities
Agriculture, forestry and fishing	1.060	0.015	0.256	0.017	0.006	0.021	0.012	0.016	0.117	0.013	0.003	0.007	0.005	0.008	0.012	0.011	0.015	0.019	0.022
Mining and quarrying	0.068	1.111	0.141	0.036	0.037	0.091	0.041	0.059	0.065	0.048	0.034	0.034	0.017	0.038	0.045	0.031	0.032	0.044	0.053
Manufacturing (green)	0.067	0.060	1.074	0.071	0.024	0.086	0.049	0.065	0.103	0.048	0.013	0.029	0.020	0.034	0.048	0.037	0.028	0.078	0.088
Electricity, gas, steam and air conditioning supply	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Water supply; sewerage, waste management and remediation activities	0.004	0.015	0.008	0.001	1.008	0.002	0.005	0.006	0.004	0.002	0.001	0.002	0.002	0.006	0.003	0.002	0.002	0.008	0.004
Construction	0.020	0.027	0.014	0.043	0.042	1.015	0.022	0.029	0.013	0.030	0.009	0.269	0.014	0.010	0.018	0.009	0.015	0.036	0.118
Wholesale and retail trade; repair of motor vehicles and motorcycles	0.043	0.051	0.087	0.033	0.020	0.053	1.025	0.033	0.065	0.054	0.012	0.022	0.059	0.031	0.036	0.027	0.044	0.043	0.054
Transportation and storage	0.034	0.050	0.043	0.026	0.023	0.054	0.026	1.035	0.039	0.072	0.009	0.023	0.045	0.028	0.041	0.018	0.034	0.029	0.178
Accommodation and food service activities	0.004	0.010	0.010	0.005	0.003	0.007	0.007	0.007	1.004	0.011	0.005	0.005	0.006	0.005	0.009	0.003	0.006	0.004	0.009
Information and communication	0.016	0.016	0.018	0.007	0.009	0.012	0.033	0.021	0.012	1.053	0.007	0.009	0.029	0.022	0.008	0.005	0.017	0.006	0.038
Financial and insurance activities	0.059	0.017	0.035	0.030	0.016	0.075	0.030	0.037	0.026	0.029	1.123	0.038	0.034	0.034	0.028	0.005	0.009	0.015	0.089
Real estate activities	0.014	0.013	0.016	0.008	0.009	0.020	0.045	0.018	0.017	0.054	0.011	1.015	0.022	0.023	0.010	0.005	0.021	0.012	0.026
Professional, scientific and technical activities	0.032	0.020	0.021	0.023	0.043	0.010	0.007	0.012	0.012	0.051	0.048	0.012	1.011	0.015	0.018	0.031	0.022	0.007	0.027
Administrative and support service activities	0.066	0.041	0.022	0.024	0.025	0.009	0.008	0.010	0.011	0.008	0.027	0.003	0.003	1.005	0.004	0.002	0.003	0.004	0.007
Public administration and defense; compulsory social security	0.019	0.012	0.006	0.007	0.007	0.003	0.002	0.003	0.003	0.002	0.008	0.001	0.001	0.001	1.001	0.001	0.001	0.001	0.002
Education	0.019	0.012	0.024	0.008	0.010	0.015	0.007	0.010	0.009	0.019	0.007	0.008	0.014	0.010	0.019	1.010	0.026	0.009	0.048
Human health and social work activities	0.005	0.004	0.005	0.002	0.003	0.003	0.002	0.002	0.002	0.003	0.002	0.002	0.002	0.002	0.002	0.001	1.027	0.001	0.005
Arts, entertainment and recreation	0.001	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.002	0.001	0.001	0.000	0.002	0.003	0.003	0.000	0.000	1.000	0.000
Other service activities	0.003	0.003	0.002	0.006	0.003	0.005	0.002	0.002	0.006	0.010	0.003	0.002	0.044	0.001	0.017	0.004	0.002	0.004	1.045
Type I output multipliers	**1.534**	**1.478**	**1.784**	**1.348**	**1.289**	**1.482**	**1.321**	**1.366**	**1.507**	**1.507**	**1.322**	**1.479**	**1.328**	**1.276**	**1.323**	**1.202**	**1.303**	**1.321**	**1.812**

Appendix 7.3: I-A inverse matrix (Leontief inverse matrix), type II (national)

I-A Inverse Matrix Type II

Industry (Row) Industry (Column)	Agriculture, forestry and fishing	Mining and quarrying	Manufacturing	Electricity, gas, steam and air conditioning supply	Water supply; sewerage, waste management and remediation activities	Construction	Wholesale and retail trade; repair of motor vehicles and motorcycles	Transportation and storage	Accommodation and food service activities	Information and communication	Financial and insurance activities	Real estate activities	Professional, scientific and technical activities	Administrative and support activities	Public administration and defense; compulsory social security	Education	Human health and social work activities	Arts, entertainment and recreation	Other service activities	Household final consumption expenditure
Agriculture, forestry and fishing	1.086	0.042	0.287	0.048	0.027	0.080	0.033	0.047	0.154	0.051	0.063	0.030	0.030	0.030	0.107	0.105	0.087	0.092	0.090	0.160
Mining and quarrying	0.085	1.128	0.161	0.055	0.051	0.129	0.054	0.078	0.089	0.072	0.072	0.048	0.033	0.052	0.105	0.091	0.078	0.090	0.097	0.102
Manufacturing (green)	0.094	0.087	1.105	0.102	0.046	0.147	0.070	0.097	0.140	0.087	0.074	0.053	0.045	0.055	0.145	0.133	0.102	0.153	0.158	0.164
Electricity, gas, steam and air conditioning supply	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Water supply; sewerage, waste management and remediation activities	0.006	0.016	0.010	0.003	1.009	0.006	0.006	0.008	0.006	0.004	0.005	0.003	0.004	0.008	0.009	0.008	0.006	0.012	0.008	0.010
Construction	0.028	0.035	0.023	0.052	0.048	1.033	0.028	0.038	0.024	0.041	0.027	0.276	0.022	0.016	0.047	0.038	0.037	0.058	0.139	0.049
Wholesale and retail trade; repair of motor vehicles and motorcycles	0.101	0.110	0.154	0.100	0.067	0.185	1.071	0.102	0.147	0.138	0.145	0.073	0.113	0.078	0.247	0.236	0.203	0.205	0.206	0.356
Transportation and storage	0.048	0.064	0.059	0.042	0.034	0.087	0.037	1.052	0.059	0.093	0.042	0.035	0.058	0.039	0.093	0.070	0.074	0.069	0.215	0.087
Accommodation and food service activities	0.008	0.013	0.014	0.009	0.006	0.014	0.009	0.011	1.009	0.016	0.013	0.008	0.009	0.007	0.021	0.015	0.015	0.014	0.018	0.021
Information and communication	0.027	0.027	0.030	0.019	0.018	0.036	0.041	0.034	0.027	1.069	0.031	0.018	0.039	0.030	0.048	0.044	0.047	0.036	0.067	0.067
Financial and insurance activities	0.068	0.026	0.046	0.041	0.024	0.096	0.038	0.048	0.039	0.042	1.144	0.046	0.042	0.041	0.062	0.039	0.035	0.041	0.114	0.058
Real estate activities	0.032	0.031	0.037	0.028	0.023	0.060	0.059	0.039	0.042	0.080	0.051	1.031	0.038	0.037	0.075	0.069	0.070	0.061	0.072	0.109
Professional, scientific and technical activities	0.035	0.024	0.025	0.027	0.046	0.018	0.010	0.016	0.017	0.056	0.056	0.015	1.014	0.018	0.031	0.044	0.032	0.016	0.036	0.022
Administrative and support service activities	0.068	0.044	0.025	0.027	0.027	0.016	0.010	0.013	0.015	0.012	0.034	0.006	0.005	1.007	0.014	0.012	0.010	0.011	0.014	0.017
Public administration and defense; compulsory social security	0.021	0.014	0.009	0.009	0.009	0.007	0.004	0.005	0.006	0.005	0.012	0.003	0.003	0.003	1.008	0.007	0.006	0.006	0.007	0.011
Education	0.032	0.026	0.039	0.023	0.021	0.045	0.017	0.025	0.027	0.038	0.037	0.019	0.026	0.021	0.066	1.058	0.062	0.046	0.083	0.081
Human health and social work activities	0.010	0.009	0.010	0.007	0.007	0.014	0.005	0.008	0.009	0.010	0.013	0.006	0.007	0.006	0.019	0.018	1.040	0.015	0.017	0.029
Arts, entertainment and recreation	0.002	0.002	0.002	0.002	0.001	0.003	0.001	0.001	0.003	0.002	0.003	0.001	0.003	0.004	0.006	0.004	0.003	1.003	0.003	0.006
Other service activities	0.005	0.005	0.005	0.008	0.005	0.010	0.003	0.005	0.008	0.013	0.007	0.004	0.045	0.003	0.024	0.011	0.007	0.010	1.050	0.012
Wages and salaries	0.197	0.199	0.226	0.227	0.159	0.443	0.155	0.231	0.277	0.285	0.448	0.174	0.182	0.158	0.711	0.706	0.539	0.545	0.515	1.201
Type II output multipliers	**1.757**	**1.703**	**2.040**	**1.605**	**1.470**	**1.985**	**1.497**	**1.627**	**1.821**	**1.831**	**1.830**	**1.676**	**1.534**	**1.455**	**2.129**	**2.002**	**1.914**	**1.939**	**2.395**	

Appendix 7.4: Type I – A-matrix (technical coefficients) for Zambia, showing all the sectors on rows, but only tourism related sectors on columns

Industry/Sector	Wholesale and retail	Transportation and storage	Accommodation and food	Arts, entertainment	Other service activities
Agriculture, forestry and fishing (Agriculture)	0.0000	0.0000	0.0882	0.0000	0.0000
Mining and quarrying (Mining)	0.0258	0.0394	0.0378	0.0253	0.0165
Manufacturing	0.0382	0.0518	0.0822	0.0648	0.0542
Electricity, gas, steam and air conditioning supply (Electricity)	0.0000	0.0000	0.0000	0.0000	0.0000
Water supply; sewerage, waste management and remediation activities (Water supply)	0.0035	0.0045	0.0019	0.0064	0.0012
Construction	0.0071	0.0209	0.0035	0.0299	0.0998
Wholesale and retail	0.0154	0.0214	0.0483	0.0321	0.0301
Transportation and storage	0.0177	0.0252	0.0264	0.0207	0.1512
Accommodation and food	0.0050	0.0049	0.0020	0.0025	0.0053
Information and communication	0.0283	0.0164	0.0050	0.0022	0.0274
Financial and insurance activities (Financial and insurance)	0.0215	0.0268	0.0117	0.0061	0.0599
Real estate activities	0.0402	0.0129	0.0099	0.0075	0.0145
Professional, scientific and technical activities (Professional, scientific)	0.0016	0.0065	0.0045	0.0029	0.0150
Administrative and support service activities (Administrative and support)	0.0042	0.0051	0.0006	0.0000	0.0000
Public administration and defence; compulsory social security (Public administration)	0.0012	0.0015	0.0002	0.0000	0.0000
Education	0.0038	0.0063	0.0032	0.0062	0.0400
Human health and social work activities (Human health and social work)	0.0010	0.0017	0.0005	0.0008	0.0030
Arts, entertainment	0.0001	0.0001	0.0016	0.0000	0.0000
Other service activities	0.0008	0.0012	0.0043	0.0034	0.0407

Note: Tourism related sectors are highlighted.

Appendix 7.5: Type II – A-matrix (Technical coefficients) for Zambia, showing all the sectors on rows, but only tourism related sectors on columns

Industry/Sector	Wholesale and retail	Transportation and storage	Accommodation and food	Arts, entertainment	Other service activities	Household final consumption expenditure
Agriculture	0.0000	0.0000	0.0882	0.0000	0.0000	0.0945
Mining	0.0258	0.0394	0.0378	0.0253	0.0165	0.0376
Manufacturing	0.0382	0.0518	0.0822	0.0648	0.0542	0.0951
Electricity	0.0000	0.0000	0.0000	0.0000	0.0000	0.0004
Water supply	0.0035	0.0045	0.0019	0.0064	0.0012	0.0048
Construction	0.0071	0.0209	0.0035	0.0299	0.0998	0.0066
Wholesale and retail	0.0154	0.0214	0.0483	0.0321	0.0301	0.2654
Transportation and storage	0.0177	0.0252	0.0264	0.0207	0.1512	0.0461
Accommodation and food	0.0050	0.0049	0.0020	0.0025	0.0053	0.0119
Information and communication	0.0283	0.0164	0.0050	0.0022	0.0274	0.0379
Financial and insurance	0.0215	0.0268	0.0117	0.0061	0.0599	0.0200
Real estate activities	0.0402	0.0129	0.0099	0.0075	0.0145	0.0698
Professional, scientific	0.0016	0.0065	0.0045	0.0029	0.0150	0.0031
Administrative and support	0.0042	0.0051	0.0006	0.0000	0.0000	0.0001
Public administration	0.0012	0.0015	0.0002	0.0000	0.0000	0.0052
Education	0.0038	0.0063	0.0032	0.0062	0.0400	0.0572
Human health and social work	0.0010	0.0017	0.0005	0.0008	0.0030	0.0217
Arts, entertainment	0.0001	0.0001	0.0016	0.0000	0.0000	0.0050
Other service activities	0.0008	0.0012	0.0043	0.0034	0.0407	0.0075
Compensations (wages and salaries)	0.0829	0.1354	0.1682	0.4072	0.2688	

Note: Tourism related sectors are highlighted.

Appendix 7.6: National ratios for income, value-added and employment

Industry/Sector	Income ratio	Value-added ratio	Employment ratio
Agriculture	0.04	0.74	238.32
Mining	0.19	0.47	3.21
Manufacturing	0.07	0.29	8.35
Electricity	9.51	64.26	870.63
Water supply	0.21	0.18	5.47
Construction	0.02	0.56	10.58
Wholesale and retail	0.04	0.73	31.00
Transportation and storage	0.10	0.61	13.46
Accommodation and food	0.04	0.72	23.45
Information and communication	0.10	0.37	4.95
Financial and insurance	0.23	0.76	7.60
Real estate activities	0.01	0.69	1.21
Professional, scientific	0.19	0.59	1.95
Administrative and support	0.19	0.65	22.65
Public administration	–	0.68	14.89
Education	0.24	0.81	19.55
Human health and social work	0.06	0.54	19.69
Arts	0.17	0.79	15.11
Other service activities	0.02	0.38	36.92

Note: Tourism related sectors are highlighted.
Source: Adapted from CSO (2016b) and author's calculations.

