EFFECTS OF CULTURAL ECOSYSTEM SERVICES ON ACCOMMODATION ROOM RATES IN THE TSAVO-AMBOSELI WILDLIFE TOURISM DESTINATION AREA, KENYA

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DECLARATION

This thesis is my original work and has not been presented in any other institution for a degree award or any other qualification.

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DEDICATION

In loving memory of Virginia Mueke Kyenge, a special friend: Your life was a blessing and your memory will remain treasured.

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LIST OF ABBREVIATIONS

AIC	Akaike Information Criterion
AEMP	Amboseli Ecosystem Management Plan
ANP	Amboseli National Park
CBD	Central Business District
CES	Cultural Ecosystem Services
CR	Critical Realism
CM	Choice Modeling
CV	Contingent Valuation
EPSG	European Petroleum Survey Group
ES	Ecosystem Services
G-HPM	Global Hedonic Pricing Models
GIS	Geographical Information System
GOK	Government of Kenya
GWR	Geographical Weighted Regression
GWR-HPM	Geographically Weighted Regression Hedonic Pricing Model
GWTI	Global Wildlife Travel Index
HPM	Hedonic Pricing Model
HUZ	High Use Zone
IPZ	Intensive Protection Zone
IUCN	International Union for Conservation of Nature
KDE	Kernel Density Estimation
KNBS	Kenya National Bureau of Statistics

KWS	Kenya Wildlife Service
LHS	Left-Hand Side
LNNP	Lake Nakuru National Park
LUZ	Low Use Zone
MEA	Millennium Ecosystem Assessment
MGWR	Multiscale Geographical Weighted Regression
OLS	Ordinary Least Squares
OTA	Online Travel Agency
PA	Protected Areas
PGIS	Participatory GIS
RHS	Right-Hand Side
SPSS	Statistical Package for Social Scientists
TAWTDA	Tsavo Amboseli Wildlife Tourism Destination Area
TCAMP	Tsavo Conservation Area Management Plan
THWS	Taita Hills Wildlife Sanctuary
TCM	Travel Cost Method
TENP	Tsavo East National Park
TEV	Total Economic Value
TWNP	Tsavo West National Park
UNWTO	United Nations World Tourism Organization
USD	United State Dollars
UTM	Universal Transverse Mercator
VIF	Variance Inflation Factor

WB	World Bank
WCM	Wildlife Conservation Management
WTA	Willingness To Accept
WTP	Willingness To Pay
WZ	Wilderness Zone

LIST OF SCIENTIFIC SYMBOLS

Symbol	Description
$\bar{R}^2$	Adjusted coefficient of determination
h	Bandwidth
D_i	Cook's distance
ε	Error term
F_o	F-Statistic
Gi^*	Getis-Ord statistic
LM	Langrage Multiplier
$\bar{R}^2_{(u_i v_i)}$	Local adjusted coefficients of determination
$\bar{X}$	Mean
I	Moran's I statistic
Log	Natural log
k	No of Neighbor
ns	Not Significant
H_0	Null Hypothesis
r	Pearson's correlation coefficient
N	Population
p	Probability value
B	Regression coefficient

Symbol	Description
n	Sample size
W	Shapiro-Wilk test
H^*	Shannon index
w_{ij}	Spatial weight
SD	Standard deviation
SE	Standard error
β	Standardized regression coefficient
t_o	T-Statistic
Z	Z score

OPERATIONAL DEFINITIONS OF TERMS USED

Cultural Ecosystem Service benefits	The non-material and psychological wellbeing enhancement obtained from active or passive interactions with aspects of the ecosystem.
Cultural Ecosystem Service hotspot	A location with high intensity of CES benefits provision surrounded by equally high CES intensity sites.
Ecolodge	A low ecological impact commercially operated protected area accommodation facility offering accommodation and catering services to park visitors that is designed and operated in line with the ethos of ecotourism.
Facilities Environmental Attributes	Natural surroundings of an accommodation facility including the space, aesthetics, and access to CES enjoyed by tourists at the facility.
Facilities Attributes	Observable market characteristics of tourist accommodation facilities including structural amenities and visitor service enjoyed in common or privately by guests staying at the facility.
Lodges	Facilities providing accommodation and catering services to persons visiting wildlife protected areas for tourism and other purposes.
Wildlife Tourism Accommodation Facilities	Establishments providing overnight accommodation, catering and related services to tourists involved in wildlife tourism activities in the wildlife protected areas.

ABSTRACT

The ecosystem services concept advocates for incorporation of Cultural Ecosystem Services (CES) in park management plans. However, park managers face difficulties articulating the CES in policy ready metrics and park tourists facilities operators lack information on visitor preferences for elements of the accommodation experience like facility's environmental attributes. The study adopted a mixed methods design to collect qualitative data from purposively sampled park staff and quantitative data from a census of operational accommodation facilities in the Tsavo Amboseli Wildlife Tourism Destination Area in Kenya. The study relied on a deliberative geographical information system (GIS) protocol where park staff mapped the distribution of CES in three contiguous most visited parks in Kenya, Tsavo East, Tsavo West and Amboseli National Parks. By combining geospatial CES data with quantitative data on accommodation facility attributes, the study build a hedonic pricing model (HPM) to explore the impact of park CES benefits on room rates. The model was then used to assess how facility attributes, including CES, globally and locally influenced room rates in the study area. Results of the geospatial analysis revealed CES concentration with benefits intensities (I = 0.44 -2.93/km^2) and diversity ($H^* = .48 - .62$) at geological, hydrological, and cultural park features while topographic and ecological features diffused the benefits. The study confirmed the joint-provision of CES at hotspots for landscape aesthetics ($Z = 5.38; p < .01$), spiritual/religious reverence ($Z = 5.67; p < .01$), ecotourism & recreation ($Z = 4.30; p < .01$), knowledge and scientific research ($Z = 4.10; p < .01$) in Tsavo West and historical and heritage appreciation ($Z = 5.71; p < .01$) in Tsavo East. The research highlighted differences in room rates (F (2, 44) =5.46; p = .01) for facilities in the three parks. Results of the global HPM (G-HPM) suggested that a plunge pool, private balcony, bathrobe, concierge service, chain affiliation, ecolodge, and proximity to a landscape aesthetics hotspot jointly influenced room rate (F (8, 38) = 9.66; p <.001). These attributes explained 60% of global variability in rates. Ecolodge status had the largest positive influence on rates (β =.41, t = 4.26, p < .001) followed by distance to a landscape aesthetic hotspot that had an inverse effect (β = -.22, t = -2.11, p = .04). The study estimated a geographically weighted regression HPM (GWR-HPM). The GWR-HPM predicted 69% to 90% of the variability in the room rates suggesting better explanatory power in parts of the study area compared to the G-HPM. The GWR-HPM confirmed spatial variations in the facilities' attributes-room rate relationships and affirmed the influence of ecolodge on room rates in 98% of the observations. The GWR-HPM revealed that proximity to landscape aesthetics hotspots positively influenced rates in only 2% of locations, contradicting the distance decay principle. This suggests that facilities could not capitalize on CES benefits in their pricing decisions at the destination scale due to the public nature of the CES benefits in the Parks. The study demonstrates applicability of the deliberative method in assessing protected area CES values. Park managers can rely on results of such a process to provide legitimate inputs into conservation decisions. The study results demonstrate the influence of visitor preferences for accommodation objective and environmental attributes on room rates and suggests that park accommodation facilities can rely on the spatial hedonic pricing model to derive indices to be used in their product pricing, development, and positioning decisions. The study concludes that the ecosystem services concept expands the understanding of values in terrestrial protected areas by highlighting the socially constructed benefits of ecosystems. Additionally, the influence of facility amenities, visitor services, and environmental characteristics on room rates reveals park visitors' preferences and expectations regarding the park accommodation experience.

CHAPTER ONE

1. INTRODUCTION

1.1 INTRODUCTION

This chapter offers a background to the study and proceeds to present the problem statement and aim of the research. The chapter outlines the study objectives, research questions, and hypotheses. The chapter concludes by describing the research scope in terms of delimitations and limitations.

1.2 BACKGROUND TO THE STUDY

Cultural Ecosystem Services (CESs) are intangible benefits arising from the interactions between people and their environment (Millennium Ecosystem Assessment, [MEA], 2005). The MEA (2005) report identifies ten CES benefits *viz.,* educational values, social relations, knowledge systems, recreation and ecotourism, artistic inspiration, spiritual/religious, heritage, landscape aesthetics, sense of place, and cultural identity values. According to the report, natural environments also give provisioning (e.g., game meat), supporting (e.g., nutrients cycle), and regulating (e.g., flood control) Ecosystem Services (ESs) (MEA, 2005).

National Parks are described by the International Union for Conservation of Nature (IUCN) as an effective means of conservation and ensuring a long-term supply of ESs (Badman & Bomhad, 2008). National Parks are important for large-scale species conservation, cultural heritage preservation, and landscape protection. According to Ribeiro and Ribeiro (2016), parks are critical for safeguarding threatened habitats that provide attractions for ecotourism and recreation, resources for personal knowledge development, and scientific research. They also provide introspective benefits like heritage appreciation and spiritual reverence (Ribeiro & Ribeiro, 2016).

In Kenya's national parks, consumptive activities are either expressly outlawed or restricted (WCM Act, 2013). As such, the law constrains parks' direct benefits to CES values, a fraction of which accrues through tourism. However, some national park CES benefits are not readily reflected in economic indicators as they are non-market and intangible (Milcu, Hanspach, Abson & Fischer, 2013)

Researchers advocate for the inclusion of the ES concept in conservation plans to sustain CES benefits supply. There is increasing recognition of CES as a powerful incentive for biodiversity conservation that provides a complementary view to the scientific perspective of natural resource management (Hernandez – Morcillo, Plieninger & Bieling, 2013; Milcu et al., 2013). The immerging view is that the CES concept can offer park managers a framework to combine biophysical and social aspects of ecosystems in conservation plans.

However, researchers agree that the intangibility and intuitive characteristics of CES benefits create difficulties in their articulation (Milcu et al., 2013; Pena et al., 2015). Most scientific research has excluded CES and generated the notion that what is not quantifiable does not matter (Satz et al., 2013). However, the evidence shows that people value CES benefits (Brown & Fagerholm, 2015).

Stegarescu and Partidario (2014) contend that quantification and mapping of CES are prerequisites for their inclusion in conservation strategies. Following this view, researchers are trying to develop acceptable methods for CES quantification (Bieling & Plieninger, 2013). Recent research is moving to the spatialization of CES using social assessment methods aided by Geographical Information System (GIS). However, it is noteworthy that most of the research and development of CES measurement techniques has been in data-rich countries and semi-natural recreation parks

(Brown & Fagerholm, 2015). Despite the noted significance of terrestrial PAs as a source of CES, there is still a paucity of studies that attempt to map CES in these natural environments.

After quantification, welfare economics prescribes the valuation of CES for their inclusion in policy and management decisions (Gibbons, Mourato, & Resende, 2014; Mburu et al., 2005; Sander & Haight, 2012). Valuation techniques have evolved to monetize CES depending on economic values targeted (Sander & Haight, 2012). The Hedonic Pricing Model (HPM) method is theoretically suited to studying CES values. Rosen (1974) described the HPM theory suggesting that the value of a heterogeneous commodity is a function of the utility derived from the commodities components. Rosen (1974) theorized that a regression analysis can estimate the implicit value of each attribute. Applied in the hospitality setting, the theory suggests that a room rate is a sum of the assessed monetary values of its attributes (Latinopoulos, 2018; Portolan, 2013).

Scholars have proposed HPM to uncover the implicit influences of environmental improvements, proximity to CESs, landscape views, and seascapes on the prices of market tourism products. (Espinet, Saez, Coenders & Fluvia, 2003; Fleischer, 2013; Hamilton; 2007; Juaneda, Raya, & Sartre, 2011; Robinson 2013; Rigall-I-Torrent & Fluvia, 2011). However, critics point out that these models only simulate the presence or absence of CES benefits using a binary specification of the services. This approach negates the realism that in national parks, CESs supply varies both qualitatively and quantitatively (Robinson, 2013).

At the same time, the tourism applications of HPM have focused on few markets, for example, beach holiday (Tochaiwat, 2019), business tourism (Pawlicz & Napierala, 2017; Zhang, Ye, & Law, 2011), and Ski tourism (Falk, 2008). In these studies, researchers rely on Global Hedonic Pricing Models (G-HPM) that are based on Ordinary Least Squares (OLS) regression to obtain regression coefficients that apply uniformly in the markets. Critics of this approach point out that hotel features and environmental attributes modeled as price determinants exhibit spatial effects, a characteristic ignored by the G-HPMs (Fotheringham, Brunsdon & Charlton, 2002; Kim & Nicholls, 2016). However, Soler and Germar (2018) point out that there is still insufficient evidence of these effects from many hospitality market scenarios like the wildlife holiday market.

Researchers advocate for spatial analysis as a new standard in tourism HPM applications (Fang, Li & Li, 2019; Soler & Germar, 2018). However, the lack of spatial analytical techniques hinders this research trajectory (Suarez-Vega & Hernandez, 2020). From experience with GIS in the property market, Aladwan and Ahmad (2019) recognize the opportunity to leverage GIS in quantifying CES variables that hitherto entered tourism HPM in binary form. Kim and Nicholls (2016) observe a trend in which GIS-supported spatially explicit regression techniques like Geographical Weighted Regression (GWR) are becoming frequent in HPM studies. However, to the best of our knowledge, no similar work has been conducted with tourist accommodation in terrestrial national parks.

1.2.1 Wildlife Tourism in Kenya

Official statistics indicate that Kenya's tourism revenues grew by 31% from Ksh 119.9 billion in 2017 to Ksh 157.4 billion in 2018. This performance is attributable to a 14% increase in international tourist arrivals to 2,027.7 thousand in 2018 and a 20% increase in bed occupancy to 8,617.9 thousand (Kenya National Bureau of Statistics [KNBS], 2019). The United Nations World Tourism Organization (UNWTO) places Kenya at position 107 globally by 2017 international arrivals statistics (UNWTO, 2018). In Africa, Kenya was 14th, one place behind Uganda (1,404,000) and a place ahead of Tanzania (1,275,000) (UNWTO, 2018).

Kenya is predominantly a wildlife tourism destination; estimates indicate that one in every two international visitors participates in one wildlife tourism activity during his/her stay in the country

(Akama, Maingi & Camargo, 2011). According to Odunga and Maingi (2011), Kenya's wildlife tourism relies on a network of PAs distributed in 10% of the territory. Twenty-three national parks, twenty-eight national reserves, four marine national parks, five marine reserves, and four sanctuaries make up the PAs (Odunga & Maingi, 2011).

According to the Global Wildlife Travel Index (GWTI), Kenya is ranked 19th as an international wildlife tourism destination, fourteen places behind neighboring Tanzania. The index compares countries using a criterion that includes *inter alia* wildlife biodiversity, mega-fauna conservation programs, year of establishment, size, and number of PAs (True travel, 2020). The United States is Kenya's key source market commanding 12% of the total international arrivals. Wildlife and safari, adventure, culture, and heritage are priority products promoted in this market (Government of Kenya [GOK], 2019). Other important markets for wildlife tourism include the United Kingdom (9%), India (6%), and China (4%) that in 2018 outperformed Germany, Italy, and France, Kenya's traditional source markets (GOK, 2019). However, in 2018 domestic tourists continued to constitute the largest proportion of visitors to the country's wildlife attractions (KNBS, 2019).

Akama et al. (2011) note that the country's famous terrestrial protected areas are in the arid and semiarid ecosystems that host diverse wildlife. The arid plain lands make the parks attractive for wildlife viewing and photography, walking, horseback safari, balloon safari, and cycling (Odunga & Maingi, 2011). Although the protected areas are fairly widely distributed in the country; visitation mainly features a few popular parks. In 2018, ten protected areas received 87% of the 2,869 thousand tourists who visited. Three urban parks viz., Nairobi Park, safari walk, and the animal orphanage (27%), Kisumu Impala Sanctuary (11%), and Lake Nakuru National Park (8%) accounted for the majority of the visitors (Figure 1.1).

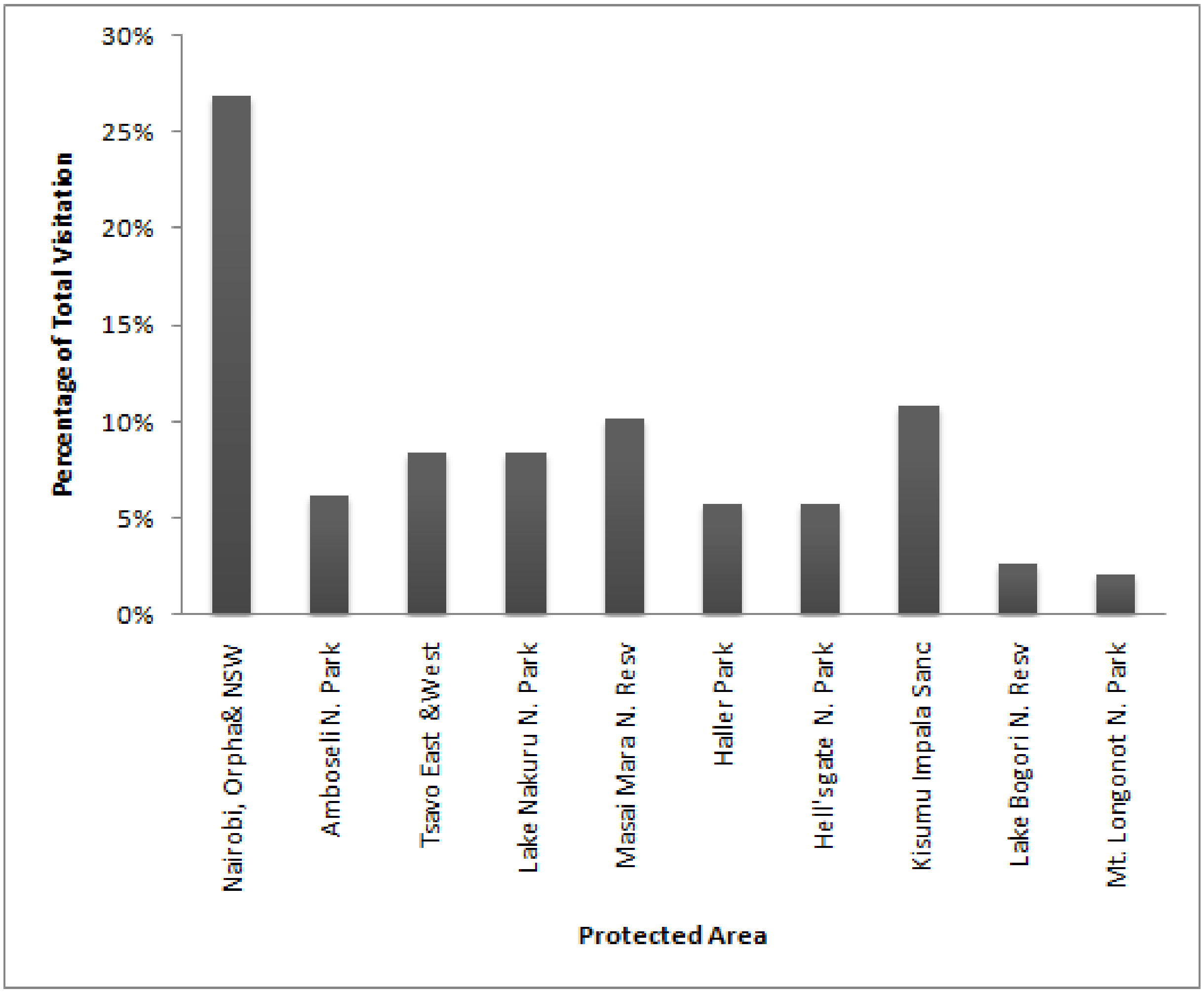

Figure 1.1 Proportion of Tourist Visitation in the Top Ten Protected Areas in Kenya

Source: KNBS (2019)

Visitors to Kenya's parks and reserves prefer overnight full catering accommodation; the number of accommodation beds for wildlife tourists reflects the current park visitation pattern (Figure 1.1). Terrestrial wildlife protected areas like the greater Masaai Mara ecosystem, the Tsavo conservation area, and the Amboseli ecosystem received 23% of the more than 1.3 million tourists who visited the terrestrial parks in 2021(KNBS, 2022) are better endowed with privately operated accommodation facilities compared to the less visited parks like Meru, Shimba Hills, Samburu, Mt Kenya, and Aberdare National Parks that received a paltry 6% of the visitors. Indeed, *Vision*

2030, the country's socio-economic development blueprint proposes to increase the number of facilities in the less visited parks as a strategy to promote visitation in the parks (GOK, 2008).