Appendix 7.7: Rural area Type I – Total requirements coefficients (Leontief Inverse matrix), showing all the sectors on rows, but only tourism related sectors on columns

Industry/Sector	Wholesale and retail	Transportation and storage	Accommodation and food	Arts, entertainment	Other service activities
Agriculture	0.003	0.005	0.067	0.006	0.005
Mining	0.011	0.017	0.018	0.012	0.011
Manufacturing	0.021	0.029	0.046	0.036	0.034
Electricity	0.000	0.000	0.000	0.000	0.000
Water supply	0.002	0.002	0.001	0.003	0.001
Construction	0.005	0.010	0.003	0.014	0.047
Wholesale and retail	1.009	0.012	0.025	0.017	0.018
Transportation and storage	0.008	1.011	0.012	0.009	0.063
Accommodation and food	0.002	0.002	1.001	0.001	0.003
Information and communication	0.012	0.007	0.003	0.001	0.012
Financial and insurance	0.008	0.010	0.005	0.003	0.022
Real estate activities	0.014	0.005	0.004	0.003	0.006
Professional, scientific	0.001	0.004	0.003	0.002	0.008
Administrative and support	0.002	0.002	0.002	0.000	0.001
Public administration	0.001	0.001	0.001	0.000	0.000
Education	0.003	0.004	0.003	0.004	0.023
Human health and social work	0.001	0.001	0.001	0.001	0.002
Arts, entertainment	0.00004	0.00004	0.0005	1.000	0.00002
Other service activities	0.0004	0.001	0.002	0.001	1.014
Type I Output Multipliers	**1.102**	**1.122**	**1.198**	**1.113**	**1.269**

Note: Tourism related sectors are highlighted.

Appendix 7.8: Rural area Type II – Total requirements coefficients (Leontief Inverse matrix), showing all the sectors on rows, but only tourism related sectors on columns (truncated matrix)

Industry/Sector	Wholesale and retail	Transportation and storage	Accommodation and food	Arts, entertainment	Other service activities	Household final consumption expenditure
Agriculture	0.006	0.009	0.073	0.019	0.016	
Mining	0.012	0.018	0.019	0.015	0.013	
Manufacturing	0.024	0.033	0.051	0.046	0.042	
Electricity	0.000	0.000	0.000	0.000	0.000	
Water supply	0.002	0.002	0.001	0.003	0.001	
Construction	0.005	0.011	0.003	0.015	0.048	
Wholesale and retail	1.014	0.020	0.036	0.040	0.035	
Transportation and storage	0.009	1.013	0.014	0.013	0.066	
Accommodation and food	0.002	0.003	1.002	0.002	0.003	
Information and communication	0.012	0.008	0.004	0.005	0.015	
Financial and insurance	0.008	0.010	0.006	0.005	0.023	
Real estate activities	0.015	0.006	0.006	0.008	0.009	
Professional, scientific	0.002	0.004	0.004	0.003	0.009	
Administrative and support	0.002	0.002	0.002	0.001	0.001	
Public administration	0.001	0.001	0.001	0.001	0.001	
Education	0.004	0.006	0.006	0.010	0.028	
Human health and social work	0.001	0.002	0.001	0.003	0.003	
Arts, entertainment	0.000	0.000	0.001	1.000	0.000	
Other service activities	0.000	0.001	0.002	0.002	1.015	
Compensations (wages and salaries)						
Type II Output Multipliers	**1.120**	**1.150**	**1.232**	**1.190**	**1.328**	

Note: Tourism related sectors are highlighted.

Appendix 7.9: Derived national multipliers for selected tourism-related sectors in Zambia

National multipliers for tourism related sector								
	Direct effects				Total effects			
Sector	Jobs /MM sales	Personal Inc/sales	Value added/ sales	Sales II	Jobs II /MM sales	Inc II/sales	VA II/sales	Sales I
All-inclusive packages	38.00	0.12	0.91	1.86	54.54	0.16	1.16	1.47
Wholesale	36.91	0.08	0.91	1.50	44.36	0.09	1.02	1.32
Transportation	21.10	0.14	0.82	1.63	32.17	0.17	0.98	1.37
Accommodation	56.23	0.09	1.02	1.82	69.50	0.12	1.22	1.51
Arts	23.35	0.20	0.97	1.94	49.53	0.26	1.36	1.32
Other service	52.44	0.11	0.85	2.40	77.14	0.16	1.22	1.81

Source: Adapted from Stynes et al., (2000) and Author's calculations.

Appendix 7.10: Legal and regulatory framework: sector cross linkages

No.	LEGAL FRAMEWORKS	PURPOSE	REMARK
10	Animal Heath Act No. 27 of 2010	Provides for the prevention and control animal diseases and regulates trade in animals and animal products	Generally animal health regulations have been identified as a constraint to wildlife trade and utilisations as the regulations were designed for the livestock sector and considers wildlife as a reservoir for diseases affecting livestock. To address this challenge there is need to advocate for the enactment of veterinary regulations that are specific to wildlife and sensitise the veterinary fraternity on the value of wildlife.
11	Public Health Act No. 22 of 1995	It provides for the prevention and suppression of infectious disease especially those communicable from animal to man, for sanitation, protection of food and supply of water and protection from pollution in general	Zoonotic diseases have emerged as a constraint to growth of the tourism industry globally. To address this problem there is need to develop public health surveillance and monitoring system for PAs and key tourism destinations in the country to act as an early warning system for human health, veterinary and tourism authorities.
12	Energy Regulations Act No. 16 of 1995	The Act among other issues regulates the development of the energy sector and promotion of accessible and affordable sources of energy	To align the growth of the energy sector to the needs of wildlife conservation (aquatic wildlife/ biodiversity) there is need to integrate the energy sector development plans in the wider ecosystem/landscape integrated development plans. Promotion of the development of alternative energy will once aligned with the ecosystems/landscape IDP may reduce the rate of deforestation and destruction of wildlife habitats. Furthermore there will be need to develop a sector based mitigation hierarchy that will promote environmental and social safe guides
13	Mines and Minerals Act of 1995	The Act provides for mineral and mines development	To align the growth of the mines and minerals sector to the needs of wildlife conservation (aquatic and terrestrial wildlife/ biodiversity) there is need to integrate the mining and minerals development plans sector development plans in the wider ecosystem/ landscape integrated development plans. Furthermore there will be need to develop a sector based mitigation hierarchy that will promote environmental and social safe guides
14	Local Government (Amendment) Act No. 9 of 2004	The Act among others provides for decentralisation and resources planning to the local level	The promotion of decentralisation will facilitate the devolution of wildlife management to the local level.
15	Water Resources Management Act No. 21 of 2011	The Act provides for the regulation and management of water resources and has mainstreamed management of water resources to the local level.	The protected area network including NATIONAL PARKS and GMAs are critical in the protection of water catchment areas and in the promotion of sustainable environmental flows and should therefore be included in environmental accounting and their role in economic development through provision environmental goods and services should not be under estimated. In view of their significant contribution there will be need to develop a legal framework that will promote PES as innovative financing mechanism for Protected areas.
16	Zambia Development Agency Act No. 11 of 2006	The Act provides for the trade, investment and industrial development in Zambia	Investments in Protected areas shall be accordance with the Protected areas GMP and is critical to sustainable financing for wildlife conservation.

Legal and regulatory framework: sector cross linkages (continued)

No.	LEGAL FRAMEWORKS	PURPOSE	REMARK
10	Animal Heath Act No. 27 of 2010	Provides for the prevention and control animal diseases and regulates trade in animals and animal products	Generally animal health regulations have been identified as a constraint to wildlife trade and utilisations as the regulations were designed for the livestock sector and considers wildlife as a reservoir for diseases affecting livestock. To address this challenge there is need to advocate for the enactment of veterinary regulations that are specific to wildlife and sensitise the veterinary fraternity on the value of wildlife.
11	Public Health Act No. 22 of 1995	It provides for the prevention and suppression of infectious disease especially those communicable from animal to man, for sanitation, protection of food and supply of water and protection from pollution in general	Zoonotic diseases have emerged as a constraint to growth of the tourism industry globally. To address this problem there is need to develop public health surveillance and monitoring system for PAs and key tourism destinations in the country to act as an early warning system for human health, veterinary and tourism authorities.
12	Energy Regulations Act No. 16 of 1995	The Act among other issues regulates the development of the energy sector and promotion of accessible and affordable sources of energy	To align the growth of the energy sector to the needs of wildlife conservation (aquatic wildlife/ biodiversity) there is need to integrate the energy sector development plans in the wider ecosystem/landscape integrated development plans. Promotion of the development of alternative energy will once aligned with the ecosystems/landscape IDP may reduce the rate of deforestation and destruction of wildlife habitats. Furthermore there will be need to develop a sector based mitigation hierarchy that will promote environmental and social safe guides
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16	Zambia Development Agency Act No. 11 of 2006	The Act provides for the trade, investment and industrial development in Zambia	Investments in Protected areas shall be accordance with the Protected areas GMP and is critical to sustainable financing for wildlife conservation.

Appendix 7.11: National Park visits by visitor segment

National Park visits by visitor segment, 2016												
	Segment											
	Top end		**Upper-middle**		**Lower-middle**		**Budget/ Self-catering**		**Day/Self-drive**		**Total**	
	KNP	SLNP	KNP	SLNP	KNP	SLNP	KNP	SLNP	KNP	SLNP	KNP	SLNP
*MCC supply survey percent	9	9	30	30	15	15	45.5	45.5	0.5	0.5	**100**	**100**
Park visits	1,130	4,163	3,765	13,877	1,883	6,939	5,710	21,047	63	231	**12,550**	**46,257**
Conversion Factors for visitors												
Re-entry factor	1	1	1.05	1.05	1.1	1.1	1.2	1.2	1	1	**1.1**	**1.1**
Party size	2.0	2.0	2.4	2.4	2.6	2.6	2.5	2.5	2.0	2.0	**2.4**	**2.4**
Length of stay	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	1	1	**3.5**	**3.5**
Park Use Measures												
Adjusted visits (omit re-entries)	1,115	4,142	3,553	13,173	1,697	6,289	4,753	17,533	63	231	**11,181**	**41,368**
Party trips	558	2,071	1,480	5,489	653	2,419	1,901	7,013	31	116	**4,623**	**17,107**
Party nights	1,952	7,248	5,181	19,211	2,285	8,465	6,654	24,546	31	116	**16,104**	**59,586**
Percent of party nights	12.1	12.2	32.2	32.2	14.2	14.2	41.3	41.2	0.2	0.2	**100**	**100**

Source: Adapted from Stynes et al., 2000.

Appendix 7.12: Money Generation Model (MGM2) summary

The MGM2 Model *(Daniel Stynes et., 2003)*

"The MGM2 model is based on the following simple equation:

*Economic Impacts = Visits * Spending per Visit * Regional Economic Multipliers*

MGM2 uses a segmented approach to capture differences in spending across distinct types of visitors. Sector-specific economic multipliers capture differences in the impacts of spending within distinct economic sectors, e.g., hotels, restaurants, amusements, retail trade. Visitor spending averages are estimated on a party day basis for day trips and a party night basis for overnight stays. Most park visitors arrive in personal vehicles, so the vehicle is treated as the spending unit or "travel party" for this analysis.

The National Park Service (NPS) (in the USA) public use data provides estimates of recreation visits and overnight stays in the parks. A recreation visit represents the entry of one person to the park. Dividing person visits by an average party/vehicle size converts visits to a travel party basis. Visit figures are adjusted for assumed re-entry rates to avoid double counting of the same visitors. For some parks this is not a problem, while for others considerable double counting is likely.

Visits are allocated across a number of distinct visitor segments by applying a set of segment shares, i.e., the percentages of visits to the park by each segment. For visitors staying overnight inside the park, the NPS overnight stay figures are divided by an average party size to estimate the number of party nights. Estimating party nights spent in the area for visitors not staying overnight inside the park poses greater problems. Day visitors to the park are frequently overnight visitors to the area. Some are staying overnight in nearby motels, campgrounds, or private homes. Others are on day trips or passing through the area as part of an extended trip. Some park visitors live in the local area. Others stay locally with friends or relatives or at an owned seasonal home.

For example, the MGM2 Short form uses four segments to separate visitors with distinct spending patterns:

- *Local visitors* live within the local region, as defined by the park (generally a 50-100 radius of the park).
- *Non-Local (NL) Day trips* are visits by parties who do not live in the local area and who did not stay overnight in the local area. For the purpose of estimating spending, visitors staying with friends or relatives in the area or in an owned seasonal home are treated as NL day trips since they do not live in the local region.
- *Motel* segment includes visitor staying in motels, hotels, resorts, lodges, cabins, B&B's or other commercial lodging in the area, either inside or outside the park.
- *Camp* segment includes visitors staying in campgrounds or backcountry sites, inside or outside the park.

Spending averages are estimated on a per party day basis or a per party night basis for visitors with overnight stays. Recreation visits, after adjusting for re-entries, are expanded to party days/nights in the area by multiplying by an average length of stay in the area. Spending figures generally exclude park admissions but include spending on campground fees and any concession operations inside the park. In estimating impacts for individual parks, local area multipliers were chosen to represent the economic characteristics of the surrounding regions. Economic ratios and multipliers in the MGM2 model are based on input-output models developed with the IMPLAN system."

Source: Stynes et al., (2003)

Appendix 7.13: The SLNP visitor spending in local areas by visitor segment (ZMW per party per day/night)[15]

Spending Categories / Visitor Segment	Top End (ZMW)		Upper Middle (ZMW)		Lower Middle (ZMW)		Budget/Self-Catering (ZMW)		Day/Self-drive (ZMW)	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Accommodation: lodges and bush camps	1,925	2,935	629	1,782	110	408	130	240	–	–
Camping fees	0	–	–	467	–	311	–	389	–	–
Meals: restaurants, bars	450	642	–	603	–	2,287	–	590	–	–
Groceries, retail, wholesale	0	65	–	1,080	–	324	–	648	186	375
Gas and oil	0	259	–	324	–	1,296	–	375	243	525
Local transportation	17	363	–	1,410	–	1,305	–	818	–	1,500
Admissions and fees (PA entry)	281	670	281	799	281	799	346	799	281	346
Activities and guided tours: game drive ...	505	1,205	505	1,439	622	1,439	622	1,439	–	–
Souvenirs and other gifts	0	648	–	432	–	36	6	162	–	–
Animal fees, concession fees (license, permits)	1,637	1,637	186	186	93	93	57	57	–	–
Local dip, pack, taxidermy	617	617	112	112	8	8	24	24	–	–
Gratuities and tips	46	1,296	–	842	–	972	–	648	–	–
Other expenses	0	–	–	–	–	–	–	375	376	750
Total	**5,479**	**10,337**	**1,713**	**9,475**	**1,114**	**9,279**	**1,184**	**6,563**	**1,086**	**3,496**

[15] ZMW stands for Zambian Kwacha currency: US$1.00 = ZMW8.64 in 2015

Appendix 7.14: Tourism economic significance of visitor spending on local economies of South Luangwa National Park

SLNP Economic Significance of Visitor Spending

	Direct Effects							
Sector/Spending category	**Direct Sales ZMW Millions**		**Jobs**		**Personal Income ZMW Millions**		**Value Added ZMW Millions**	
	Min	Max	Min	Max	Min	Max	Min	Max
Accomodation	8.10	17.42	21	45	1.62	3.48	5.45	11.73
Camping fees	-	21.18	-	88	-	0.93	-	11.31
Meals	1.97	30.11	5	78	0.39	6.01	1.33	20.28
Groceries	0.00	4.00	0	6	0.00	0.21	0.00	2.85
Gas & oil	0.00	2.84	0	4	0.00	0.15	0.00	2.02
Local transportation	0.06	27.52	0	30	0.00	1.14	0.03	14.36
Admissions & fees	18.36	46.73	76	194	0.80	2.05	9.80	24.95
Activities and Guided Tours	27.19	67.24	19	47	4.34	10.73	14.85	36.72
Souvenirs	0.08	8.67	0	6	0.01	1.38	0.04	4.73
Animal fees	3.54	3.54	15	15	0.15	0.15	1.89	1.89
Local dip & pack	1.46	1.46	1	1	0.23	0.23	0.80	0.80
Gratuities	0.30	44.86	0	31	0.05	7.16	0.17	24.50
Other expenses	0.02	4.65	0	19	0.00	0.20	0.01	2.48
Direct effects	**61.08**	**280.22**	**137**	**563**	**7.61**	**33.82**	**34.37**	**158.64**
Secondary effect	15.04	64.12	17	72	0.26	1.10	2.30	9.73
Total effects	**76.12**	**344.34**	**154**	**636**	**7.87**	**34.93**	**36.67**	**168.37**

Appendix 7.15: Sample of questionnaire for visitor survey conducted in the KNP and the SLNP

VISITOR SURVEY - KAFUE NATIONAL PARK (KNP)

Hello, I am doing a visitor survey on behalf of Copperbelt University (CBU) in collaboration with Stellenbosch University (SU) on the estimation of how much time and money visitors to Kafue National Park (KNP) spend in Zambia. I would be very grateful if you would help us estimate how much you and your personal group have spent during this visit to Zambia.

The information you provide will be used for academic purposes and will be kept strictly confidential.

0.1 ENUMERATOR NAME: …………………………………… 0.2 DATE: ……………………….

"Your Tour Plan

1. Are you a Zambian ………..? [*Please check (√) ONLY ONE*]

   a) citizen ☐ Yes, (*SKIP QUESTION 3)*

   b) resident (or working in Zambia)? ☐ Yes, (*SKIP QUESTION 3)*

   c) non-resident? ☐ Yes, (If non-resident) What country's passport are you travelling on? ………………., and from what country did your trip to Zambia originate? ………………………...

2. By what mode of transport did you or your group chose to use for travelling to and from the park (check more than one if departure mode differs from arrival)?

   a) ☐ Air → name of charter: ……………………………………….

   b) ☐ Ground → Type of ground transport?

      i. ☐ Commercial (bus/hired vehicle),

      ii. ☐ transfer,

      iii. ☐ over-lander,

      iv. ☐ personal vehicle(s),

      v. ☐ rental vehicle(s) (country where rental vehicle(s) registered: ………………………)

3. Did you decide to visit KNP…………..? [*Please check (√) ONLY ONE*]

   a) before you came to Zambia on this trip? ☐ Yes

   b) while you were in Zambia? ☐ Yes

4. How did this visit to KNP fit into your travel plans? [*Please check (√) ONLY ONE*]

   ☐ KNP was the primary destination

   ☐ KNP was one of several destinations

   ☐ KNP was not a planned destination

5. How many people are in your travel group? ……. How many group members are under 12? ……
6. Is this your first visit to KNP?

   a) ☐ Yes,

   b) ☐ No ⟶ state the number of times you have visited KNP previously: …….

7. Where did you and your group stay on the night before visiting KNP? ………………… (*Nearest town*)
8. Where will you and your group stay on the night after visiting KNP? ………………….. (*Nearest town*)
9. Where any nights on this trip spent (or going to be spent) in a home of a personal group member who lives in Zambia?

   a) ☐ No,

   b) ☐ Yes ⟶ how many nights? …………………

10. What is the name of the lodge or camp you stayed at, while in KNP or Mumbwa, what type of accommodation did you use (e.g. chalet, safari tent, camping, dorm), how many nights did you spend there and how many people in your group stayed there? *(please answer by competing the chart below:)*

Name of hotel/lodge/camp	Type of accommodation	Number of nights	Number of people

11. If you stayed outside KNP on any or all nights, on how many separate days did you enter the park? ……
12. Were your travel arrangements to KNP ……………?

a) part of a packaged tour ☐ Yes, (*GO TO QUESTION 13)*

b) independently planned and purchased ☐ Yes, (*GO TO QUESTION 22)*

Packaged Tour Plan

13. What is the name of the tour operator: ……………………………. …………and in what country are they based? …………………….

14. Your packaged tour was to visit …………………. *[check (√) all that apply]*

c) ☐ KNP only
d) ☐ KNP and other attractions in Zambia
e) ☐ KNP and attractions in other countries

15. What other sites in Zambia did the packaged tour include?
……………………………………………………………………………………………………
16. What other countries did the packaged tour include?
……………………………………………………………………………………………………
17. What is the total duration of your trip (number of days)? ………………………………………
18.What was the approximate cost per-person of the package? ………………………..
19.How many people in your personal group were on the packaged tour (s)? ……………..
20.What was included in the package (s)? *[check (√) all that apply]*

- ☐ Air transportation
- ☐ Ground transportation
- ☐ Lodging
- ☐ Meals
- ☐ Beverages
- ☐ Guide services
- ☐ Fees, such as a hunting/fishing license
- ☐ Gear, such as tents, other camping equipment,
- ☐ Admissions
- ☐ Other (*please identify*): ………………………………………………………
…………………………………………………………………………………………………
………………………………………………………………………

21.Are there members of your personal group whose expenses were **NOT** included in the packaged tour plan?

f) ☐ No

g) ☐ Yes → if yes, how many members were not included in the packages tour expenses: …………...

Independent Travel

22. Estimate your total expenses on this trip (*Please only expenses **NOT** included in package tours - Report **N/A** under 'amount' for packaged categories).*

Expenses	Amount	Currency	Town/place (where money was spent)
Admission and fees (park entry)			
Accommodation (hotel/lodge/camp/camping/etc.)			
Restaurant			
Bar			
Groceries (for self-caterers)			
Transport to/from park			
Transport around park			
Vehicle rental fees (for this portion of trip)			
Activities (game drives/walking safaris, etc.)			
Souvenirs			
Other, including anything bought from the local area (e.g. toiletries, tobacco, camping gear, firewood, internet, phone credit, etc.)			
Gas and oil for car, boat, etc.			
Donations/gratuities			

23. What was the total amount spent on international airfare (note if individual or group)? ___________ (currency: ______)

THANK YOU

For answering these questions, there is no other way we could get this information. We hope you enjoyed your visit to Kafue NP and will return soon."

Adapted from Colt et al., (2013)

Appendix 7.16: Total visitor spending for Kafue and South Luangwa national parks

Kafue and South Luangwa National Parks' Total Visitor Spending Impact by Segment												
	Top End		**Upper Middle**		**Lower Middle**		**Budget/Self-Catering**		**Day/Self-drive**		**Total/Average**	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Kafue National Park												
Party nights	1,897	1,897	5,036	5,036	2,221	2,221	6,470	6,470	31	31	15,654	15,654
Spending averages (per party per night/day (ZMW 000's))	7.0	12.6	1.9	11.0	1.0	10.8	1.1	7.1	1.3	4.4	2.4	9.2
Total spending (ZMW 000's)	**13,272**	**23,957**	**9,401**	**55,346**	**2,295**	**24,005**	**6,847**	**46,255**	**39**	**136**	**31,853**	**149,698**
South Luangwa National Park												
Party nights	7,172	7,172	19,009	19,009	8,376	8,376	24,288	24,288	114	114	58,959	58,959
Spending averages (per party per night/day (ZMW 000's))	5.5	10.3	1.7	9.5	1.1	9.3	1.2	6.6	1.1	3.5	2.1	7.8
Total spending (ZMW 000's)	**39,291**	**74,134**	**32,561**	**180,112**	**9,335**	**77,725**	**28,768**	**159,397**	**124**	**400**	**110,079**	**491,768**

Appendix 7.17: MGM2 generic rural economic multipliers

	"Jobs/ MM sales	Personal inc/sales	Value Added /sales	sales II	JobsII/ MMsales	IncII/ sales	VA II/sales	Sales I
Hotels And Lodging Places	25.58	0.29	0.44	1.37	31.22	0.42	0.67	1.25
Eating & Drinking	31.23	0.31	0.44	1.3	35.8	0.42	0.62	1.19
Amusement And Recreation	29.45	0.34	0.56	1.32	34.42	0.45	0.76	1.19
Auto repair and service	12.95	0.28	0.44	1.26	17.04	0.37	0.6	1.16
Local transportation	33.29	0.53	0.62	1.28	38.04	0.63	0.79	1.11
Food processing	5.03	0.14	0.27	1.32	9.61	0.25	0.45	1.25
Petroleum refining	0.55	0.05	0.12	1.51	3.76	0.16	0.44	1.45
Sporting goods	7.37	0.27	0.51	1.25	11.07	0.36	0.66	1.16
Manufacturing	9.42	0.23	0.39	1.32	14.28	0.34	0.58	1.21
Retail Trade	35.33	0.51	0.8	1.26	39.58	0.6	0.96	1.1
Wholesale trade"	12.5	0.4	0.68	1.26	16.69	0.49	0.84	1.12
Source : Stynes et al., 2003								

Appendix 7.18: Kafue and South Luangwa national parks' total visitor spending (significance) by visitor segment

Kafue and South Luangwa National Parks' Total Visitor Spending Significance by Segment												
	Top End		**Upper Middle**		**Lower Middle**		**Budget/Self-Catering**		**Day/Self-drive**		**Total/Average**	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Kafue National Park												
Party nights	1,977	1,977	5,229	5,229	2,304	2,304	6,662	6,662	31	31	16,203	16,203
Spending averages (per party per night/day (ZMW 000's))	7.4	12.7	1.9	11.0	1.0	10.8	1.1	7.1	1.3	4.4	2.5	9.2
Total spending (ZMW 000's)	**14,683**	**25,099**	**9,762**	**57,467**	**2,380**	**24,901**	**7,050**	**47,629**	**40**	**139**	**33,915**	**155,235**
South Luangwa National Park												
Party nights	7,285	7,285	19,274	19,274	8,491	8,491	24,555	24,555	116	116	59,721	59,721
Spending averages (per party per night/day (ZMW 000's))	5.5	10.3	1.7	9.5	1.1	9.3	1.2	6.6	1.1	3.5	2.1	7.8
Total spending (ZMW 000's)	**39,915**	**75,311**	**33,015**	**182,624**	**9,463**	**78,792**	**29,084**	**161,148**	**126**	**404**	**111,603**	**498,279**

Table notes:

- Each segment's total spending = party nights * average spending per party per night/day (Stynes & Sun, 2003)

Appendix 7.19: Tourism economic impact of visitor spending on local economies of the South Luangwa National Park

SLNP Economic Impact of Visitor Spending

	Direct Effects							
Sector/Spending category	**Direct Sales ZMW Millions**		**Jobs**		**Personal Income ZMW Millions**		**Value Added ZMW Millions**	
	Min	Max	Min	Max	Min	Max	Min	Max
Accomodation	7.11	16.75	18	43	1.42	3.34	4.79	11.28
Camping fees	-	20.92	-	87	-	0.92	-	11.17
Meals	1.94	29.72	5	77	0.39	5.93	1.31	20.02
Groceries	0.00	3.95	0	6	0.00	0.20	0.00	2.81
Gas & oil	0.00	2.80	0	4	0.00	0.15	0.00	2.00
Local transportation	0.05	27.17	0	29	0.00	1.12	0.03	14.18
Admissions & fees	17.95	45.68	74	189	0.79	2.00	9.58	24.39
Activities and Guided Tours	26.84	66.38	19	46	4.29	10.60	14.66	36.25
Souvenirs	0.08	8.55	0	6	0.01	1.36	0.04	4.67
Animal fees	3.49	3.49	14	14	0.15	0.15	1.86	1.86
Local dip & pack	1.44	1.44	1	1	0.23	0.23	0.79	0.79
Gratuities	0.30	44.27	0	31	0.05	7.07	0.16	24.18
Other expenses	0.02	4.60	0	19	0.00	0.20	0.01	2.45
Direct effects	**59.23**	**275.71**	**132**	**553**	**7.32**	**33.28**	**33.24**	**156.05**
Secondary effect	14.58	63.04	17	71	0.25	1.09	2.24	9.58
Total effects	**73.81**	**338.75**	**149**	**625**	**7.58**	**34.36**	**35.48**	**165.63**

Table notes:

- Rows/columns may not sum to totals due to rounding and conversion from US dollar currency to kwacha currency

Appendix 7.20: Total Economic Impact for the Kafue National Parks' Visitor Spending on Local Economies

KNP Total Economic Impact of Visitor Spending

	Direct Effects							
Sector/Spending category	**Direct Sales ZMW Millions**		**Jobs**		**Personal Income ZMW Millions**		**Value Added ZMW Millions**	
	Min	Max	Min	Max	Min	Max	Min	Max
Accomodation	10.53	22.67	27	59	2.10	4.52	7.09	15.27
Camping fees	-	4.99	-	21	-	0.22	-	2.66
Meals	1.14	17.53	3	45	0.23	3.50	0.77	11.81
Groceries	0.01	13.98	0	21	0.00	0.73	0.01	9.95
Gas & oil	0.01	9.93	0	15	0.00	0.52	0.01	7.07
Local transportation	0.04	21.38	0	23	0.00	0.88	0.02	11.16
Admissions & fees	3.47	7.30	14	30	0.15	0.32	1.85	3.90
Activities and Guided Tours	7.97	16.71	6	12	1.27	2.67	4.35	9.13
Souvenirs	0.06	6.04	0	4	0.01	0.96	0.03	3.30
Animal fees	6.59	6.59	27	27	0.29	0.29	3.52	3.52
Local dip & pack	1.91	1.91	1	1	0.30	0.30	1.04	1.04
Gratuities	0.12	17.40	0	12	0.02	2.78	0.06	9.50
Other expenses	0.02	3.27	0	14	0.00	0.14	0.01	1.74
Direct effects	**31.85**	**149.70**	**79**	**284**	**4.38**	**17.83**	**18.76**	**90.05**
Secondary effect	7.93	30.64	8	31	0.12	0.47	1.05	4.12
Total effects	**39.78**	**180.34**	**87**	**315**	**4.50**	**18.30**	**19.81**	**94.17**

Appendix 7.21: Total Economic Impact for the South Luangwa National Parks' Visitor Spending on Local Economies

SLNP Total Economic Impact of Visitor Spending

	Direct Effects							
Sector/Spending category	**Direct Sales ZMW Millions**		**Jobs**		**Personal Income ZMW Millions**		**Value Added ZMW Millions**	
	Min	Max	Min	Max	Min	Max	Min	Max
Accomodation	29.82	64.17	77	166	5.95	12.81	20.09	43.22
Camping fees	-	20.92	-	87	-	0.92	-	11.17
Meals	3.23	49.54	8	128	0.64	9.89	2.18	33.37
Groceries	0.02	39.49	0	59	0.00	2.05	0.02	28.11
Gas & oil	0.03	28.04	0	42	0.00	1.46	0.02	19.96
Local transportation	0.12	60.38	0	65	0.00	2.49	0.06	31.51
Admissions & fees	18.13	46.14	75	191	0.79	2.02	9.68	24.64
Activities and Guided Tours	33.55	82.98	23	58	5.36	13.25	18.32	45.32
Souvenirs	0.16	17.10	0	12	0.03	2.73	0.09	9.34
Animal fees	17.43	17.43	72	72	0.76	0.76	9.31	9.31
Local dip & pack	7.21	7.21	5	5	1.15	1.15	3.94	3.94
Gratuities	0.33	49.19	0	34	0.05	7.85	0.18	26.86
Other expenses	0.04	9.19	0	38	0.00	0.40	0.02	4.91
Direct effects	**110.08**	**491.77**	**262**	**958**	**14.75**	**57.78**	**63.90**	**291.65**
Secondary effect	27.20	103.93	28	107	0.43	1.64	3.80	14.44
Total effects	**137.28**	**595.70**	**290**	**1065**	**15.18**	**59.42**	**67.71**	**306.09**