Supported by wildlife, tourism plays a leading role in Kenya's social-economic development. For instance, *Vision 2030*, identifies tourism as one of the six growth sectors to contribute to a projected 10% annual economic growth (Njiraini, Mwongera, Kiarie & Wang'ombe, 2015). The blueprint expected the country to attain three million tourist arrivals by 2012 and generate Ksh. 200 billion in annual tourism revenues. External and domestic factors have hindered the attainment of these targets. Industry observers argue that a decline in the destination's product competitiveness and increasing competition have adversely affected Kenya's wildlife tourism prospects (Njiraini et al., 2015). The declining destination competitiveness is due to a reduction in wildlife species populations associated with poaching, habitat degradation, and increased anthropogenic pressure on wildlife spaces.

The Kenya Wildlife Service (KWS), the government agency in charge of wildlife conservation, believes that when people see the benefits of wildlife, they are more likely to support conservation (KWS, 2007). Scholars such as Barasa (2018) agree that community participation and benefit-sharing can provide economic incentives for conservation. Kipngetich et al. (2017) argue that tourism can generate revenue to support wildlife protection, habitat management, and community benefit initiatives. Visitor entry fees account for 80% of the parks' self-generated revenue, with government subsidies and donor funding also contributing (Chacha et al., 2013). A KWS audit report indicates that in the 2019/2020 financial year, incomes from tourism, government subvention, and donors were inadequate to fund operating activities and support the implementation of community benefit-sharing initiatives (GoK, 2020).

Pressure on protected areas for alternative commercial exploitation and declining government sponsorship for conservation is compelling conservationists to explore innovative ways to demonstrate the rationale for the existence of the parks and reserves, especially to a host community that is growing disillusioned by the existing conservation model (Muhumuza, Ahebwa & Njoroge, 2021). The ecosystem services paradigm offers park managers opportunities to demonstrate the utilitarian and non-utilitarian values of protected areas to the community and to articulate the values for consideration in policy decisions involving economic trade-offs on resource use. Munyao, Ondimu, Njiraini, and Nguyo (2020) advance the view that the paradigm engenders participation and inclusivity in resource stewardship by highlighting the protected areas' importance and benefits to the community. The researchers argue that this can help mitigate the underlying drivers of biodiversity loss in the community.

On the other hand, low investment in product improvement, poor infrastructure, and limited marketing efforts are other causes of the declining performance of wildlife tourism in the country. Njiraini et al. (2015) observe that there has been minimal capital injection into facilities renovation in the parks resulting in the facilities' inability to meet changing tourist needs. Additionally, the authors point out that overcrowding in a few parks has contributed to the declining quality of the wildlife tourism experience.

According to a World Bank (WB) report, the country's competitors are developing and packaging new experiences that provide more intimate experiences for tourists (WB, 2010). The report recommends "developing a new mix of products that augments the existing offerings with new and innovative options" to rejuvenate wildlife tourism in Kenya (WB, 2010. Pg., 62). To pursue this recommendation, park managers and accommodation facilities operators will require accurate information on tourists' preferences for various aspects of the park wildlife tourism experience.

By acknowledging and promoting park CES benefits, park managers and service providers can attract a range of visitors, including those interested in the introspective benefits like culture, religious reverence, and inspiration apart from the traditional wildlife tourism enthusiasts (Clough, 2013).

From this background, the study used a novel deliberative GIS procedure to obtain georeferenced data on the park staff's perceptions of CES benefits in Tsavo East, Tsavo West, and Amboseli national parks in Kenya. Data obtained was used to map and quantify the distribution of Park CES and provide quantitative input for evaluation of the CES as attributes of park accommodation facilities using the HPM framework. The goal was to develop a quantitative model of CES benefits enjoyed by tourists in their visits to national parks based on the benefits' effects on accommodation facilities' room rates.

1.3 PROBLEM STATEMENT

Park managers tend to focus on the easily visible and market-ready subset of national park benefits when expressing values of protected areas in their management blueprints. For instance, the IUCN's 2020 conservation outlook report evaluates Tanzania's Serengeti National Park based on biophysical indicators and highlights its value in terms of migratory mammal species, wildlife communities, rare species, and the ecosystem size (IUCN, 2020). Similarly, the Tsavo Conservation Area (TCA) and Amboseli Ecosystem (AE) management plans (2008-2018) in Kenya prioritize biodiversity and geophysical characteristics as their parks' values (KWS, 2009a, 2009b). Scholars opine that this is because the intuitive and non-market nature of some park benefits presents difficulties in their quantification (Bieling & Plieninger, 2013; Hernandez-Morcillo, et al., 2013; Milcu et al., 2013; Pena et al., 2015). Consequently, park managers ignore CES benefits and understate park values in conservation plans. Graves, Pearson and Turner (2017) argue convincingly that biophysical indictors like species diversity do not adequately predict park ecosystem values. Therefore, it is not known whether social CES assessment approaches can be used to effectively quantify and integrate the non-market benefits of national parks, including cultural and social benefits, into conservation plans. The study aimed to bridge this gap by trialing and refining a deliberative social assessment method that leverages on GIS to quantify and map the distribution of CES in the protected areas.

Tourism researchers have experimented with HPMs to estimate CES benefit values (Espinet et al., 2003; Fleischer, 2013; Hamilton, 2007; Juaneda et al., 2011). This research trajectory hinges on the notion that tourism commodities include CES benefits that implicitly influence the heterogeneous commodities' prices. Because of difficulties in expressing CES quantitatively, studies tend to model the presence or absence of environmental amenities using dichotomous specifications such as location in a city center (Chen & Rothschild, 2010; Pawlicz & Napierala, 2017), in front of a beach (Espinet et al., 2003), and the presence of touristic views (Tung et al., 2012). Improvements to this specification have considered the distance to particular amenities like the city center or transport hub (Agmapisarn, 2014; Pawlicz & Napierala, 2017; Kefela, 2014) and the distance to a beach (Rigall-I-Torrent et al., 2011) as explanatory variables. However, if applied in national parks, this approach neglects the truism that different locations in the parks provide CES to varying degrees of quality and quantity. Studies that consider variation in the supply of CES in coastal ecosystems suggest that an increase in the length of open coast accounts for variability in accommodation room rates (Hamilton, 2007). However, it is unknown whether a more nuanced approach that considers spatial variability in the intensity of CES in national parks can improve the estimation of CES benefit values using HPMs and inform policy decisions more effectively. Therefore the study aimed to model the influence of CES on room rate using a quantitative index that captures spatial variability of the benefits in the protected areas.

Hedonic pricing studies have focused on data-rich mature tourism markets with many well-developed accommodation facilities offering a relatively homogenous product. A review of tourism and hospitality hedonic pricing studies by Papatheodorou, Lei, and Apostolakis (2012) shows that most studies were in developed sun and beach destinations, urban areas, and holiday resorts and note that this was because hedonic pricing analysis requires a considerable degree of data homogeneity to create surrogate markets for environmental commodities. Few studies extend hedonic pricing to rural settings characterized by relatively heterogeneous accommodation markets with fewer facilities (e.g., Bilbao-Terol, Cañal-Fernández, Valdés, & Del Valle, 2017). Consequently, while HPM research confirms that tourists' choices are a function of accommodation attributes in the urban, city, and resort accommodation markets (Huybers & Bennet, 2000; Dhami, Deng, Burns & Pierskalla, 2014), There is limited application of hedonic pricing models in rural settings with heterogeneous accommodation markets, particularly in wildlife tourism destination areas with relatively fewer facilities. This gap suggests a lack of understanding of the relationship between facility attributes, such as CES benefits, and visitor preferences in these remote areas. The study aimed to apply hedonic pricing models to wildlife tourism destinations, incorporating quantitative measurements of CES benefits and considering the spatial variability of these benefits within the parks and help park managers and tourism service providers better understand visitor preferences for intangible park benefits.

Tourist accommodation facilities managers face difficulties in pricing decisions because of incomplete information on visitor preferences for components of the hotel service (Hung et al., 2010). Recent studies in peer-to-peer accommodation and the business tourism markets demonstrate that local effects exist in the relationships between visitor preferences and accommodation prices (Hong & Yoo, 2020; Kim et al., 2020; Suarez-Vega & Hernandez, 2020; Zhang et al., 2017). However, for wildlife holiday accommodation facilities, a lacuna persists on the theoretical effects of visitor preferences for facilities attributes like CES at the local scale. The limited studies that have relied on HPM to assess the determinants of room rates in wildlife accommodation markets like Zhang et al. (2014), who studied the impact of natural scenery on the price of hotels in Yala National Park, Sri Lanka, and Sengupta et al. (2019), who assessed the determinants of room rates for wildlife tourism accommodations in Indian national parks did not analyze the local effects of environmental amenities on room rates. Without adequate empirical evidence, there is a lacuna in knowledge on whether spatially heterogeneous relationships exist between park visitor willingness to pay for accommodation facilities and the facilities' characteristics, including environmental amenities like CES, at the local scale in wildlife holiday accommodation facilities. The study intended to bridge this gap by providing evidence on the existence or absence of spatially heterogeneous relationships between visitor willingness to pay for accommodation and facilities' characteristics.

Based on evidence from other tourism markets, recent best practice advocates for spatial analysis as a standard practice in HPM (Fang et al., 2019; Soler & Gemar, 2018). However, there is no supportive evidence on the relative performance of spatial and traditional HPM in the wildlife holiday accommodation market. The study aimed to compare the performance of global hedonic pricing models and spatial hedonic pricing models in this market.

1.4 OBJECTIVES OF THE STUDY

1.4.1 General Objective

To analyze the effects of Cultural Ecosystem Services on Accommodation facilities room rates and develop a quantitative model of the global and spatial effects of the ecosystem services on room rates in the Tsavo – Amboseli Wildlife Tourism Destination Area (TAWTDA) National Parks in Kenya.

1.4.2 Specific Objectives

1. To map out the supply of Cultural Ecosystem Services benefits in the TAWTDA parks;
2. To profile park tourist accommodation facilities in the TAWTDA based on the room rates.
3. To assess the accommodation facilities structural amenities, visitor services and proximity to CES hotspots in the TAWTDA parks;
4. To model the global and spatial effects of accommodation facilities' structural amenities, visitor services and CES on room rates for the facilities in the TAWTDA.

1.5 RESEARCH QUESTIONS

The research addressed the following questions:

1. What are the CES benefits provided by the Tsavo- Amboseli Wildlife Tourism Destination area?
2. What is the spatial pattern of CES benefits in the TAWTDA parks?
3. What are the high season room rates in the privately operated tourist accommodation facilities in the TAWTDA parks?
4. What are the structural amenities, visitor services and environmental attributes of privately operated tourist accommodation facilities in the TAWTDA parks?

5. What is the relative effects of tourists' accommodation facilities' structural amenities, visitor services and environmental attributes on room rates in the TAWTDA parks?
6. Are there spatial effects in the joint and marginal influences of tourists' accommodation facilities' structural amenities, visitor services and environmental attributes on room rates in the TAWTDA?

1.6 RESEARCH HYPOTHESES

The study tested the following four (4) hypotheses:

H_{01}: Tourist accommodation facilities' structural amenities, visitor services and environmental attributes do not jointly affect room rates in the study area.

$H_0 2$: Tourist accommodation facilities' structural amenities do not significantly affect room rates in the study area.

$H_0 3$: Tourist accommodation facilities' visitor services do not significantly affect room rates in the study area.

$H_0 4$: Tourist accommodation facilities' environmental attributes do not significantly affect room rates in the study area.

1.7 SIGNIFICANCE AND ANTICIPATED OUTPUT

The current research refines the social CES assessment techniques for articulating intangible park benefits and demonstrates the applicability of the deliberative method in assessing the non-material values of national parks. The research results confirm that park managers can rely on the social CES mapping technique to articulate non-material park benefits and complement the utilitarian values derived from the often-used biophysical metrics of park values. This approach enables a more holistic assessment of benefits to stakeholders like visitors, the host community, and tourism service providers. The ability to articulate the range of tangible and intangible park benefits can help park managers prioritize conservation efforts for park biophysical and intangible cultural values. Furthermore, the CES mapping protocol developed by the study can be used by park managers to engage different stakeholders, gaining a more nuanced understanding of park values. This process also promotes stakeholder participation in protected area planning, creating broad-based acceptance and support of conservation programs. Therefore, the study's output provides a valuable tool for developing a more effective conservation model that takes into account both the tangible and intangible benefits of national parks.

The study provides empirical evidence of global and spatial effects facilities structural, service quality and environmental attributes influence room rates in the wildlife holiday accommodation market, addressing a lacuna in the extant HPM literature. The study affirms the Lancaster characteristic theory and demonstrates that park accommodation facilities in the TAWDA offer structural amenities, visitor services, and CES benefits that significantly influence guests' willingness to pay for the accommodation. This knowledge has significant implications for park managers responsible for tourism product development, who can use the findings to diversify the wildlife tourism experience based on visitor preference for the CES benefits. For example, park managers can use the knowledge to prioritize investment in developing tourism circuits in parts of the park with higher concentration of the preferred CES benefits. Similarly, accommodation facilities managers can use the spatial model to derive place-specific visitor preference indices for facilities' attributes. This information can then inform the lodge managers' decisions on product differentiation within the park, allowing accommodation facilities to better cater to the preferences of their guests and ultimately improve their competitiveness.

The research contributes to the understanding of the relationship between intangible CES benefits and room rates within a wildlife tourism destination. The study developed a quantitative index of

CES benefits and utilized it as an explanatory variable in the hedonic pricing models. This approach departs from previous research that relied on binary specifications, which do not account for variations in park CES provision. With this specification, the current study found that the influence of proximity to CES benefits on room rates at the destination scale contradicts the distance decay principle that presumes an inverse relationship between room rates and proximity to CES benefits. This contradiction arises due to the non-excludability nature of the CES benefits within the destination. These findings present novel knowledge on the theoretical relationship between intangible CES benefits at a small scale. Researchers can build on this premise to study the influence of CES benefits on room rates in different wildlife tourism destinations, which can further enhance the understanding of the structure of tourists' preferences for park CES.   .

1.8 DELIMITATIONS

The study was delimited to park operational staffs' perspectives of non-material benefits provided in their respective national parks and did not consider views from diverse categories of stakeholders.

Additionally, the study was delimited to an assessment of benefits from five (5) categories of CES viz., spiritual/religious reverence, knowledge development and scientific research, historical/heritage appreciation, landscape aesthetic appreciation, and ecotourism and recreation provided in the Tsavo-Amboseli Wildlife Tourism.

Also, the study delimited its scope to private accommodation facilities within and near three national parks in the TAWTDA and restricted participants in the survey to park staff involved in the field and operational duties.

At the same time, the study was delimited to data on park CES benefits and accommodation room rates in privately operated park facilities during the peak tourism season between 21st August and 3rd October 2019. This was to control for seasonal differences in facility rates and temporal variations in the supply of park CES due to climatic influences on the park ecosystem.

Furthermore, the study delimited its methodology to the hedonic pricing analysis, a revealed preference technique used to elicit the implicit values of CES from room rates by using a surrogate tourism accommodation market in the TAWTDA. This method mimics actual market transactions and provides insights into tourists' real-world behavior. In contrast, alternative methods in the stated preference domain, such as the contingent valuation method and choice experiment, which are amenable to studying preferences for co-produced park CES benefits, rely on hypothetical scenarios that may not accurately reflect real-world behavior.

1.9 LIMITATIONS

The research is subject to some limitations that non-the-less provide future research opportunities: First, the study relied on a census of privately operated accommodation facilities in ecosystems with comparable eco-climatic characteristics. This design limited the data to a restricted number of observations (N = 47) facilities and prevented an analysis of the effects of ES from differing ecosystems on room rates. Thus, some results of the study may not apply to other regions or destination areas in the country or parks characterized by environments like mountains, forests, or coastal ecosystems. However, future researchers can consider testing the GWR-HPM using observations from a larger geographical scale, e.g., a national scope that will increase the study units and model effects of CES benefits from different ecosystems.

Secondly, the research assessed and quantified five CES benefits in the study area. However, the modeling excluded four CES benefit categories (ecotourism and recreation, knowledge development & scientific research, spiritual/religious reverence, and historical/heritage appreciation) to mitigate the risk of multicollinearity. This exclusion limited the study to modeling the effect of a single CES benefit on room rates. Some studies in terrestrial ecosystems have shown joint-provision of CES benefits (e.g., Ament, Moore, Herbst, & Cumming 2017; Ribeiro & Ribeiro, 2016). From the study's results, it is unclear whether the other co-produced CES at the aesthetic appreciation hotspots had confounding effects on room rates. Future investigations can consider using the HPM framework to uncover the influence of jointly produced CES benefits on room rates.

1.10 KEY ASSUMPTIONS

The study proceeded on the following assumptions:

1. The tourist has complete knowledge of the accommodation facilities' attributes and rationally chooses the facility with the combination of characteristics that maximize their satisfaction from a stay;
2. Completeness and availability- rooms from facilities in the market were available for booking at the point of consideration;
3. There are no significant econometrically incurable distortions in the market for park holiday accommodation that could introduce imperfections in the relationship between room rates and its determinants in the study area.
4. Room rates in the market for holiday accommodation automatically adjust to any changes in the structural, service, and environmental attributes of the facilities in the study area.

CHAPTER TWO

2. LITERATURE REVIEW

2.1 INTRODUCTION

This chapter presents a review of relevant literature. The chapter provides an appraisal of key concepts underpinning the research before reviewing the literature on the research's theoretical foundations. A review of empirical studies relevant to the study's objectives follows. The chapter concludes with a summary of reviewed works highlighting knowledge gaps in the literature.