Appendix 7.22: List of tour operators in the Kafue National Park (inside the park, in GMAs and in OAs)

LIST OF SOME TOUR OPERATORS IN AND AROUND KAFUE NATIONAL PARK, 2016

No.	Name of Lodge/Camp	Tour Operator	Bed Cap.	Business	Operation	Type of Investment	Partnership	Location
1	Mapunga Bush Camp	Ace Pest Control Ltd	8	Bush camp	Year round	Joint venture	DNPW & Private	Park
2	Nanzila Bush Camp	Sicaba Dev. Ltd	16	Bush camp	Seasonal	Joint venture	DNPW & Private	Park
3	Mcbride camp	Lubungu safaris	16	Safari camp	Year round	Joint venture	DNPW & Private	Park
4	Hippo Lodge	Hippo lodges Ltd	16	Safari lodge	Year round	Joint venture	DNPW & Private	Park
5	Hippo Island Bush Camp	Hippo lodges Ltd	8	Bush camp	Year round	Joint venture	DNPW & Private	Park
6	Hornbill Safaris lodge	Hornbill Saf. Z Ltd	8	Safari lodge	Seasonal	Total non-local	Private	GMA
7	Mayukuyuku Bush Camp	Kafue Camps Ltd	28	Safari camp	Year round	Joint venture	DNPW & Private	Park
8	Mayukuyuku Bush Camp	Kafue Camps Ltd	28	Bush camp	Year round	Joint venture	DNPW & Private	Park
9	Chibila Camp	Wildlife and Environmental Conservation Society of Zambia (WECSZ)	12	Safari camp	Year round	Total non-local	Private	GMA
10	Kafwala Rapids Camp	Kafwala Rapids Camp	12	Safari camp	Seasonal	Joint venture	DNPW & Private	Park
11	Kafwala WECSZ Bush Camp	Wildlife and Environmental Conservation Society of Zambia (WECSZ)	8	Safari camp	Seasonal	Joint venture	DNPW & Private	Park
13	Kaingu Safari Lodge	Kaingu Lodge	12	Safari lodge	Year round	Total non-local	Private	GMA
14	Mukambi Safari Lodge	Mukambi Lodge	26	Safari lodge	Year round	Total non-local	Private	GMA
15	New Kalala Lodge	New Kalala Lodge	72	Safari lodge	Year round	Total non-local	Private	GMA
16	Musungwa Lodge	Musungwa Lodge	72	Safari lodge	Year round	Total non-local	Private	GMA
17	Puku Pan Safari Lodge	Puku Pan Safari Lodge	16	Safari lodge	Seasonal	Total non-local	Private	GMA
18	Delia Bush Camp	Mushingashi Conservancy	8	Safari camp	Year round	Total non-local	Private	Open Area
20	Kalonga Waloba Bush Camp	Mushingashi Conservancy	24	Safari camp	Year round	Total non-local	Private	Open Area
22	Kapalaushi Cottage Camp	Mushingashi Conservancy	8	Safari camp	Year round	Total non-local	Private	Open Area
24	Kashikoto Bush Camp	Mushingashi Conservancy	10	Safari camp	Year round	Total non-local	Private	Open Area
25	Mushingashi Conservancy	Mushingashi Conservancy	-	Bush camp	Year round	Total non-local	Private	Open Area
26	Mushingashi Conservancy	Mushingashi Conservancy	-	Hunting camp	Seasonal	Total non-local	Private	Open Area
27	Kafue River Bush Camp	Zambezi Safaris	8	Safari camp	Seasonal	Total non-local	Private	GMA
28	Leopard Lodge	Leopard Lodge	12	Safari lodge	Seasonal	Total non-local	Private	GMA
29	Lunga River Lodge	Lunga River Lodge	12	Safari lodge	Seasonal	Total non-local	Private	GMA
30	Kaindu Community Ranch	KNRT & Kafue Safaris	-	Hunting camp	Seasonal	Joint venture	Community & Private	Open Area
31	Nsonga Safaris	Lunsemfwa Safaris	-	Hunting camp	Seasonal	Joint venture	Community, DNPW & Private	GMA
32	Ntemwa lodge	Wilderness Safaris	24	Safari lodge	Year round	Joint venture	DNPW & Private	Park
33	Ntemwa Bush Camp	Wilderness Safaris	8	Safari lodge	Seasonal	Joint venture	DNPW & Private	Park
34	Fig Tree Bush Camp	Mukambi Lodge	8	Bush camp	Year round	Joint venture	DNPW & Private	Park
35	Mukambi Plains Camp	Mukambi Lodge	8	Bush camp	Seasonal	Joint venture	DNPW & Private	Park
36	Mawimbi B Camp	Mawimbi Safaris	6	Bush camp	Seasonal			
37	Musekesi Lodge	JM Safaris	8	Safari lodge	Seasonal	Joint venture	DNPW & Private	Park
38	Kafue-Luasanza Lodg.	Senanga Safaris	12	Safari lodge	Seasonal			
39	Chunga Camping Site	Tunya Lodge Ltd	30	Safari camp	Year round	Joint venture	DNPW & Private	Park
40	Konkamoya lodge	Cooke's Afr. Safaris	20	Safari lodge	Seasonal	Joint venture	DNPW & Private	Park
41	Lufupa River Camp	Wilderness Safaris	16	Safari camp	Year round	Joint venture	DNPW & Private	Park
42	Lufupa Tented Camp	Wilderness Safaris	16	Safari camp	Year round	Joint venture	DNPW & Private	Park
43	Busanga Bush Camp	Wilderness Safaris	8	Bush camp	Seasonal	Joint venture	DNPW & Private	Park
44	Shumba B Camp	Wilderness Safaris	12	Bush camp	Year round	Joint venture	DNPW & Private	Park
45	Kasabushi Camp	Undiscovered B/C Z Ltd	8	Safari camp	Seasonal			
46	Kubu Kweena Lodge	Kubu Kweena Lodge Ltd	12	Safari lodge	Year round			
47	Ila Safari Lodge	Green Safaris Ltd	28	Safari lodge	Year round	Total non-local	Private	GMA
48	Mfupanda Safari Camp	Pioner safaris	-	Hunting camp	Seasonal	Joint venture	Community, DNPW & Private	GMA
49	*Mangomba Safaris Camp	*Mangomba Safaris camp	-	Hunting camp	Seasonal	Joint venture	Community, DNPW & Private	GMA
50	*Swanapoel Safaris Camp	*Swanapoel Safaris Camp	-	Hunting camp	Seasonal	Joint venture	Community, DNPW & Private	GMA
	Total		**664**					

* The operations of Swanapoel Safaris was replaced by Mangomba Safaris in Mumbwa GMA in 2016

Appendix 7.23: List of tour operators in the South Luangwa National Park (inside the park and in GMAs)

LIST OF SOME TOUR OPERATORS IN AND AROUND SOUTH LUANGWA NATIONAL PARK, 2016

No.	Name of Lodge/Camp	Tour Operator	Bed Cap.	Business	Operation	Type of Investment	Ownership	Location
1	Bilimangwe Bush Camp	The Bushcamp Company	8	Bush camp	Seasonal	Joint venture	DNPW & Private	Park
2	Chamilandu Bush Camp	The Bushcamp Company	6	Bush camp	Seasonal	Joint venture	DNPW & Private	Park
3	Chichele Lodge	Sanctuary Retreats	20	Safari lodge	Year round	Joint venture	DNPW & Private	Park
4	Chikoko Trails Camp	Remote Africa Safaris	6	Bush camp	Seasonal	Joint venture	DNPW & Private	Park
5	Chindeni Bush Camp	The Bushcamp Company		Bush camp	Seasonal	Joint venture	DNPW & Private	Park
30	Chinzombo camp	Norman Carr		Safari lodge	Seasonal	Total non-local	Private	GMA
6	Croc Valley Camp	Croc Valley safaris		Safari lodge	Seasonal	Total non-local	Private	GMA
31	Croc valley camp (campground)	Croc Valley safaris		Camp site	Seasonal	Total non-local	Private	GMA
7	Crocodile River Camp	Remote Africa Safaris	6	Bush camp	Seasonal	Joint venture	DNPW & Private	Park
8	Flatdogs Camp	Flatdogs safaris		Safari lodge	Seasonal	Total non-local	Private	GMA
9	Island Bush Camp	Kamili Safaris		Bush camp	Seasonal	Joint venture	DNPW & Private	Park
10	Kafunta River Lodge	Kamili Safaris		Safari lodge	Seasonal	Total non-local	Private	GMA
11	Kaingo Camp	Shenton Safaris	16	Safari camp	Seasonal	Joint venture	DNPW & Private	Park
12	Kakuli Bush Camp	Norman Carr	8	Bush camp	Seasonal	Joint venture	DNPW & Private	Park
13	Kapani Lodge	Norman Carr		Safari lodge	Seasonal	Total non-local	Private	GMA
32	Kuyenda Bushcamp	The Bushcamp Company		Bush camp	Seasonal	Joint venture	DNPW & Private	Park
14	Lion Camp	Lion camp safaris	18	Safari camp	Seasonal	Joint venture	DNPW & Private	Park
33	Luangwa Bush Camping	Robin Pope		Bush camp	Seasonal	Joint venture	DNPW & Private	Park
15	Luangwa River Lodge	Robin Pope		Safari lodge	Seasonal	Total non-local	Private	GMA
34	Luangwa Safari House	Robin Pope		Safari camp	Seasonal	Joint venture	DNPW & Private	Park
35	Lupande Lodge	Lupande safaris		Safari lodge	Seasonal	Joint venture	DNPW & Private	Park
36	Lubi Bush Camp	Norman Carr		Bush camp	Seasonal	Joint venture	DNPW & Private	Park
16	Marula Lodge	Marula lodge safaris		Safari lodge	Seasonal	Total non-local	Private	GMA
17	Mchenja Camp	Norman Carr	10	Bush camp	Seasonal	Joint venture	DNPW & Private	Park
18	Mfuwe Lodge	The Bushcamp Company	36	Safari lodge	Year round	Joint venture	DNPW & Private	Park
37	Mobile Walking Safari	Robin Pope		Safari camp	Seasonal	Joint venture	DNPW & Private	Park
19	Mopani Safari Lodge	Mopane safaris		Safari lodge	Seasonal	Joint venture	DNPW & Private	Park
20	Mushroom Lodge	Mushroom safaris	26	Safari lodge	Year round	Joint venture	DNPW & Private	Park
38	Mwaleshi Camp	Remote Africa Safaris		Bush camp	Seasonal	Joint venture	DNPW & Private	Park
21	Mwamba Bush Camp	Shenton Safaris		Bush camp	Seasonal	Joint venture	DNPW & Private	Park
22	Nkwali Camp	Robin Pope		Safari lodge	Seasonal	Total non-local	Private	GMA
23	Nsefu Camp	Robin Pope	12	Safari camp	Seasonal	Joint venture	DNPW & Private	Park
39	Nsolo Bush Camp	Norman Carr		Bush camp	Seasonal	Joint venture	DNPW & Private	Park
24	Puku Ridge Tented Camp	Sanctuary Retreats	8	Bush camp	Seasonal	Joint venture	DNPW & Private	Park
25	Robin's House	Robin Pope		Safari camp	Seasonal	Joint venture	DNPW & Private	Park
40	Tafika Camp	Remote Africa Safaris		Bush camp	Seasonal	Total non-local	Private	GMA
26	Tena Tena Camp	Robin Pope	12	Safari camp	Seasonal	Joint venture	DNPW & Private	Park
27	Thornicroft Lodge	Thornicroft safaris		Safari lodge	Seasonal	Joint venture	DNPW & Private	Park
28	Track and Trail	Track and trail safaris		Safari lodge	Seasonal	Joint venture	DNPW & Private	Park
41	Track and Trail (campground)	Track and trail safaris		Camp site	Seasonal	Joint venture	DNPW & Private	Park
42	Wildlife Camp (bush camp)	Wildlife safaris		Bush camp	Seasonal	Total non-local	Private	GMA
43	Wildlife Camp (campground)	Wildlife safaris		Camp site	Seasonal	Total non-local	Private	GMA
29	Wildlife Camp (chalets)	Wildlife safaris		Safari lodge	Seasonal	Total non-local	Private	GMA
44	Zikomo Safaris	Zikomo safaris		Safari lodge	Seasonal	Joint venture	DNPW & Private	Park
45	Zikomo Safaris (campground)	Zikomo safaris		Safari camp	Seasonal	Joint venture	DNPW & Private	Park
46	Zungulila Bush Camp	The Bushcamp Company	8	Bush camp	Seasonal	Joint venture	DNPW & Private	Park
47	Lumimba Chanjuzi	Lumimba safaris		Hunting camp	Seasonal	Joint venture	Community, DNPW & Private	GMA
48	Lumimba Mwanya	Lumimba safaris		Hunting camp	Seasonal	Joint venture	Community, DNPW & Private	GMA
49	Lupande Lower	Lupande safaris		Hunting camp	Seasonal	Joint venture	Community, DNPW & Private	GMA
50	Lupande Upper	Lupande safaris		Hunting camp	Seasonal	Joint venture	Community, DNPW & Private	GMA
51	Munyamadzi Luwawata	Munyamadzi safaris		Hunting camp	Seasonal	Joint venture	Community, DNPW & Private	GMA
52	Munyamadzi Nyampala	Munyamadzi safaris		Hunting camp	Seasonal	Joint venture	Community, DNPW & Private	GMA
	Total		**192**					

Appendix 7.24: Average distances of settlements from PAs

National Park	Chiefdom / CRB	Village / Settlement	Distance from PA (km)		
			NP	Other' PAs	Average
KNP	Kabulwebulwe	Nalusaga	5.1	16.4	10.7
KNP	Kabulwebulwe	Chikanda	9.5	17.1	13.3
KNP	Kabulwebulwe	Lukanga	9.6	25.5	17.6
KNP	Kaindu	Kafwikamo	19.7	16.3	17.9
KNP	Kabulwebulwe	Chona	12.3	23.9	18.2
KNP	Kaindu	Kalyanyembe	29.0	8.2	18.5
KNP	Kabulwebulwe	Lungobe	17.8	29.5	23.6
KNP	Kaindu	Misamba	40.8	6.9	23.8
KNP	Kaindu	Mpusu	50.0	6.8	28.4
KNP	Kaindu	Kamilambo	41.8	36.7	39.3
SLNP	Nsefu	Chitunda	5.4	0.0	2.7
SLNP	Nsefu	Kuwaza	6.0	0.1	3.0
SLNP	Nsefu	Msandira	6.5	0.3	3.4
SLNP	Kakumbi	Yosefe	6.7	0.0	3.4
SLNP	Nsefu	Shalileni	8.5	2.6	5.5
SLNP	Kakumbi	Chilanga	11.8	3.4	7.6
SLNP	Kakumbi	Chenje	10.9	7.4	9.2
SLNP	Kakumbi	Chiwawo	10.5	8.4	9.5
SLNP	Mwanya	Mwanya	10.0	18.7	14.3
SLNP	Nsefu	Chembe	6.4	22.6	14.5
SLNP	Mukanya	Kamanga	23.6	6.1	14.9
SLNP	Mukanya	Chutika	23.8	5.9	14.9
SLNP	Mwanya	Chipako	23.8	6.0	14.9
SLNP	Malama	Kafumbe	4.7	32.2	18.5
SLNP	Malama	Kalengo	4.7	32.2	18.5
SLNP	Malama	Malama	7.6	29.4	18.5
SLNP	Malama	Malanga	7.8	29.1	18.5