2.2 KEY STUDY CONCEPTS

The study hinged on the concept of ES that includes CES as a category of non-material benefits provided by terrestrial national parks and enjoyed by visitors as tourism experiences:

2.2.1 Ecosystem Services

Ecosystem Services relate ecosystem structure and functioning to society through a variety of welfare-enhancing goods and services (Ament et al., 2017). The concept originated in the 1970s labeled as ecosystem capital and included production, regeneration, stabilization, and life-fulfilling services (Daily et al., 2000). The MEA in 2005 conceptualized ES as ecosystem structure and functions that result into human benefits. The MEA (2005) report classified the ES into four groups viz., (i) Provisioning; services that accrue from an ecosystem's ability to supply material benefits like game meat, raw materials, medicine, and water; (ii) Supporting services that arise from its support to production processes, for instance, crop pollination and seed dispersal (iii) Regulating services due to an ecosystems' role in maintaining proper functioning of earth's systems like climate regulation and water purification processes and (iv) Cultural ecosystem services; intangible benefits from an ecosystem.

The ES concept has gained popularity as an area of academic interest. Fisher, Constanza, Turner, and Morling (2007) demonstrate sustained growth in the number of academic publications on ES from the 1990s to the years immediately after the MEA report. While the MEA (2005) conceptualization of ES spurred interest in the subject, scholars argue that the MEA definition did not operationalize the services in a manner that permits their incorporation in environmental management decisions (Fisher et al., 2007). Subsequent conceptualizations have focused on addressing this deficiency. For instance, in an attempt to operationalize ES in metrics that are comparable to conventional commodities, Boyd and Banzhaf (2007) advanced a definition that was consistent with national income accounting practices. The authors define final ecosystem services as "components of nature directly enjoyed, consumed or used to give human well-being" (p.619). In this definition, Boyd and Banzhaf (2007) separate final from intermediate ES and argue that most elements of the ecosystems are intermediate products because they contribute to the production of nature's final goods.

Borrowing from Boyd and Banzhaf (2007), other scholars like Fisher et al. (2007) suggest that ES are elements of the ecosystem structure and function utilized actively or passively to produce commodities that satisfy human needs. Fisher et al. (2007) incorporate both ecosystem structure and processes into ES and broaden the range of services to include those that are used indirectly. The authors distinguish ecosystem services and benefits and point out that while services result from the ecosystem structure and functioning, benefits are the welfare results of people's direct or indirect utilization of the ecosystem services. For instance, recreational wildlife viewing is a benefit provided by wildlife species populations, the latter is an ecosystem service (Fisher et al., 2007).

Notwithstanding the controversy in its definition, scholars like Egoh et al. (2012) and Gould et al. (2019) recommend ES concept inclusion into conservation models. This enthusiasm for the ES paradigm will continue due to the perceived relevance of the concept in new conservation paradigms. For instance, García-Llorente et al. (2018) think that the ES concept promotes a holistic conservation model and incorporates social dimensions into previously wholly scientific-based conservation approaches. They argue that the ES-based model promotes broader support for conservation and integrates ecosystems into the social-economic decision by recognizing them as sources of welfare-enhancing services (García-Llorente et al., 2018).

2.2.2 Cultural Ecosystem Services

De Groot et al. (2005) observe that cultures and ecosystems interact to give rise to positive spiritual, intellectual, and non-physical welfare to society. The MEA report describes intangible benefits arising from peoples interactions with the natural environment as Cultural Ecosystem Services. De Groot et al. (2005) identify six subjective benefits resulting from such interactions *viz.*, heritage appreciation, cultural identity, landscapes aesthetics, spiritual reverence, artistic inspiration, recreation, and tourism. To this list, MEA (2005) adds knowledge systems, social relations, educational values, and sense of place. Table 2.1 summarizes the categorization of CES as espoused in the MEA report.

Table 2.1 Categorization of Cultural Ecosystem Services

	Cultural Ecosystem Service	**Description**
1.	Recreation and ecotourism.	The values of an ecosystem as a resource for leisure and recreation activities.
2.	Spiritual and religious values	Pious values placed on ecosystems (e.g. forests shrine), species (e.g. totemic plants and animals, for instance), and landscape features (e.g. sacred mountains).
3.	Traditional and Formal Knowledge systems	The opportunities provided by ecosystems to develop knowledge systems e.g. through research and indigenous knowledge.
4.	Educational values.	Formal and informal personal knowledge development opportunities provided by ecosystems.
5.	Cultural identity.	Ecosystems' impacts on cultural identity e.g. economic activities influenced by ecosystem like nomadic pastoralism in resource strained environments.
6.	Social relations.	Ecosystems impact on social relations in communities. For instance, the social structure of hunter-gathers communities is determined by their habitat in forested areas.
7.	Sense of place.	Ecosystem value associated with recognized features of the ecosystem like climate, landscape and vegetation.
8.	Heritage values.	Cultural meanings placed on aspects of the ecosystem with historically importance e.g. iconic wildlife species.
9.	Inspiration.	Artistic inspiration expressed in music, national symbols, architecture, and advertising.
10.	Aesthetic values.	The sheer aesthetic value of the ecosystem structure such as scenic landscape features, wildlife species assemblage and beautiful landscape.

Source: Adapted from Hernandez-Morcillo et al. (2013); De Groot et al. (2005)

While the classification of CES benefits is useful for analytical purposes, the literature suggests that ecosystem processes and structures provide these benefits jointly. Combinations of CES flows and interdependence are a product of the joint provision of CES (Plieninger et al., 2013; Milcu et al., 2013). For instance, in the case of co-provisioning, wildlife species populations may be associated with ecotourism and recreation benefits as well as with personal knowledge development (Ament et al., 2017). Plieninger et al. (2013) suggest that ambiguity in the distinction of CES categories results from socially determined processes like familiarity, awareness, and perceptions, which create overlaps in perceived CES benefits. In their view, these overlaps attest to the interdependence and holistic nature of CES (Plieninger et al., 2013).

There is consensus that CES are intangible benefits that are subjective in nature. The subjectivity of CES arises from an individual's interactions with ecosystem biophysical components in socio-ecological contexts yielding health, social and psychological benefits (Daniel et al., 2012; De Groot et al., 2005; Milcu et al., 2013; Plieninger et al., 2013). On account of their intangibility and incommensurability, CESs are not well studied and included in management/policy decisions as compared to other ESs (Bieling & Plieninger, 2013; Hernández-Morcillo et al., 2013; Willcock, Camp, & Peh, 2017).

There has been a tremendous increase in ES research in recent years; Tew, Simmons, and Sutherland (2019) observe satisfactory progress in incorporating results of the studies in policy formulation. However, Milcu et al. (2013) opine that most research relegates CESs to a complementary role. The authors argue that most CES research has focused on specific CES subcategories to the exclusion of others. According to Bieling and Plieninger (2013), gaps in data and knowledge concerning the entire range of CES result from this research focus. Hernandez – Morcillo et al. (2013) advance the view that lack of empirical evidence on CES hampers their inclusion in conservation policies and jeopardizes benefits from society’s interactions with nature.

Scholars now recommend CES integration into conservation plans by providing research output that is relevant to decision-making.

2.2.3 Cultural Ecosystem Services in Wildlife Protected Areas (WPAs)

The IUCN describes Protected Areas (PAs) as geographical spaces designated and managed for large scale conservation of natural environments and the associated ecosystem services (Dudley, 2008). According to Leung (2018), PAs are vital in the global strategy for biodiversity, landscapes, and heritage conservation. The IUCN distinguishes six categories of PAs based on the primary objectives for their establishment, management goals, and governance structure (Pullin et al., 2013). National Parks are category II PAs made up of extensive natural or semi-natural areas designated for the large-scale protection of ecosystems, their ecological processes, characteristic species, and cultural values (Dudley, 2008).

According to Pullin et al. (2013), the role of PAs as a strategy for conservation is demonstrated by the area of land and sea under protection globally. The authors observe that 13% of the earth's total terrestrial space is under some form of protection. According to Space for Giants, Africa has over 8,400 PAs that occupy some 4.3 million square kilometers or 14% of the continent (Space for Giants, 2019). Half of the PAs in Africa are state-run and cover about 2.2 million square kilometers or 7% of the land (Space for Giants, 2019). Pullin et al., (2013) argue that protected area establishment inevitably occasions adverse impacts on host community well-being as it involves inhibition of some anthropogenic activities. However, the authors hasten to point out that the adverse effects are balanced off by welfare enhanced due to improved provision of various ecosystem services. Thus, conservationists idealize PAs as a successful strategy for the sustainable global supply of ES like CES. However, opinion remains divided as to whether PAs have net welfare gains or losses at a local or regional level (Pullin et al., 2013).

The medical and psychology literature has long established the nexus between natural ecosystems, tourism, and human wellness. According to Willis (2015), visiting a national park can relieve stress, relax the physical body, rejuvenate one's mind, and restore mental capabilities. Thus parks are a resource for human social, physical, and mental well-being. Borrowing from Abraham, Sommerhalder and Abel (2010), one can relate mental health to the curative ability of natural environments and physical health to recreational opportunities. At the same time, one can link social welfare to opportunities for interpersonal bonding in parks. Taking from the MEA report, Willis (2015) cites the welfare consequences of a visit to the park as including personal spiritual enrichment, artistic inspiration, and opportunities for reflection. The author observes a strong resonance between the non-material benefits of a park visit and determinants of psychological well-being such as optimism, self-esteem, self-acceptance, finding purpose in life, and healthy relationships.

Studies have shown that CESs are not limited to natural ecosystems like wildlife-protected areas. Interactions between society and semi-natural or modified ecosystems can also produce intangible benefits. Van Berkel and Verburg (2014) conducted a study to spatially quantify and value CES in agricultural landscapes in the Netherlands. The researchers discovered that modified agro-ecosystems provide ecosystem services such as aesthetic values, recreation, and heritage values comparable to the CES supplied by natural ecosystems. The researchers identified hotspots for CES within agricultural landscapes and recommended that these areas be prioritized in landscape management and planning to ensure a sustainable supply of CES.