Appendix 7.25: Distances of households and settlements from PAs

N/Park	CRB/Chiefdom	Settlement/ Village	Average Geographical areas' distances from Households (km)							
			N/Park	Other' PAs	N/Park gate	Village centre	All-weather road	AMU	CBD	Main fishery
KNP	Kabulwebulwe	Nalusaga	5.0	16.4	8.2	2.5	1.5	37.5	37.5	61.5
KNP	Kabulwebulwe	Chikanda	9.8	16.8	11.1	2.7	8.2	37.1	37.1	62.4
KNP	Kabulwebulwe	Lukanga	11.4	23.8	16.6	4.8	5.8	31.3	31.3	54.0
KNP	Kaindu	Kafwikamo	18.5	17.3	29.5	1.1	0.8	37.4	37.4	30.0
KNP	Kabulwebulwe	Chona	13.8	22.7	16.0	2.0	0.8	29.9	29.9	61.7
KNP	Kaindu	Kalyanyembe	27.3	9.7	35.4	2.1	0.2	52.5	52.5	13.0
KNP	Kabulwebulwe	Lungobe	18.6	28.5	21.4	1.2	1.0	24.1	24.1	61.8
KNP	Kaindu	Misamba	39.7	7.9	43.2	2.3	0.7	56.7	56.7	6.5
KNP	Kaindu	Mpusu	50.0	6.8	51.6	4.3	0.1	69.3	69.3	6.8
KNP	Kaindu	Kamilambo	41.8	36.7	45.4	4.3	0.7	27.3	27.3	36.1
SLNP	Nsefu	Chitunda	5.4	0.0	8.1	2.2	0.2	8.4	31.0	5.5
SLNP	Nsefu	Kuwaza	6.0	0.1	10.1	2.0	0.7	11.1	30.0	6.2
SLNP	Nsefu	Msandira	6.4	0.3	9.9	0.9	1.2	10.7	29.6	6.5
SLNP	Kakumbi	Yosefe	6.7	0.0	8.5	1.8	0.2	8.6	30.3	6.2
SLNP	Nsefu	Shalileni	8.5	2.6	14.1	7.6	3.4	14.9	28.6	8.5
SLNP	Kakumbi	Chilanga	11.8	3.4	11.8	10.1	0.1	10.4	29.2	10.2
SLNP	Kakumbi	Chenje	10.6	5.9	13.4	26.7	0.0	11.4	29.9	10.9
SLNP	Kakumbi	Chiwawo	10.5	8.4	14.8	14.3	0.0	12.5	30.8	10.6
SLNP	Mwanya	Mwanya	10.0	18.7	53.8	34.8	7.5	56.3	59.6	9.9
SLNP	Nsefu	Chembe	6.4	22.6	48.4	33.3	4.5	51.1	56.7	6.3
SLNP	Mukanya	Kamanga	23.6	6.2	26.8	25.9	0.1	25.2	18.4	24.3
SLNP	Mukanya	Chutika	23.8	6.0	25.7	24.8	0.1	24.2	17.8	24.2
SLNP	Mwanya	Chipako	23.8	6.0	27.8	0.5	0.1	26.2	17.4	25.6
SLNP	Malama	Kafumbe	4.7	32.2	9.2	0.1	0.0	48.0	60.3	8.7
SLNP	Malama	Kalengo	4.7	32.2	4.1	7.6	0.0	42.6	58.2	3.6
SLNP	Malama	Malama	8.8	28.1	9.7	9.2	0.5	48.3	60.3	9.1
SLNP	Malama	Malanga	6.4	30.5	9.4	0.9	0.4	48.1	60.2	8.8

Appendix 7.26: Average consumption rates of resource-use by settlements from the KNP and the SLNP

NP	Settlement/ village	Firewood	Foods & medicines	Material & fibre	Total NRs income
KNP	Lungobe	53.8	46.9	19.0	120
KNP	Kamilambo	44.8	15.1	70.5	130
KNP	Misamba	63.2	50.9	26.1	140
KNP	Nalusanga	22.2	43.0	86.9	152
KNP	Chikanda	91.9	52.7	48.4	193
KNP	Mpusu	152.6	90.2	120.5	363
KNP	Lukanga	209.3	91.7	115.0	416
KNP	Chona	271.1	55.4	152.1	479
KNP	Kafwikamo	406.3	72.8	129.6	609
KNP	Kalyanyembe	455.7	102.8	141.2	700
SLNP	Chipako	13.4	-	-	13
SLNP	Chilanga	25.5	-	-	25
SLNP	Chiwawo	18.8	13.2	17.6	50
SLNP	Chenje	16.2	24.3	19.7	60
SLNP	Mwanya	22.5	19.7	23.1	65
SLNP	Chutika	29.6	23.4	28.9	82
SLNP	Kalengo	19.5	12.5	65.3	97
SLNP	Msandira	27.8	40.5	45.1	113
SLNP	Chembe	86.8	25.0	28.9	141
SLNP	Yosefe	57.9	37.0	48.6	144
SLNP	Chitunda	57.9	17.4	75.2	150
SLNP	Kafumbe	76.8	46.3	50.2	173
SLNP	Kamanga	11.6	13.9	267.4	293
SLNP	Shalileni	80.1	120.8	115.7	317
SLNP	Malanga	201.4	39.4	365.7	606
SLNP	Kuwaza	245.4	328.7	134.7	709
SLNP	Malama	729.2	50.9	23.1	803

Appendix 7.27: The principle component loadings vectors for the combined data on well-being of households in settlements near the Kafue and South Luangwa national parks.

```
> combca_1
Standard deviations (1, .., p=14):
 [1] 2.1312379 1.5425544 1.3214618 1.2089002 1.0097842 0.9369708 0.8478035 0.6375715 0.5537960
[10] 0.4453520 0.3554532 0.3227098 0.2736705 0.1933669

Rotation (n x k) = (14 x 14):
                     PC1         PC2          PC3          PC4         PC5         PC6         PC7
NP            0.32517404  0.10401869 -0.161321815  0.439161173 -0.16595664  0.31244969 -0.06742523
OPAs          0.07915197  0.27958038 -0.289467260  0.012613721 -0.59177854 -0.48349021 -0.14911776
Gates         0.32615044  0.10034716 -0.241416695  0.263198747  0.16057376  0.26085724 -0.46509513
V_centres     0.19975045 -0.38160098 -0.009469088 -0.061095501 -0.56864003  0.30465734  0.15842578
Roads         0.34623496 -0.22522698 -0.008331429 -0.190954532  0.17138810  0.21716788 -0.20662441
AMU           0.13647375  0.41632261 -0.325258279 -0.254142808  0.01608296  0.13951695  0.33248062
CBD          -0.17801388  0.16218968 -0.285407572 -0.541484491 -0.09673994  0.39301360 -0.10338122
River         0.37002535  0.21955877  0.162771887  0.119536332  0.09823366 -0.31332011 -0.04680987
food_shortage  0.27458181 -0.07501331  0.424622228 -0.258980261 -0.09970914  0.04737716 -0.20894652
plot          0.14453033  0.45834305  0.239064539 -0.342113166  0.08942658 -0.02853274 -0.28127617
firedbrick    0.37235489  0.04245110 -0.271598130 -0.009985273  0.10195104 -0.06038164  0.38107885
Iron_sheet    0.28262862 -0.28768301 -0.243081409 -0.207059690  0.37266683 -0.25256767  0.23294111
toilet       -0.01024898 -0.38735858 -0.390087970 -0.221671809 -0.02831440 -0.32739482 -0.45684752
wellbeing    -0.34596921  0.08029442 -0.309061696  0.221814164  0.23762326  0.10397745 -0.18633958
                     PC8         PC9        PC10         PC11         PC12        PC13        PC14
NP            0.06682171 -0.08260381  0.04792999 -0.155457019 -0.450324942  0.51825223 -0.16034804
OPAs         -0.34846327  0.03662865 -0.13713485 -0.051929355 -0.166594983 -0.22941417 -0.02762179
Gates         0.20366399  0.01606920  0.05523791 -0.156109840  0.170213841 -0.55857732  0.18898864
V_centres     0.17593304  0.07996599 -0.01558599  0.144314741  0.342206627 -0.14189070 -0.41681747
Roads        -0.49048920  0.28722671 -0.44212740  0.348068838 -0.085851453  0.10303552  0.12624388
AMU           0.28911898 -0.38168541 -0.45960532  0.190766404  0.101086986  0.04087444  0.13641914
CBD          -0.07457800  0.08169591  0.52169179  0.144436052 -0.289015031 -0.05675509  0.02873355
River         0.15071648 -0.01397661  0.36837867  0.699087639  0.022987636  0.02257162 -0.12532349
food_shortage -0.23532542 -0.72138947  0.10194678 -0.166314812 -0.005725812 -0.03370510  0.02746741
plot          0.12393779  0.32570349 -0.11621360 -0.312048439  0.217225047  0.19857297 -0.43355592
firedbrick   -0.36831185  0.07970382  0.36878931 -0.265367648  0.457720184  0.19766864  0.17149612
Iron_sheet    0.08153029 -0.05282756 -0.01213126 -0.186953744 -0.400132432 -0.27685051 -0.44404474
toilet        0.30967517 -0.11426945  0.02135732  0.006397612  0.177952132  0.41652008  0.13127578
wellbeing    -0.37455550 -0.31850146 -0.02271876  0.174249611  0.270606843  0.02914070 -0.52957301
```

Appendix 7.28: Resource Consumption Data Collection Questionnaire (using ODK)

Socio-economic Data Collection Questionnaire (*using ODK*)

Undertaking a survey of socio-economic impacts of Kafue national park on Mumbwa GMA

SECTION A: Basic Household Data

"Hello, I am doing a survey on behalf of ***Copperbelt University (CBU) in collaboration with Stellenbosch University (SU), and Norwegian University of Life Sciences (NMBU)*** *on the estimation of the positive and negative impacts of the* ***Kafue National Park (KNP)*** *on your household livelihoods. I would be very grateful if you would answer a few questions to help us estimate these impacts.*

The information that you provide will be kept strictly confidential.

The interview lasts about 30 minutes. Do you agree to be interviewed? If so, is this an appropriate time?

0.1 ENUMERATOR NAME: ………………………………………..… 0.2 DATE: ………………………

1. Respondent

1.1. Gender: a) MALE ☐ b) FEMALE ☐

1.2. Ethnic group: NKOYA ☐ KAONDE ☐ ILA ☐ TONGA ☐ LOZI ☐ LUVALE ☐ c) OTHER: ……..…………

1.3. Age: ………………

1.4. Head of household: a) YES ☐ b) NO ☐

2. Geographic Location

2.1. Chief name: ……………………………………………………

2.2. Village headman/section name: ……………………………………...………...

2.3. Were you born is this village? a) YES ☐ b) NO ☐

2.4. If no how long have you lived here? a) < 5 YEARS ☐ b) 5-20 YEARS ☐ c) > 20 YEARS ☐

2.5. GPS X co-ordinate: …………………………….………...……….

2.6. GPS Y co-ordinate: ………………………………………………….

3. Size of Household

3.1. Please complete the table below about members of your household:

ID	Name	Age (years)	Sex	Relationship to the HH head	Education level attained	Main Occupation
1						
2						
3						
4						
5						
6						

4. Household Well-being

4.1 What materials have been used to build your main house?

(i) Walls (TICK ONE): a) CONCRETE BLOCKS ☐ b) FIRED BRICKS ☐ c) WOOD ☐ d) MUD & WATTLE ☐

(ii) Roof (TICK ONE): a) TILED ☐ b) IRON SHEET ☒ c) ASBESTOS ☐ d) THATCH ☐

(iii) Piped water? Y/N a) YES ☐ b) NO ☐

(iv) Drinkable water? Y/N a) YES ☐ b) NO ☐

(v) Mains electricity? Y/N a) YES ☐ b) NO ☐

5. Land and livestock

5.1 Do you own land for agriculture or pasture? a) YES ☐ b) NO ☐

(i) If yes, complete the table below:

Area	Ownership	Rent in	Rent out	Use of land	Cultivated by

5.2 Do you own livestock? a) YES ☐ b) NO ☐

(i) If yes, complete the table below:

Livestock type	Number now	Number one year ago	Number purchased (past year)	Number sold (past year)	Number consumed (past year)	Current Price* (sale price)
Cattle						
Goats						
Sheep						
Pigs						
Chickens						
Other						

*for adult animal

SECTION B: Environmental benefits

6 Employment benefits

6.1 How far is it from your home to the park boundary? ……………………………

6.2 Do you or any member of your household own any tourism business in Kafue NP?

a) YES ☐ b) NO ☐

(i) If yes, what is the nature of the business? ……………………………….

6.3 Are you or any member of the household been employed by ZAWA in Kafue NP?

a) YES ☐ b) NO ☐

(i) If yes, how many are employed? ……………………

6.4 Has any member of the household been employed by any organisation or company working in Kafue NP?

a) YES ☐ b) NO ☐

(i) If yes, how many are employed? ……………………

6.5 Do you or any member of your household collect any product(s) from the park?

a) YES ☐ b) NO ☐

(i) If yes, do you face any problem(s) collecting the products from the park?

a) YES ☐ b) NO ☐

(a) If yes, which problems?

……
………………………………………………………………………………………

6.7 Do you collect any similar products from outside the park?

a) YES ☐ b) NO ☐

6.8 And do you face any problems collecting those products?

a) YES ☐ b) NO ☐

(i) If yes, which problems?