Coastal ecosystems are highly productive and provide crucial ecological functions and services for human well-being. In a study by Ruskule, Klepers, and Veidemane (2018) in Latvia, CESs in coastal areas were mapped and assessed using expert surveys and public participation activities.

The research revealed that recreation and tourism-related services were the most highly valued, followed by cultural heritage, education, and aesthetics. The study also identified key locations where these services were supplied, including beaches, cultural heritage sites, and scenic landscapes.

In a recent study, Kimuyu and Owino (2019) assessed the provision of Cultural Ecosystem Services (CES) in urban and peri-urban Nairobi Forests in Kenya using a mix of social surveys, field observation, and interviews to identify and evaluate CES in the forests. The study found that the forests in Nairobi City provided various CES, including recreational opportunities, cultural heritage, educational, and aesthetic values. The researchers were also able to identify forest areas and features that were important for the supply of CES and recommended management strategies to conserve the forests to enhance the provision of CESs in urban areas. Other studies, such as Mao et al. (2020), have also identified the supply of CES in green spaces in residential areas in Zhengzhou, China.

2.2.4 Wildlife Protected Areas as Tourism Destination Area

Leung (2018) admits that national parks promote tourism as a strategy for archiving their establishment objectives: The PAs provide a range of opportunities to attract visitors who include organized groups, individuals, commercial users, recreationists, cultural and spiritual users as well as researchers. Belicia and Islam (2018) consider wildlife tourism as any form of tourism that is dependent on tourists' interactions with non-domesticated animals in their natural habitats or captivity. According to the UNWTO, non-consumptive wildlife tourism is the most prevalent form of wildlife-based tourism in PAs (UNWTO, 2014). This form of tourism offers visitors opportunities to experience park benefits such as recreation/ecotourism, spiritual reverence, and education & scientific study opportunities made possible by parks' provision of CES. The

UNWTO estimates that safari or wildlife watching and bird watching are the most sought-after tourist activities in the parks accounting for over 80% of peoples' motivation to visit PAs (UNWTO, 2014).

Current and reliable data on the global economic significance of wildlife tourism is incomplete. However, by 2008, Grihault (2008) estimated the global size of the wildlife tourism market at 12 trips per year worth about £30 billion and projected a 10% annual growth in the market. Grihault (2008) asserts that the domestic market for wildlife tourism is larger than the international market. However, in developing countries, international tourism is considered more significant due to its foreign exchange implications. A survey of European tour operators selling trips to Africa confirms that 80% of the trips sold to African destinations are for wildlife-based tourism and wildlife watching (UNWTO, 2014). The survey estimates that some 14 countries in Africa generate close to United State Dollars (USD) 142 million annually in park entrance fees from wildlife tourism. This figure is undoubtedly higher if one considers all African countries (UNWTO, 2014). Belicia and Islam (2018) anticipate developing countries to take up 57% of the global international tourists' arrivals by the year 2030 mainly driven by wildlife tourism demand.

Although most wildlife tourists are leisure tourists (Grihault, 2008), an increasing number of business tourists are taking trips to participate in meetings and conferences hosted in the park lodges. The UNWTO estimates that a typical wildlife tourism trip involves a group of six people taking a ten-day trip that costs at an average of USD 433 per person. A member of such a party spends an additional USD 55 as an out-of-pocket expenditure per day (UNWTO, 2014). Based on per capita expenditure, UNWTO (2014) distinguishes the luxury wildlife tourists or high-end segments made up of visitors who spend upwards of USD 753 per person per day on the package from the low-end tourist who spends USD 243 per day on a standard package.

The East African region considers the tourism industry as a crucial element for its national socio-economic development objectives. This is due to the industry's contribution to income generation, employment creation, poverty alleviation, and support for wildlife conservation (Okello & Novelli, 2014). The East African Community (EAC) has noted that tourism contributes an average of 17% to the region's export earnings, accounts for 10% of the region's gross domestic product (GDP), and generates 7% of employment in the region (EAC, 2022). Okello and Novelli (2014) argue that tourism in EAC member states is mainly nature based and apart from Tanzania and Kenya whose tourism industry integrates beach and wildlife tourism, in the other land-locked countries like Uganda, Burundi wildlife is major tourism asset.

In Kenya, the country's network of 58 terrestrial protected areas, which covers 12% of the country's land area, received over 2 million tourists in 2019. This generated USD 1.03 billion for the country (African Leadership University School of Wildlife Conservation [ALUSWC], 2020). In Tanzania, tourism is the second-biggest sector after manufacturing in terms of income contribution. In 2019, tourism contributed USD 6.7 billion to the country's GDP, which accounted for 5.3% of the country's GDP. The sector was also responsible for 6.2% of total employment in Tanzania (WTTC, 2021).

The major international source markets for the region's wildlife tourism include the United Kingdom, the United States, India, Germany, Italy, France, and Canada. Additionally, there is a significant inter-regional domestic wildlife tourism market (Price, 2018). Okello and Novelli (2014) reviewed the tourist attractions and activities in the East African Region and highlighted that the region is renowned for its diverse and unique wildlife, stunning landscapes, and rich cultural heritage. Wildlife-based tourism is a significant attraction in East Africa, with visitors coming on safari to see the "big five" in parks like Serengeti, Maasai Mara, Amboseli, Ngorongoro, and Murchison Falls. The region's landscapes, like Mount Kilimanjaro, Mount Kenya, and the Great Rift Valley, are major tourist draws. East Africa is also home to habitats that attract visitors, including the mountain forest in Burundi, Bwindi impenetrable forest in Uganda, and Virunga in Rwanda, home to the iconic mountain gorilla species (Okello & Novelli, 2014).

2.2.5 Categories of Tourist Accommodation Facilities in Wildlife Protected Areas

Development of accommodations facilities in IUCN category I to III PAs that includes national parks is restricted. Eagles, Bowman, and Tao (2001) observe that in many instances, park managers prefer that park tourist accommodation facilities are outside the PAs to protect the integrity of wildlife habitats in the parks. However, municipal law may permit the development of accommodation facilities in the parks. In Kenya, the Wildlife Conservation and Management Act (2013) allow KWS to lease out land for the development of accommodation facilities within parks through public-private partnership agreements. Tourist accommodation facilities within wildlife expansion areas and community land neighboring PAs are developed as community-owned enterprises or through community – private partnerships (Twining-Ward, Bhammar, & Wright, 2018).

Brouder and Teixeira (2020) distinguish between the single-unit and chain-affiliated accommodation facilities in national parks and chain-affiliated and note that the former refers to independent and non-chain-affiliated lodging establishments that typically have fewer rooms, offer personalized services, and are owned and operated by individuals or small businesses. On the other hand, chain-affiliated facilities usually have more than 100 beds to leverage economies of scale and are managed by corporates of brands that favor standardized amenities and services.

Researchers have compared guest preferences for single-unit accommodation facilities and chain-affiliated lodges in national parks: Kim and Usyal (2019) conducted a study in Grand Canyon

National Park, USA, and found that guests at single-unit facilities reported higher levels of satisfaction compared to those staying in chain-affiliated lodges. Similarly, Park et al. (2020) conducted a study at Yosemite National Park, USA, and recorded a similar finding. These studies are consistent with evidence from African National Parks, where Brouder and Teixeira (2020) found that guests staying in private game reserves in South Africa preferred small, boutique lodges over large chain-affiliated units. Hughes and Ensor (2019) also observed that guests staying at private luxury tented camps in Kenya National Parks valued the authentic and unique experience offered by the small-scale units.

The evidence in the literature suggests that park visitors' value the more personalized experiences offered by small, independent facilities. Additionally, guests may prefer the unique and authentic experience in a smaller, more intimate setting and the peaceful and secluded environment in smaller lodges, compared to the busier and more crowded atmosphere of chain-affiliated facilities (Brouder & Teixeira, 2020; Hughes & Ensor, 2019; Kim & Usyal, 2019).

Chan, Lian, and Baum (2007) distinguish between lodges and ecolodges, two types of accommodation facilities in PAs by asserting that ecolodges are specialist environmentally sensitive accommodation facilities operated based on ecotourism ethos. The authors liken the typical size of an ecolodge to a small boutique hotel or guesthouse owned by homegrown entrepreneurs. Following Chan et al. (2007), one can compare ecolodge and conventional lodges based on the level of luxury, architectural design and construction, environmental orientation, and level of service. Table 2.2 presents the difference between park accommodation facilities based on the Chan et al. (2007) criteria.

Table 2.2 Characteristics of Park Tourist Accommodation Facilities

Characteristic	Facility Type: Lodge	Facility Type: Ecolodge
Size	• Large size (more than 100 beds).	• Small size (from 24 to 80 beds).
Architectural design	• Generic style; • Intrusive to the environment; • Enclave development.	• Unique style interpreting local environment and culture; • Sensitive to visual impact; • Blend well with the environment;
Construction material	• Heavy use of concrete.	• Minimum use of concrete, use of local material such as grass thatch, stone cladding and canvas.
Service	• Luxury and mid-level service; • Focused on passive activities and relaxation; • Guide and interpretation a minor aspect of the experience.	• High-end luxury personalized guest service; • Exclusive service; • Emphasis on interpretation.
Ownership	• Group/chain affiliation.	• Individual units.
Investment	• High investment.	• Moderate to low investment.
Operation	• Sensitive to profit.	• Sensitive to profit. • Sensitive to ecological footprint and impact on host community.

Source: Adapted from Chan et al. (2007)

Studies have found a growing preference for ecolodges among park tourists due to the increasing awareness of environmental and sustainable tourism practices. Research on the effect of green attributes of ecolodges on customer satisfaction has concluded that customers generally have higher satisfaction and loyalty for facilities that adopt green practices than traditional lodges. Choi and Kim (2020) found that green attributes of ecolodges, such as environmental sustainability, natural settings, and unique design, positively influence customer satisfaction. Similarly, Ha and Kim (2021) compared guest preferences for ecolodges and traditional lodges and found that customer demographics and travel motivations also play a role in determining guests' choice of park accommodation.