……
……………………………………………………………………………………

6.9 Apart from collecting forest products, do you get any other benefit from the park?

a) YES ☐ b) NO ☐

(i) If yes, elaborate
……
…………………………………………………

7 Environmental goods

7.1 Please complete the table below for the environmental goods used in the last 6 months (*request the household to recall the kind and quantity of environmental goods used in the last 6 months and how much was from inside and outside the park*)

Item	Local unit	Total quantity used	Quantity from inside park	Quantity from outside park	Quantity bought	Quantity sold	Unit price
Wild food:							
Mushroom	Basket						
Wild honey	Litre						
…	…						
other	Heap						
Wild animals:							
Rats	Piece						
Rabbits	Piece						
Duiker	Piece						
Primates	Piece						
Guinea fowl	Piece						
other							
Other products:							
Building poles	Piece						
Timber	Piece						
Grass for thatching	Bundle						
Rattan	Bundle						
Bamboo	Bundle						
Sand	Heap						
Clay	Heap						
Stones	Heap						
Large carpentry items	Item						
Small carpentry items	Item						
Medicinal plants	Kg						
Handicrafts	Item						
Firewood	Bundle						
Charcoal	Sac						
Other							

SECTION C: Change in general well-being and food security

8. Well-being

8.1 How much influence do you feel that you have on decision-making in your village?

a) HIGH ☐ b) MEDIUM ☐ c) LOW ☐ d) NONE ☐

8.2 How secure do you feel from the risk of theft of your property? (TICK ONE)

a) VERY SECURE ☐ b) SECURE ☐ c) INSECURE ☐ d) VERY INSECURE ☐

8.3 How is the well-being of your household in general ('how's life')? (TICK ONE)

a) GOOD ☐ b) AVERAGE/NOT BAD ☐ c) BAD ☐ d) VERY BAD ☐

8.4 How has the general well-being of your household/community changed over the last 5 years? (TICK ONE)

a) IMPROVED ☐ b) NO CHANGE ☐ c) WORSE ☐

8.5 If there was a change, what were the main causes of this change? (List in order of their significance)

a) …………………………………………………………………………

b) ………………………………………………………………………...

c) ………………………………………………………………………...

9 Food Security

9.1 In the past year how often has your household skipped lunch and/or supper due to food shortage? (TICK ONE)

a) NEVER ☐ b) ONLY A FEW DAYS IN THE WORST MONTHS ☐ c) SOME DAYS IN EVERY MONTH ☐ d) EVERY DAY ☐

9.2 If your household has skipped lunch and/or supper due to food shortage how has the frequency changed over the last 5 years? (TICK ONE)

a) WE SKIP MEALS LESS OFTEN ☐ b) NO CHANGE ☐ c) WE SKIP MEALS MORE OFTEN ☐

9.3 If there was a change, what were the main causes of this change? (List in order of their significance)

a) …………………………………………………………………………

b) ………………………………………………………………………...

c)…………………………………………………………………………

SECTION C: Specific socio-economic impacts and their significance for household well-being (for the last 5 years)

10 Negative Impacts

10.1 Impact Rating (TICK ONE PER LINE)

(i) People who buy meat from poachers are arrested	a) HIGH ☐	b) MEDIUM ☐	c) LOW ☐	d) ZERO ☐
(ii) Encroachment in the GMAs	a) HIGH ☐	b) MEDIUM ☐	c) LOW ☐	d) ZERO ☐
(iii) Benefits of fishing mostly go to ZAWA	a) HIGH ☐	b) MEDIUM ☐	c) LOW ☐	d) ZERO ☐
(iv) Damage to crops and livestock by wildlife	a) HIGH ☐	b) MEDIUM ☐	c) LOW ☐	d) ZERO ☐
(v) Ban on bona fide hunting in the GMA	a) HIGH ☐	b) MEDIUM ☐	c) LOW ☐	d) ZERO ☐
(vi) Wild animals contaminating water sources	a) HIGH ☐	b) MEDIUM ☐	c) LOW ☐	d) ZERO ☐
(vii) CRB projects benefit leaders but not the poor	a) HIGH ☐	b) MEDIUM ☐	c) LOW ☐	d) ZERO ☐

10.2 Other negative impacts: note here any other significant negative impacts that were not included above

a) …………………………………………………………………………

b) ………………………………………………………………………...

c)…………………………………………………………………………

11 Positive Impacts

11.1 Impact Rating (TICK ONE PER LINE)

(i) Projects funded through the CRB	a) HIGH ☐	b) MEDIUM ☐	c) LOW ☐	d) ZERO ☐
(ii) Conservation of wildlife for our children	a) HIGH ☐	b) MEDIUM ☐	c) LOW ☐	d) ZERO ☐
(iii) Jobs created by the GMA, Kafue NP and tourism	a) HIGH ☐	b) MEDIUM ☐	c) LOW ☐	d) ZERO ☐
(iv) Projects funded by tourists	a) HIGH ☐	b) MEDIUM ☐	c) LOW ☐	d) ZERO ☐
(v) Projects funded by hunting outfitters.	a) HIGH ☐	b) MEDIUM ☐	c) LOW ☐	d) ZERO ☐
(vi) Access to fertile land in the GMA conservation zone	a) HIGH ☐	b) MEDIUM ☐	c) LOW ☐	d) ZERO ☐
(vii) Training from projects related to the GMA	a) HIGH ☐	b) MEDIUM ☐	c) LOW ☐	d) ZERO ☐

11.2 Other positive impacts: note here any other significant positive impacts that were not included above

a) …………………………………………………………………………

b) ………………………………………………………………………...

c)…………………………………………………………………………

12 Overall impact on household well-being/poverty

12.1 Taking into account all the positive and negative socio-economic impacts that we have been discussing how would you summarise the overall impact of Kafue NP on the well-being of your household? (TICK ONE)

a) The Kafue NP increase our well-being ☐

b) The Kafue NP slightly increases our well-being ☐

c) The Kafue NP do not increase or decrease in well-being ☐

d) The Kafue NP slightly reduce our well-being ☐

e) The Kafue NP reduce our well-being ☐

12.2 How has the contribution of Kafue NP to your household well-being changed in the last 5 years? (TICK ONE)

a) The situation now is better than 5 years ago ☐

b) The situation now is no different than 5 years ago ☐

c) The situation now is worse than 5 years ago ☐

SECTION D: Further assessing specific impacts

Key: SA = strongly agree, A = agree, N = neutral, D = disagree, SD = strongly disagree

13 Views on the CRB/GMA approach

13.1 CRB/GMA approach is effective in meeting communities different needs SA ☐ A ☐ N ☐ D ☐ SD ☐

13.2 CRB/GMA approach is effective in conservation of wildlife and forests SA ☐ A ☐ N ☐ D ☐ SD ☐

13.3 People living in the GMA conservation zone should be removed SA ☐ A ☐ N ☐ D ☐ SD ☐

14 Human wildlife conflict

14.1 What animal is the most damaging to your household?

Monkeys/baboons ☐ Elephants ☐ Lions/leopards ☐ Bush pigs ☐ Other…………………………

15 Any other comments

a) ……………………………………………………………………………

b) …………………………………………………………………………...

c)……………………………………………………………………………

<u>Thank the respondent for their time”</u>

Adapted from Bush (2009); Franks & Small (2018) and Tumusiime (2006)

Appendix 7.29: Leaked Economic Impact for the Kafue National Parks' Visitor Spending on Local Economies

KNP Leaked Economic Impact of Visitor Spending

	Direct Effects							
Sector/Spending category	**Direct Sales ZMW Millions**		**Jobs**		**Personal Income ZMW Millions**		**Value Added ZMW Millions**	
	Min	Max	Min	Max	Min	Max	Min	Max
Accomodation	6.36	14.70	16.44	37.98	1.27	2.93	4.29	9.90
Camping fees	-	2.90	-	12.04	-	0.13	-	1.55
Meals	0.46	7.01	1.18	18.12	0.09	1.40	0.31	4.72
Groceries	0.01	12.58	0.01	18.91	0.00	0.65	0.00	8.96
Gas & oil	0.01	8.93	0.01	13.42	0.00	0.46	0.01	6.36
Local transportation	0.03	13.71	0.03	14.87	0.00	0.57	0.01	7.15
Admissions & fees	3.47	7.30	14.38	30.28	0.15	0.32	1.85	3.90
Activities and Guided Tours	1.99	4.18	1.39	2.91	0.32	0.67	1.09	2.28
Souvenirs	0.04	4.84	0.03	3.37	0.01	0.77	0.02	2.64
Animal fees	4.94	4.94	20.49	20.49	0.22	0.22	2.64	2.64
Local dip & pack	1.53	1.53	1.06	1.06	0.24	0.24	0.83	0.83
Gratuities	0.01	1.74	0.01	1.21	0.00	0.28	0.01	0.95
Other expenses	0.01	1.63	0.03	6.77	0.00	0.07	0.00	0.87
Direct effects	**18.86**	**86.00**	**55**	**181**	**2.30**	**8.71**	**11.07**	**52.76**
Secondary effect	5.03	17.50	4	15	0.07	0.23	0.60	2.04
Total effects	**23.89**	**103.50**	**60**	**197**	**2.37**	**8.94**	**11.66**	**54.81**

Appendix 7.30: Leaked Economic Impact for the South Luangwa National Parks' Visitor Spending on Local Economies

SLNP Leaked Economic Impact of Visitor Spending

	Direct Effects							
Sector/Spending category	**Direct Sales ZMW Millions**		**Jobs**		**Personal Income ZMW Millions**		**Value Added ZMW Millions**	
	Min	Max	Min	Max	Min	Max	Min	Max
Accomodation	22.71	47.42	58.68	122.53	4.53	9.47	15.30	31.94
Camping fees	-	-	-	-	-	-	-	-
Meals	1.29	19.82	3.34	51.20	0.26	3.96	0.87	13.35
Groceries	0.02	35.54	0.03	53.40	0.00	1.84	0.01	25.30
Gas & oil	0.03	25.24	0.04	37.92	0.00	1.31	0.02	17.96
Local transportation	0.07	33.21	0.07	36.02	0.00	1.37	0.03	17.33
Admissions & fees	0.18	0.46	0.75	1.91	0.01	0.02	0.10	0.25
Activities and Guided Tours	6.71	16.60	4.67	11.55	1.07	2.65	3.66	9.06
Souvenirs	0.08	8.55	0.05	5.95	0.01	1.36	0.04	4.67
Animal fees	13.94	13.94	57.80	57.80	0.61	0.61	7.45	7.45
Local dip & pack	5.77	5.77	4.02	4.02	0.92	0.92	3.15	3.15
Gratuities	0.03	4.92	0.02	3.42	0.01	0.79	0.02	2.69
Other expenses	0.02	4.60	0.09	19.06	0.00	0.20	0.01	2.45
Direct effects	**50.85**	**216.06**	**130**	**405**	**7.43**	**24.50**	**30.66**	**135.60**
Secondary effect	12.62	40.89	12	36	0.18	0.55	1.56	4.86
Total effects	**63.47**	**256.94**	**141**	**441**	**7.60**	**25.05**	**32.23**	**140.46**

Appendix 7.31: Ordinary Least Squares (OLS), 2-step Heckman model and the Stargazer table for firewood consumption by households near the KNP

```
Call:
lm(formula = logFirewood ~ NP_bound + OPAs_bound + V_centre +
    All_w_road + M_fishery, data = KNP_2_2020_R_Analysis_2_EXAMINERS)

Residuals:
    Min      1Q  Median      3Q     Max
-4.6114 -1.1374  0.1995  1.3393  3.8335

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept)  3.474169   0.547516   6.345 8.59e-10 ***
NP_bound     0.046625   0.012112   3.849 0.000146 ***
OPAs_bound   0.026618   0.015493   1.718 0.086851 .
V_centre    -0.198105   0.061630  -3.214 0.001456 **
All_w_road   0.214822   0.040897   5.253 2.92e-07 ***
M_fishery   -0.024233   0.007979  -3.037 0.002607 **
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```

```
Residual standard error: 1.69 on 288 degrees of freedom
  (167 observations deleted due to missingness)
Multiple R-squared:  0.2156,	Adjusted R-squared:  0.2019 
F-statistic: 15.83 on 5 and 288 DF,  p-value: 8.981e-14

> bptest(ols12_t)

	studentized Breusch-Pagan test

data:  ols12_t
BP = 9.6865, df = 5, p-value = 0.08462

> # Two-step estimation with LFP selection equation
> heck12<-
heckit(FWC~NP_bound+OPAs_bound+V_centre+All_w_road+M_fishery+Mumbwa_GMA,outco
me=logFirewood~NP_bound+OPAs_bound+V_centre+All_w_road+M_fishery,data =
KNP_2_2020_R_Analysis_2_EXAMINERS)
> summary(heck12)
--------------------------------------------
Tobit 2 model (sample selection model)
2-step Heckman / heckit estimation
461 observations (167 censored and 294 observed)
16 free parameters (df = 446)
Probit selection equation:
                Estimate Std. Error t value Pr(>|t|)    
(Intercept)     1.169982   0.323952   3.612 0.000339 ***
NP_bound       -0.022272   0.007455  -2.987 0.002968 ** 
OPAs_bound     -0.013035   0.009385  -1.389 0.165547    
V_centre        0.025389   0.037631   0.675 0.500229    
All_w_road     -0.025413   0.029387  -0.865 0.387638    
M_fishery      -0.012897   0.009759  -1.322 0.186995    
Mumbwa_GMATRUE  0.970297   0.373418   2.598 0.009675 ** 
Outcome equation:
             Estimate Std. Error t value Pr(>|t|)    
(Intercept)  3.813030   0.709387   5.375 1.24e-07 ***
NP_bound     0.056365   0.018115   3.111  0.00198 ** 
OPAs_bound   0.035143   0.019706   1.783  0.07520 .  
V_centre    -0.221717   0.070244  -3.156  0.00171 ** 
All_w_road   0.221929   0.043368   5.117 4.61e-07 ***
M_fishery   -0.028320   0.009864  -2.871  0.00429 ** 
Multiple R-Squared:0.2171,	Adjusted R-Squared:0.2008
   Error terms:
              Estimate Std. Error t value Pr(>|t|)
invMillsRatio  -0.9087     1.2062  -0.753    0.452
sigma           1.7909         NA      NA       NA
rho            -0.5074         NA      NA       NA
--------------------------------------------
> # stargazer table
> stargazer(ols12_t, heck12, type="text",
+           title="Household's Firewood Consumption Regression",
single.row=TRUE,
+           omit.stat=c("LL","ser","f"), no.space=TRUE)

Household's Firewood Consumption Regression
=======================================================
                            Dependent variable:
```

```
                    ----------------------------------
                               logFirewood
                          OLS             Heckman
                                         selection
                          (1)               (2)
--------------------------------------------------------
NP_bound            0.047*** (0.012)  0.056*** (0.018)
OPAs_bound           0.027* (0.015)    0.035* (0.020)
V_centre            -0.198*** (0.062) -0.222*** (0.070)
All_w_road          0.215*** (0.041)  0.222*** (0.043)
M_fishery           -0.024*** (0.008) -0.028*** (0.010)
Constant            3.474*** (0.548)  3.813*** (0.709)
--------------------------------------------------------
Observations              294               461
R2                       0.216             0.217
Adjusted R2              0.202             0.201
rho                                        -0.507
Inverse Mills Ratio                    -0.909 (1.206)
========================================================
Note:                        *p<0.1; **p<0.05; ***p<0.01
```

Appendix 7.32: Ordinary Least Squares (OLS), 2-step Heckman model and the Stargazer table for firewood consumption by households near the SLNP

```
Call:
lm(formula = recipFirewood ~ NP_bound + OPAs_bound + All_w_road +
    NP_Gate, data = SLNP_2020_R_Analysis_2_EXAMINERS)

Residuals:
     Min       1Q   Median       3Q      Max
-0.61246 -0.33678  0.02021  0.19880  1.62775

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)  0.4282604  0.0476930   8.980   <2e-16 ***
NP_bound     0.0006783  0.0036067   0.188   0.8510
OPAs_bound   0.0038653  0.0030025   1.287   0.1989
All_w_road  -0.0218666  0.0104568  -2.091   0.0373 *
NP_Gate      0.0036108  0.0028116   1.284   0.2000
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.3833 on 308 degrees of freedom
  (16 observations deleted due to missingness)
Multiple R-squared:  0.03751, Adjusted R-squared:  0.02501
F-statistic: 3.001 on 4 and 308 DF,  p-value: 0.0188

> bptest(ols1_SL2_t)
```

```
        studentized Breusch-Pagan test

data:  ols1_SL2_t
BP = 3.2167, df = 4, p-value = 0.5222

> # Two-step estimation with LFP selection equation
> heck1_SL2_t<-
heckit(FWC~NP_bound+OPAs_bound+NP_Gate+All_w_road+Lupande_GMA,outcome=recipFi
rewood~NP_bound+NP_Gate+OPAs_bound+All_w_road,data =
SLNP_2020_R_Analysis_2_EXAMINERS)
> summary(heck1_SL2_t)
--------------------------------------------
Tobit 2 model (sample selection model)
2-step Heckman / heckit estimation
329 observations (16 censored and 313 observed)
14 free parameters (df = 316)
Probit selection equation:
                Estimate Std. Error t value Pr(>|t|)
(Intercept)      2.22999    0.98543   2.263  0.02432 *
NP_bound        -0.02291    0.02729  -0.839  0.40190
OPAs_bound      -0.03735    0.01300  -2.873  0.00435 **
NP_Gate          0.01082    0.02335   0.463  0.64356
All_w_road      -0.04766    0.05157  -0.924  0.35609
Lupande_GMATRUE -0.09478    0.87287  -0.109  0.91360
Outcome equation:
             Estimate Std. Error t value Pr(>|t|)
(Intercept)  0.498753   0.152581   3.269   0.0012 **
NP_bound     0.009439   0.016833   0.561   0.5754
NP_Gate     -0.003491   0.013642  -0.256   0.7982
OPAs_bound   0.019217   0.027050   0.710   0.4779
All_w_road   0.001975   0.046337   0.043   0.9660
Multiple R-Squared:0.0394,    Adjusted R-Squared:0.0237
   Error terms:
              Estimate Std. Error t value Pr(>|t|)
invMillsRatio  -1.7720     2.9570  -0.599    0.549
sigma           0.8241         NA      NA       NA
rho            -2.1501         NA      NA       NA
--------------------------------------------
> # stargazer table
> stargazer(ols1_SL2_t, heck1_SL2_t, type="text",
+           title="Household's Firewood Consumption Regression",
single.row=TRUE,
+           omit.stat=c("LL","ser","f"), no.space=TRUE)

Household's Firewood Consumption Regression
=====================================================
                          Dependent variable:
                    ---------------------------------
                             recipFirewood
                          OLS            Heckman
                                        selection
                          (1)              (2)
-----------------------------------------------------
NP_bound             0.001 (0.004)    0.009 (0.017)
OPAs_bound           0.004 (0.003)    0.019 (0.027)
All_w_road          -0.022** (0.010)  0.002 (0.046)
NP_Gate              0.004 (0.003)   -0.003 (0.014)
```

```
Constant            0.428*** (0.048) 0.499*** (0.153)
-----------------------------------------------------
Observations              313              329
R2                       0.038            0.039
Adjusted R2              0.025            0.024
rho                                      -2.150
Inverse Mills Ratio                  -1.772 (2.957)
=====================================================
Note:                    *p<0.1; **p<0.05; ***p<0.01
```

Appendix 7.33: Ordinary Least Squares (OLS), 2-step Heckman model and the Stargazer table for food and medicine consumption by household near the KNP

```
Call:
lm(formula = recipFoods_medicines ~ NP_bound + OPAs_bound + V_centre +
    All_w_road + M_fishery, data = KNP_2_2020_R_Analysis_2_EXAMINERS)

Residuals:
    Min      1Q  Median      3Q     Max
-0.8031 -0.3270 -0.1982 -0.0259  8.4562

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept)  0.287113   0.228595   1.256  0.20987
NP_bound    -0.007380   0.005374  -1.373  0.17047
OPAs_bound   0.003349   0.005622   0.596  0.55176
V_centre     0.060545   0.025522   2.372  0.01816 *
All_w_road  -0.061801   0.019916  -3.103  0.00205 **
M_fishery    0.003294   0.003923   0.840  0.40168
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.8957 on 393 degrees of freedom
  (62 observations deleted due to missingness)
Multiple R-squared:  0.04072,	Adjusted R-squared:  0.02852
F-statistic: 3.336 on 5 and 393 DF,  p-value: 0.00579

> bptest(ols22_t)

	studentized Breusch-Pagan test

data:  ols22_t
BP = 9.7494, df = 5, p-value = 0.08266

> # Two-step estimation with LFP selection equation
> heck22_t<-
heckit(FMC~NP_bound+OPAs_bound+V_centre+All_w_road+M_fishery+Mumbwa_GMA,outco
me=recipFoods_medicines~NP_bound+OPAs_bound+V_centre+All_w_road+M_fishery,dat
a = KNP_2_2020_R_Analysis_2_EXAMINERS)
```

```
> summary(heck22_t)
--------------------------------------------
Tobit 2 model (sample selection model)
2-step Heckman / heckit estimation
461 observations (62 censored and 399 observed)
16 free parameters (df = 446)
Probit selection equation:
               Estimate Std. Error t value Pr(>|t|)
(Intercept)     0.79517    0.42242   1.882  0.06043 .
NP_bound        0.02791    0.01021   2.732  0.00654 **
OPAs_bound     -0.03345    0.01187  -2.818  0.00505 **
V_centre        0.03599    0.04946   0.728  0.46715
All_w_road      0.04522    0.03294   1.373  0.17053
M_fishery       0.01718    0.01274   1.348  0.17824
Mumbwa_GMATRUE -0.85408    0.50709  -1.684  0.09283 .
Outcome equation:
             Estimate Std. Error t value Pr(>|t|)
(Intercept)  0.513767   0.321544   1.598   0.1108
NP_bound    -0.012744   0.007591  -1.679   0.0939 .
OPAs_bound   0.007057   0.006909   1.021   0.3076
V_centre     0.058985   0.027177   2.170   0.0305 *
All_w_road  -0.072014   0.023052  -3.124   0.0019 **
M_fishery    0.004186   0.004216   0.993   0.3213
Multiple R-Squared:0.0439,    Adjusted R-Squared:0.0293
   Error terms:
              Estimate Std. Error t value Pr(>|t|)
invMillsRatio  -0.7492     0.6899  -1.086    0.278
sigma           0.9729         NA      NA       NA
rho            -0.7701         NA      NA       NA
--------------------------------------------
> # stargazer table
> stargazer(ols22_t, heck22_t, type="text",
+           title="Household's Food & Medicines Consumption Regression",
single.row=TRUE,
+           omit.stat=c("LL","ser","f"), no.space=TRUE)

Household's Food & Medicines Consumption Regression
=======================================================
                           Dependent variable:
                    -----------------------------------
                           recipFoods_medicines
                           OLS              Heckman
                                           selection
                           (1)                (2)
-------------------------------------------------------
NP_bound             -0.007 (0.005)     -0.013* (0.008)
OPAs_bound            0.003 (0.006)      0.007 (0.007)
V_centre             0.061** (0.026)    0.059** (0.027)
All_w_road          -0.062*** (0.020) -0.072*** (0.023)
M_fishery             0.003 (0.004)      0.004 (0.004)
Constant              0.287 (0.229)      0.514 (0.322)
-------------------------------------------------------
Observations               399                461
R2                        0.041              0.044
Adjusted R2               0.029              0.029
rho                                         -0.770
Inverse Mills Ratio                    -0.749 (0.690)
```

```
===========================================================
Note:                           *p<0.1; **p<0.05; ***p<0.01
```

Appendix 7.34: Ordinary Least Squares (OLS), 2-step Heckman model and the Stargazer table for food and medicines consumption by households near the SLNP.

```
Call:
lm(formula = Foods_medicines ~ NP_bound + OPAs_bound + NP_Gate + 
    All_w_road, data = SLNP_2020_R_Analysis_2_EXAMINERS)

Residuals:
   Min     1Q Median     3Q    Max 
-8.526 -5.669 -3.875  1.169 90.476 

Coefficients:
             Estimate Std. Error t value Pr(>|t|)    
(Intercept)  5.850037   1.752703   3.338 0.000971 ***
NP_bound     0.132911   0.131373   1.012 0.312641    
OPAs_bound  -0.058607   0.114920  -0.510 0.610506    
NP_Gate     -0.005213   0.106440  -0.049 0.960974    
All_w_road  -0.208441   0.390963  -0.533 0.594397    
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 12.86 on 254 degrees of freedom
  (70 observations deleted due to missingness)
Multiple R-squared:  0.01202,	Adjusted R-squared:  -0.003535 
F-statistic: 0.7728 on 4 and 254 DF,  p-value: 0.5438



--------------------------------------------
Tobit 2 model (sample selection model)
2-step Heckman / heckit estimation
329 observations (70 censored and 259 observed)
14 free parameters (df = 316)
Probit selection equation:
                  Estimate Std. Error t value Pr(>|t|)  
(Intercept)      1.4265154  0.6280849   2.271   0.0238 *
NP_bound        -0.0003206  0.0174194  -0.018   0.9853  
OPAs_bound      -0.0216601  0.0095846  -2.260   0.0245 *
NP_Gate          0.0053825  0.0152957   0.352   0.7252  
All_w_road      -0.0476636  0.0369837  -1.289   0.1984  
Lupande_GMATRUE -0.5630414  0.5686124  -0.990   0.3228  
Outcome equation:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  7.48969    9.68719   0.773    0.440
NP_bound     0.15774    0.19595   0.805    0.421
OPAs_bound  -0.01124    0.29863  -0.038    0.970
NP_Gate     -0.04296    0.24406  -0.176    0.860
All_w_road  -0.10610    0.71372  -0.149    0.882
Multiple R-Squared:0.0121,    Adjusted R-Squared:-0.0074
   Error terms:
              Estimate Std. Error t value Pr(>|t|)
invMillsRatio  -4.5622    26.5054  -0.172    0.863
sigma          13.0776         NA      NA       NA
```

```
rho              -0.3489         NA       NA        NA
--------------------------------------------
```

```
Household's Food & Medicines Consumption Regression
====================================================
                           Dependent variable:
                    --------------------------------
                              Foods_medicines
                           OLS            Heckman
                                         selection
                           (1)              (2)
----------------------------------------------------
NP_bound              0.133 (0.131)    0.158 (0.196)
OPAs_bound           -0.059 (0.115)  -0.011 (0.299)
NP_Gate              -0.005 (0.106)  -0.043 (0.244)
All_w_road           -0.208 (0.391)  -0.106 (0.714)
Constant            5.850*** (1.753)  7.490 (9.687)
----------------------------------------------------
Observations              259              329
R2                       0.012            0.012
Adjusted R2             -0.004           -0.007
rho                                      -0.349
Inverse Mills Ratio                 -4.562 (26.505)
====================================================
Note:                    *p<0.1; **p<0.05; ***p<0.01
```

Appendix 7.35: Ordinary Least Squares (OLS), 2-step Heckman model and the Stargazer table for material and fibre consumption by households near the KNP.

```
Call:
lm(formula = recipMaterials_fibres ~ NP_bound + OPAs_bound + 
    V_centre + All_w_road + M_fishery, data = KNP_2_2020_R_Analysis_2_EXAMINERS)

Residuals:
    Min      1Q  Median      3Q     Max 
-0.6135 -0.2540 -0.1566  0.0731  4.3567 

Coefficients:
             Estimate Std. Error t value Pr(>|t|)    
(Intercept) -0.040377   0.144300  -0.280 0.779781    
NP_bound     0.005494   0.003331   1.649 0.099941 .  
OPAs_bound   0.011937   0.003488   3.422 0.000692 ***
V_centre    -0.015361   0.015560  -0.987 0.324211    
All_w_road  -0.016004   0.011724  -1.365 0.173066    
M_fishery    0.001452   0.002391   0.607 0.544038    
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.5227 on 368 degrees of freedom
  (87 observations deleted due to missingness)
Multiple R-squared:  0.07856,	Adjusted R-squared:  0.06604
```

```
F-statistic: 6.275 on 5 and 368 DF,  p-value: 1.329e-05

> bptest(ols32_t)

	studentized Breusch-Pagan test

data:  ols32_t
BP = 5.2541, df = 5, p-value = 0.3857

> # Two-step estimation with LFP selection equation
> heck32_t<-
heckit(MFC~NP_bound+OPAs_bound+V_centre+All_w_road+M_fishery+Mumbwa_GMA,outcome=recipMate
= KNP_2_2020_R_Analysis_2_EXAMINERS)
> summary(heck32_t)
--------------------------------------------
Tobit 2 model (sample selection model)
2-step Heckman / heckit estimation
461 observations (87 censored and 374 observed)
16 free parameters (df = 446)
Probit selection equation:
                Estimate Std. Error t value Pr(>|t|)    
(Intercept)     0.536567   0.359014   1.495  0.13574    
NP_bound        0.018773   0.008573   2.190  0.02906 *  
OPAs_bound      0.013205   0.010789   1.224  0.22164    
V_centre        0.084830   0.048455   1.751  0.08068 .  
All_w_road      0.056847   0.039586   1.436  0.15169    
M_fishery      -0.037989   0.011759  -3.231  0.00133 ** 
Mumbwa_GMATRUE  1.848405   0.416816   4.435 1.16e-05 ***
Outcome equation:
             Estimate Std. Error t value Pr(>|t|)  
(Intercept) -0.458524   0.230909  -1.986   0.0477 *
NP_bound     0.010083   0.004330   2.329   0.0203 *
OPAs_bound   0.008977   0.004316   2.080   0.0381 *
V_centre     0.005541   0.020510   0.270   0.7872  
All_w_road  -0.003521   0.014852  -0.237   0.8127  
M_fishery    0.002675   0.002908   0.920   0.3581  
Multiple R-Squared:0.1056,	Adjusted R-Squared:0.091
   Error terms:
              Estimate Std. Error t value Pr(>|t|)   
invMillsRatio   0.7607     0.2570    2.96  0.00324 **
sigma           0.6838         NA      NA       NA   
rho             1.1123         NA      NA       NA   
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
--------------------------------------------
> # stargazer table
> stargazer(ols32_t, heck32_t, type="text",
+           title="Household's Material & Fibre Consumption Regression", single.row=TRUE,
+           omit.stat=c("LL","ser","f"), no.space=TRUE)

Household's Material & Fibre Consumption Regression
=====================================================
                          Dependent variable:        
                    ---------------------------------
                          recipMaterials_fibres      
                          OLS             Heckman    
                                         selection   
                          (1)               (2)      
-----------------------------------------------------
NP_bound              0.005* (0.003)  0.010** (0.004)
OPAs_bound          0.012*** (0.003) 0.009** (0.004) 
V_centre              -0.015 (0.016)   0.006 (0.021) 
All_w_road            -0.016 (0.012)   -0.004 (0.015)
```

```
M_fishery              0.001 (0.002)    0.003 (0.003)
Constant              -0.040 (0.144)  -0.459** (0.231)
-----------------------------------------------------
Observations               374              461
R2                        0.079            0.106
Adjusted R2               0.066            0.091
rho                                        1.112
Inverse Mills Ratio                   0.761*** (0.257)
=====================================================
Note:                      *p<0.1; **p<0.05; ***p<0.01
```

Appendix 7.36: Ordinary Least Squares (OLS), 2-step Heckman model and the Stargazer table for material and fibre consumption by households near the SLNP.