In the African context, studies have also supported the assertion that park tourists favor ecolodges due to their unique features and the perceived environmental benefits. Mihelcic and Hrzenjak (2018) found that tourists in South Africa preferred ecolodges due to their green attributes, natural surroundings, and cultural authenticity. Moreover, a study conducted in Kenya's Maasai Mara National Reserve by Ondieki and Karanja (2021) that compared tourist preferences for ecolodges and traditional lodges found that tourists preferred ecolodges due to their environmentally friendly features and unique experiences they offer.

2.2.6 Tourist Accommodation Facilities Structural Amenities, Visitor Services and Environmental Attributes.

According to Mensah (2020), the term "park tourist accommodation facilities' structural amenities" refers to the physical characteristics and features of the lodging facilities that enhance guests' comfort, convenience, and satisfaction during their stay at the park. The lodge or ecolodges size, room types, beds, bathrooms, furniture, fixtures, and fittings contribute to the visitor park experience and make the accommodation facilities ideal bases for various park wildlife tourism activities.

Visitor services refer to services provided to guests staying in the park, such as housekeeping, laundry, food and beverage services, front office, tour guiding and interpretation, and transportation services (Lee et al., 2018). Lee et al. (2018) suggest that visitor services are significantly related to visitor satisfaction with their stay at the lodging facility and that the range and quality of such services may influence guests' choice of park accommodation options. The researchers posit that visitor services may have a more significant effect on visitor satisfaction than the physical/structural amenities of the accommodation facilities.

The literature describes an accommodation facilities environmental or neighborhood attributes as the characteristics of its surrounding environment or location. These attributes can enhance guest experiences and satisfaction during their stay at the park (Gössling, Scott, & Hall, 2013; Lee, Song, & Bendle, 2017). Such attributes include proximity to park attractions, scenic beauty, access to outdoor recreation options, and places of cultural significance. On the other hand, neighborhood attributes like closeness to areas with high noise levels, congestion, and pollution hotspots can also negatively influence guest experiences at the park (Kim & Ritchie, 2014). These characteristics can affect how the facility leverages its location to satisfy guests or attain a comparative advantage in the park.

Researchers have attempted to group the range of facilities structural amenities, visitor services and environmental attributes for ease of analysis on how they affect visitor preferences for accommodation choices and room rates: In a study of South African hotels, Du Plessis & Saayman (2011) categorize the attributes into ten groups, *viz.*, amenities, image, positioning, marketing, management, quality service, infrastructure services, product quality, location, and environmental. Still, Tochaiwat (2019) considers three groups of attributes *viz.*, quality, physical attributes, and neighborhood as independent variables in a study of beach resorts in Thailand. In an earlier study, Chen and Rothschild (2010) distinguished quantitative and qualitative variables influencing room rates in Taipei hotels. The authors modeled room size measured in square meters as a quantitative factor and included location, features, and visitor amenities as qualitative hotel attributes. In a review of HPM studies, Soler and Gemar (2018) identify independent variables categorized into general attributes that include tangible and intangible characteristics as well as site-specific attributes like environmental attributes. The review covers 16 HPM studies in hospitality published between 2002 and 2014.

The reviewed literature suggests no consensus in the typology of hotel room price determinants in the HPM tradition. Because there is no theoretical basis for the selection of independent variables to include in HPM studies (Zhang et al., 2011), researchers incorporate various hotel attributes as the RHS variables in hedonic models. However, accommodation facilities' structural amenities, visitor services and environmental attributes categories frequently feature in the empirical studies:

2.3 THEORETICAL FOUNDATIONS OF THE STUDY

2.3.1 Total Economic Value

The Total Economic Value (TEV) framework expounded by Randall and Stoll (1980) ascribes value to CESs whose benefits exhibit the non-excludability and non-rivalrous attributes of public goods. Randall and Stroll (1980) posit that individuals engage in activities for the satisfaction that the activities confer. For example, equation 1 describes a tourist's utility from a park visit:

$$U = f(Z) \tag{1}$$

Where ***U*** is the utility measure and ***Z*** is a vector of activities of the tourist that includes productive activities as well as recreational pursuits. Randall and Stroll (1980) posit that individuals produce the tourist and other activities using a combination of commercially available inputs, time, ecosystem services, and other public goods. The authors propose a production function that describes how the tourists combines the inputs in the production process as:

$$Z = z(X, Q, T) \tag{2}$$

Where **Q** are the ecosystem services e.g. wildlife species concentration required for an ecotourism experience, **X** is a vector of other goods and services for example accommodation services, and **T** is the production technology.

Randall and Stroll (1980) advanced the view that ES in general (Q) and CES (Q_{CES}) in particular are valuable in the production of Z activities. The authors proposed that the value of Q_{CES} depended on the quantity used up and theorized that demand for Q_{CES} as an input is a result of the amounts needed in the production process. They described the value of Q_{CES} for a household as the consumer's surplus from all Q_{CES} -using production processes. And consumer surplus is the net benefit after considering household production costs. The TEV framework thus classifies ecosystem services according to whether benefits accrue from direct, indirect use or non-use in the household production process. Direct and indirect use values occur when Q_{CES} is combined with elements of X in production while the mere knowledge of the existence of Q_{CES} generates non-use values (Randall and Stroll, 1980). The current study relied on the TEV framework to identify and categorize values associated with CES benefits provided by terrestrial wildlife protected area in the TAWTDA. Figure 2.1 presents a schematic diagram of the classification of the economic value of CES from in terrestrial PAs based on the TEV theory.

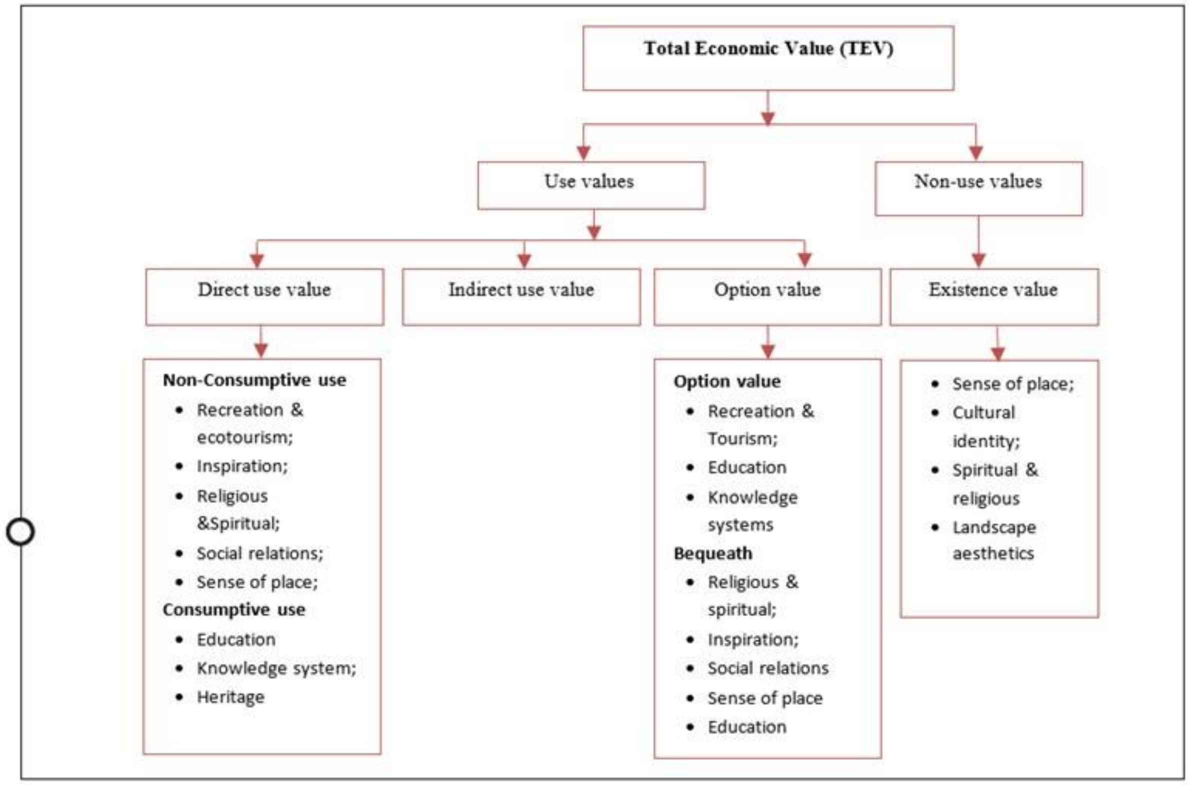

Figure 2.1 Classification of the Total Economic Values of Park CES.

Sources: CBD (2007); Mburu et al. (2005); Pascual et al. (2010)

From figure 2.1, the research identifies direct use values of CES which derive from non-extractive actual interactions with the environment. For instance, a park visitor can enjoy a wildlife viewing ecotourism experience or a visit to a spiritual shrine without depleting the resource. On the other hand, the law prohibits extractive forms of consumptive CES utilization of biodiversity such as recreational hunting and fishing in IUCN category II PAs. However, consumptive values associated with knowledge development and scientific study are permissible in the national parks.

According to Mburu et al. (2005), indirect use values relate to support provided to economic activities by the ecosystem's natural functions. These benefits are outside the ambit of CES as conceptualized in the MEA (2005) categorization but enter the household production function described by Randall and Stroll (1980). For instance, regulating services like micro-climate control contributes to the production of ecotourism experiences by allowing ambient conditions for tourism.