```
Call:
lm(formula = sqrtMaterials_fibres ~ NP_bound + OPAs_bound + All_w_road + 
    NP_Gate, data = SLNP_2020_R_Analysis_2_EXAMINERS)

Residuals:
    Min      1Q  Median      3Q     Max 
-2.3246 -1.1438 -0.4750  0.7943 11.8347 

Coefficients:
            Estimate Std. Error t value Pr(>|t|)    
(Intercept)  2.21951    0.21203  10.468   <2e-16 ***
NP_bound     0.01785    0.01586   1.126   0.2613    
OPAs_bound   0.02564    0.01349   1.901   0.0584 .  
All_w_road   0.05011    0.04565   1.098   0.2733    
NP_Gate     -0.02487    0.01249  -1.992   0.0474 *  
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 1.613 on 279 degrees of freedom
  (45 observations deleted due to missingness)
Multiple R-squared:  0.01923,	Adjusted R-squared:  0.00517 
F-statistic: 1.368 on 4 and 279 DF,  p-value: 0.2453

> bptest(ols3_SL2_t)

	studentized Breusch-Pagan test

data:  ols3_SL2_t
BP = 3.6973, df = 4, p-value = 0.4485

> # Two-step estimation with LFP selection equation
> heck3_SL2_t<-
heckit(MFC~NP_bound+OPAs_bound+NP_Gate+All_w_road+Lupande_GMA,outcome=sqrtMat
erials_fibres~NP_bound+OPAs_bound+NP_Gate+All_w_road,data = 
SLNP_2020_R_Analysis_2_EXAMINERS)
> summary(heck3_SL2_t)
--------------------------------------------
Tobit 2 model (sample selection model)
2-step Heckman / heckit estimation
329 observations (45 censored and 284 observed)
```

```
14 free parameters (df = 316)
Probit selection equation:
                 Estimate Std. Error t value Pr(>|t|)
(Intercept)      1.058224   0.750718   1.410    0.160
NP_bound        -0.001289   0.020144  -0.064    0.949
OPAs_bound      -0.015270   0.010143  -1.505    0.133
NP_Gate          0.014457   0.017916   0.807    0.420
All_w_road      -0.019684   0.043404  -0.454    0.650
Lupande_GMATRUE -0.087202   0.683609  -0.128    0.899
Outcome equation:
             Estimate Std. Error t value Pr(>|t|)
(Intercept) -0.285818   9.334371  -0.031    0.976
NP_bound     0.003637   0.068452   0.053    0.958
OPAs_bound  -0.027895   0.205156  -0.136    0.892
NP_Gate      0.028127   0.200418   0.140    0.888
All_w_road  -0.038463   0.351962  -0.109    0.913
Multiple R-Squared:0.0201,    Adjusted R-Squared:0.0025
   Error terms:
              Estimate Std. Error t value Pr(>|t|)
invMillsRatio    8.465     31.481   0.269    0.788
sigma            5.145         NA      NA       NA
rho              1.645         NA      NA       NA
--------------------------------------------
> # stargazer table
> stargazer(ols3_SL2_t, heck3_SL2_t, type="text",
+           title="Household's Material & Fibre Consumption Regression", single.row=TRUE,
+           omit.stat=c("LL","ser","f"), no.space=TRUE)

Household's Material & Fibre Consumption Regression
===================================================
                         Dependent variable:
                    -------------------------------
                        sqrtMaterials_fibres
                         OLS            Heckman
                                       selection
                         (1)              (2)
---------------------------------------------------
NP_bound             0.018 (0.016)   0.004 (0.068)
OPAs_bound           0.026* (0.013)  -0.028 (0.205)
All_w_road           0.050 (0.046)   -0.038 (0.352)
NP_Gate             -0.025** (0.012) 0.028 (0.200)
Constant            2.220*** (0.212) -0.286 (9.334)
---------------------------------------------------
Observations              284             329
R2                       0.019           0.020
Adjusted R2              0.005           0.003
rho                                      1.645
Inverse Mills Ratio                  8.465 (31.481)
===================================================
Note:                  *p<0.1; **p<0.05; ***p<0.01
```

Appendix 7.37: Multi-collinearity testing of the KNP data.

Correlation:

```
             NP_bound  OPAs_bound    NP_Gate    V_centre  All_w_road     AMU_CBD
NP_bound    1.0000000 -0.22268613  0.9288683  0.22144754 -0.40747305  0.51932758
OPAs_bound -0.2226861  1.00000000 -0.1979598  0.06903557  0.08518814 -0.80525333
NP_Gate     0.9288683 -0.19795984  1.0000000  0.20865321 -0.39513146  0.53741525
V_centre    0.2214475  0.06903557  0.2086532  1.00000000  0.35864585  0.03853747
All_w_road -0.4074731  0.08518814 -0.3951315  0.35864585  1.00000000 -0.20514337
AMU_CBD     0.5193276 -0.80525333  0.5374152  0.03853747 -0.20514337  1.00000000
M_fishery  -0.7771588  0.54061742 -0.8667946 -0.11591639  0.34484297 -0.82898471
            M_fishery
NP_bound   -0.7771588
OPAs_bound  0.5406174
NP_Gate    -0.8667946
V_centre   -0.1159164
All_w_road  0.3448430
AMU_CBD    -0.8289847
M_fishery   1.0000000
```

```
Call:
lm(formula = NP_bound ~ OPAs_bound + V_centre + All_w_road + 
    M_fishery)

Residuals:
    Min      1Q  Median      3Q     Max 
-31.185  -6.100   0.984   5.733  37.145 

Coefficients:
            Estimate Std. Error t value Pr(>|t|)    
(Intercept) 36.64330    1.04509  35.062  < 2e-16 ***
OPAs_bound   0.31807    0.04753   6.692 6.47e-11 ***
V_centre     1.44001    0.21661   6.648 8.51e-11 ***
All_w_road  -1.16602    0.16200  -7.198 2.54e-12 ***
M_fishery   -0.52866    0.02320 -22.785  < 2e-16 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 8.418 on 456 degrees of freedom
Multiple R-squared:  0.7022,	Adjusted R-squared:  0.6996 
F-statistic: 268.8 on 4 and 456 DF,  p-value: < 2.2e-16
```

```
Call:
lm(formula = OPAs_bound ~ NP_bound + V_centre + All_w_road + 
    M_fishery)

Residuals:
     Min       1Q   Median       3Q      Max 
-27.7325  -6.4654  -0.9096   3.7276  28.2822 

Coefficients:
            Estimate Std. Error t value Pr(>|t|)    
(Intercept) -4.71329    1.87607  -2.512   0.0123 *  
NP_bound     0.28116    0.04201   6.692 6.47e-11 ***
V_centre     0.57842    0.21157   2.734   0.0065 ** 
All_w_road  -0.35219    0.15988  -2.203   0.0281 *  
```

```
M_fishery    0.40670    0.02559  15.892  < 2e-16 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 7.915 on 456 degrees of freedom
Multiple R-squared:  0.4017,   Adjusted R-squared:  0.3965
F-statistic: 76.55 on 4 and 456 DF,  p-value: < 2.2e-16



Call:
lm(formula = V_centre ~ NP_bound + OPAs_bound + All_w_road +
    M_fishery)

Residuals:
    Min      1Q  Median      3Q     Max
-3.8852 -1.2908 -0.3652  0.9380  6.5253

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept)  0.140881   0.414681   0.340   0.7342
NP_bound     0.061358   0.009230   6.648 8.51e-11 ***
OPAs_bound   0.027882   0.010198   2.734   0.0065 **
All_w_road   0.383261   0.030383  12.614  < 2e-16 ***
M_fishery   -0.002118   0.007003  -0.302   0.7625
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 1.738 on 456 degrees of freedom
Multiple R-squared:  0.3063,   Adjusted R-squared:  0.3002
F-statistic: 50.33 on 4 and 456 DF,  p-value: < 2.2e-16



Call:
lm(formula = All_w_road ~ NP_bound + OPAs_bound + V_centre +
    M_fishery)

Residuals:
    Min      1Q  Median      3Q     Max
-5.4855 -0.9970 -0.3537  0.8113  8.7522

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept)  2.082489   0.541666   3.845 0.000138 ***
NP_bound    -0.087495   0.012156  -7.198 2.54e-12 ***
OPAs_bound  -0.029897   0.013572  -2.203 0.028108 *
V_centre     0.674952   0.053507  12.614  < 2e-16 ***
M_fishery    0.012688   0.009275   1.368 0.172007
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 2.306 on 456 degrees of freedom
Multiple R-squared:  0.3845,   Adjusted R-squared:  0.3791
F-statistic: 71.21 on 4 and 456 DF,  p-value: < 2.2e-16
```

```
Call:
lm(formula = M_fishery ~ NP_bound + OPAs_bound + V_centre + All_w_road)

Residuals:
    Min      1Q  Median      3Q     Max 
-46.409  -7.912   2.583   7.111  53.835 

Coefficients:
            Estimate Std. Error t value Pr(>|t|)    
(Intercept) 46.03033    1.74446  26.387   <2e-16 ***
NP_bound    -1.00703    0.04420 -22.785   <2e-16 ***
OPAs_bound   0.87642    0.05515  15.892   <2e-16 ***
V_centre    -0.09468    0.31308  -0.302    0.762    
All_w_road   0.32210    0.23546   1.368    0.172    
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 11.62 on 456 degrees of freedom
Multiple R-squared:  0.7473,	Adjusted R-squared:  0.7451 
F-statistic: 337.1 on 4 and 456 DF,  p-value: < 2.2e-16
```

Appendix 7.38: Multi-collinearity testing of the SLNP data.

Correlation:

```
             NP_bound  OPAs_bound   NP_Gate  V_centre All_w_road       AMU        CBD
NP_bound    1.0000000 -0.24603203 0.3505343 0.5679630 0.19275000 0.1525228 -0.4038011
OPAs_bound -0.2460320  1.00000000 0.3347817 0.2981494 0.01793242 0.7067252  0.6951144
NP_Gate     0.3505343  0.33478173 1.0000000 0.8964479 0.75515117 0.8199357  0.5063310
V_centre    0.5679630  0.29814943 0.8964479 1.0000000 0.56240901 0.7032699  0.2859965
All_w_road  0.1927500  0.01793242 0.7551512 0.5624090 1.00000000 0.6556940  0.5762923
AMU         0.1525228  0.70672518 0.8199357 0.7032699 0.65569395 1.0000000  0.7959299
CBD        -0.4038011  0.69511437 0.5063310 0.2859965 0.57629225 0.7959299  1.0000000
M_fishery   0.9790315 -0.18514128 0.3542228 0.5711536 0.18430834 0.1963035 -0.3809471
            M_fishery
NP_bound    0.9790315
OPAs_bound -0.1851413
NP_Gate     0.3542228
V_centre    0.5711536
All_w_road  0.1843083
AMU         0.1963035
CBD        -0.3809471
M_fishery   1.0000000
```

```
Call:
lm(formula = NP_bound ~ OPAs_bound + All_w_road + NP_Gate)

Residuals:
     Min       1Q   Median       3Q      Max 
-11.9354  -4.4016   0.5093   5.7751  11.5496 

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
```

```
(Intercept)  7.72749    0.60436  12.786  < 2e-16 ***
OPAs_bound  -0.39394    0.03817 -10.320  < 2e-16 ***
All_w_road  -0.92944    0.15012  -6.191  1.8e-09 ***
NP_Gate      0.40119    0.03600  11.145  < 2e-16 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 6.035 on 325 degrees of freedom
Multiple R-squared:  0.3484,   Adjusted R-squared:  0.3424
F-statistic: 57.93 on 3 and 325 DF,  p-value: < 2.2e-16

Call:
lm(formula = OPAs_bound ~ NP_bound + All_w_road + NP_Gate)

Residuals:
    Min      1Q  Median      3Q     Max
-9.8620 -4.5095 -0.7645  0.6858 27.4897

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  5.30426    0.88689   5.981 5.85e-09 ***
NP_bound    -0.62654    0.06071 -10.320  < 2e-16 ***
All_w_road  -1.70860    0.17632  -9.691  < 2e-16 ***
NP_Gate      0.59947    0.04175  14.360  < 2e-16 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 7.611 on 325 degrees of freedom
Multiple R-squared:  0.4279,   Adjusted R-squared:  0.4226
F-statistic: 81.04 on 3 and 325 DF,  p-value: < 2.2e-16



Call:
lm(formula = All_w_road ~ NP_bound + OPAs_bound + NP_Gate)

Residuals:
    Min      1Q  Median      3Q     Max
-4.2710 -1.2772 -0.2372  0.7587  4.5129

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept) -0.598233   0.256802  -2.330   0.0204 *
NP_bound    -0.113513   0.018334  -6.191  1.8e-09 ***
OPAs_bound  -0.131202   0.013539  -9.691  < 2e-16 ***
NP_Gate      0.216091   0.008664  24.943  < 2e-16 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 2.109 on 325 degrees of freedom
Multiple R-squared:  0.6712,   Adjusted R-squared:  0.6681
F-statistic: 221.1 on 3 and 325 DF,  p-value: < 2.2e-16



Call:
lm(formula = NP_Gate ~ NP_bound + OPAs_bound + All_w_road)
```

```
Residuals:
     Min       1Q   Median       3Q      Max
-23.1156  -2.0520   0.5393   2.3271  18.3421

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  2.94519    0.95733   3.076  0.00227 **
NP_bound     0.68924    0.06184  11.145  < 2e-16 ***
OPAs_bound   0.64753    0.04509  14.360  < 2e-16 ***
All_w_road   3.03974    0.12187  24.943  < 2e-16 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 7.91 on 325 degrees of freedom
Multiple R-squared:  0.7638,   Adjusted R-squared:  0.7616
F-statistic: 350.3 on 3 and 325 DF,  p-value: < 2.2e-16
```

Appendix 7.39: Socio-economic characteristics and resource consumption bivariate analyses for the Kabulwebulwe's and Kaindu's households

Variable tested for HHs	Mean/Av (n = 468)	Kabulwebulwe (n = 220)	Kaindu (n = 248)	Significance
		Number/percent/mean of sample		
Occupation for HHHs *(N)*				8.667×10^{-5}
- Farmer	152.5	162	143	
- Own business	28.5	18	39	
- Employee	14.5	12	17	
- Pensioner	12.5	10	15	
- Unemployed	12	8	16	
- Fisher	6	2	10	
- Charcoal burner	4	3	5	
- Scholar	2	2	2	
- Other	1.5	2	1	
- Hunter	0.5	1	0	

*Signif. codes: '***'= 0.001, '**'= 0.01, '*'= 0.05, '.'= 0.1, ' '= 1*

<u>*Tables notes:*</u>

Abbreviations: HHs = Households; HHHs = Household heads

Test: = (1) = Wilcoxon rank-sum test

Data type: (N) = Nominal.