The study relied on the TEV framework which recognized option value as future benefits from the CES supply: For example, society can put a premium on preserving a pristine ecosystem for knowledge development and scientific study by itself in the future (option value) or by future generations (bequeath values) (Pascual et al., 2010). Using the TEV, the research recognizes non-use values of TWPAs CES as the utility people have from the knowledge that a component or function of the ecosystem exists for its own sake. For instance, people derive positive welfare from knowing that certain rare species exist though they do not anticipate any future use of the species (Mburu et al., 2005).

By recognizing non-monetary and monetary park values, the TEV framework extends the park benefits beyond the often-cited recreation use values (Grant, Hill, Trathan & Murphy, 2013). However, the framework does not directly address how individuals value benefits, which requires other economic models like the neoclassical and Lancaster's Characteristics models of consumer choice. Consumer choice models account for individuals' preferences for specific CES benefits and provide a more nuanced and comprehensive understanding of how individuals value intangible CES benefits in parks (Kenter et al., 2021).

2.3.2 Lancaster's Characteristics Model of Consumer Choice

The neoclassical model of consumer choice does not yield information about how commodity attributes influence consumer choices (Marcin, 1993) and cannot predict how demand is likely to change if the commodity attributes vary. On the other hand, Lancaster (1971) proposed an alternative theoretical approach that hinges on the notion that consumers do not desire goods themselves but desire the utility conferring attributes of the commodities. Like the neoclassical model, Lancaster's characteristics theory also known as the new economic theory of consumer behavior relies on the premise that a rational consumer seeks the best combination of goods given a budget constraint but differs from the traditional model by considering the goods as a bundle of their characteristics.

Lancaster (1971) posits that consumer preferences can be captured by a utility function that defines a consumer's preferences and utility levels from the consumption of a commodity in terms of the characteristics of the goods/services. Formally:

$$U = f(C_{11}, C_{12}, C_{13}, \cdots, C_{1N}, C_{21}, C_{22}, C_{23} \cdots C_{2N}, \cdots, C_{M1}, C_{M2}, C_{M3}, \cdots C_{MN}) \quad (3)$$

Where C_{ij} is the amount of the i^{th}attribute contained in the j^{th} purchased commodity, $i = 1,2,3, \cdots, M$ and $j = 1,2,3, \cdots, N$

The theory assumes that the attributes of the commodity are objectively measurable. For instance, for a tourist accommodation experience, one can objectively quantify the structural amenities like availability of private balcony, visitor services like room service and environmental attributes as elements of the whole experience. Thus, Lancaster's Characteristics Model provided the current study with a framework to disaggregate the park tourist accommodation experience into its constituents and study visitor preferences for the facility's structural amenities, visitor services, and non-market environmental attributes like CES. Behavioral economists have developed stated preference techniques like contingency valuation and revealed preference methods like the hedonic pricing model to econometrically monetize the non-market constituent elements of a heterogeneous commodity like the park accommodation experience (Rosenberger & Lomis, 2001).

2.3.3 The Hedonic Pricing Model (HPM)

The hedonic pricing theory extend Lancaster's characteristics model to derive implicit prices of characteristics of a commodity desired by consumers. The hedonic pricing model was given impetus by Rosen (1974) who affirmed that consumers value goods for their utility bearing characteristics. Rosen (1974) asserted that a heterogeneous commodity can be described by a vector of its characteristics and theorized that HPM reveals the attributes' implicit prices from the differentiated product's market price. The term "hedonic price" describes the weighting assigned to each attribute of a composite good. Thus, the HPM is used to estimate the implicit values of the characteristics using regression techniques (Dolnicar & Otter, 2003).

The HPM is a revealed preference method for non-market commodities valuation. A market for a related good or service, such as tourism, can be used as a surrogate market for the non-market commodity like CES. For example, the market for wildlife holiday accommodation can be a surrogate market for park CES, allowing for the estimation of implicit prices of the CES using accommodation facilities' room rates. The HPM is based on the theory that the value of the park accommodation experience is a bundle of valuable characteristics, one of which is CES (Mburu, 2005).

Applying Rosen's HPM theory to the wildlife holiday accommodation market, the current research advances the view that the room's value is a function of the facility's structural amenities, visitor services, and environmental characteristics (Bilbao-Torel et al., 2017; Latinopoulos, 2018; Portolan, 2013). Thus assuming equilibrium in a perfectly competitive market for wildlife tourism holiday accommodation, equation 4 describes a hedonic price function for the accommodation experience:

$$p_i = p(S_{i1}, \cdots, S_{ij}, , \cdots, Q_{i1}, \cdots, Q_{ik}, \cdots, N_{i1}, \cdots, N_{im}) \qquad (4)$$

Where: S_j, Q_k, and N_m are the facility's structural amenities, visitor services, and environmental attributes respectively. Letting **X** represent the range of attributes, the price function for a representative room is modeled as:

$$P_i = p(X_i, \beta, \varepsilon) \qquad (5)$$

Where, β is a vector of regression coefficients that estimate the marginal influence of respective accommodation facility attributes on room rates and ε is a stochastic error term. Ordinary least squares (OLS) regression analysis estimates the hedonic prices by regressing facility attributes on room rates (Rosen, 1974).

The economic interpretation of the estimated coefficients (B) is sensitive to the functional form of the regression model. However, the hedonic pricing theory does not prescribe the functional form for the regression equation. The linear, log-linear, and log-log are possible forms. In the semi-log specification, either the dependent or independent variable is transformed while in a log-log model, the right-hand side (RHS) and left-hand side (LHS) continuous variables are transformed (Aladwan & Ahamad, 2019). Equation (6) is a log-log specification of the HPM:

$$Log\ P = Log\ \beta_0 + \sum_{k=1}^{k} \beta_k Log\ X_k + \varepsilon, (k = 1, \cdots, K) \qquad (6)$$

Where:

P: is the room rate,

β_0: is a constant term;

$\beta_k (k = 1 \cdots K)$: are the effects on a room's price due to X_k attribute;

ε: is the independent and identically distributed (i.i.d) error term.

In the log-log model, the estimated coefficients (B_k) are the constant elasticity coefficients interpreted as the approximate percentage changes in the room rate if the k^{th} attribute changes by one percent (Aladwan & Ahamad, 2019). On the other hand, in the log-linear functional form, the coefficients for the dummy variables (B_j) are the approximate proportionate change in the room rate due to the presence of the accommodation facility attribute (Agmapisarn, 2014).

Equation (6) provided the current study with a neat framework for an empirical study of the determinants of accommodation room rates from the estimated global coefficients. The coefficients are unbiased estimates of the mean influence of respective facility attributes on room rates across the accommodation market. However, critics of this approach point out that accommodation features modeled as price determinants exhibit spatial effects, a detail ignored by the OLS regression (Fotheringham et al., 2002; Kim & Nicholls, 2016).

Kim, Jang, Kang and Kim (2020) point out that hotels may have similar structural amenities and charge comparable rates because they are near each other. Proximity results in the spatial interdependence in the rates (Xiao, 2017). At the same time, the effects of hotel attributes on rates may vary with location resulting in spatial non-stationarity (Fang et al., 2019; Kim et al., 2020). Kim et al., (2020) warn that not accounting for spatial effects leads to biased coefficients, large residuals, and spurious significance statistics. Spatially explicit regression models such as Geographically Weighted Regression hedonic pricing models (GWR-HPMs) attempt to cure this deficiency.

2.3.4 Geographically Weighted Regression Hedonic Pricing Models (GWR-HPM)

The fundamental premise of the GWR-HPM is Tobler's first law of geography that states that everything is related to everything else. However, closer things are closely related than far apart things (Tobler, 1970). The Study applied the GWR-HPM to the park tourism accommodation market and investigated whether room rates for neighboring facilities were related; and rate-attributes relationships varied spatially (Hong & Yoo, 2020).

In the spirit of Tobler's law, GWR departs from the basic OLS regression by allowing varying attribute-price relationships and deals with spatial heterogeneity by generating local coefficients for each observation (Kim & Nicholls, 2016). Hong and Yoo (2020) argue that the core tenet of GWR is to directly capture geographical variance by unique regression coefficient estimates across space.

Following Fotheringham et al. (2002) the basic log-log HPM (equation 6) is specified in the GWR framework by introducing spatial details as follows:

$$Log\ P_i = Log\ \beta_{i0}(u_i, v_i) + \sum_{k=1}^{k} \beta_{ik}(u_i, v_i) Log X_{ik} + \varepsilon_i,\ \ (i = 1, \cdots, n) \tag{7}$$

Where:

P_i: The price/room rate of an accommodation facility at location i;

X_{ik}: The k^{th} accommodation facility attribute at location i;

(u_i, v_i): The UTM coordinates for the facility at location i;

$\beta_{ik}(u_i, v_i)$: The local parameter for attribute X_{ik};

ε_i: Error term at location i.

Following Tobler's law, determinants in equation (7) are weighted from the regression focal point (u_i, v_i) to allow their influence on the estimated coefficients at (u_i, v_i) to diminish with decreasing proximity. In matrix notation, coefficients at (u_i, v_i) are estimated in equation (7) as follows:

$$B(i) = \left[\boldsymbol{X}^T \mathbf{W}_{(i)} \boldsymbol{X}\right]^{-1} \boldsymbol{X}^T \boldsymbol{W}_{(i)} \boldsymbol{Y} \tag{8}$$

Where

$B(i)$ = Estimated coefficients at(u_i, v_i);

$\boldsymbol{X}$: A matrix of observed room rate determinants;

$\boldsymbol{Y}$: The vector of observed room rates; and

$\boldsymbol{W}_{(i)}$: A n by n diagonal spatially weighted matrix.

The matrices $\boldsymbol{W}_{(i)}$, $\boldsymbol{X}$, and $\boldsymbol{Y}$ are written as:

$$W_{(i)} = \begin{bmatrix} W^{i1} & 0 & \dots & 0 \\ 0 & W^{i2} & \dots & 0 \\ \vdots & \vdots & \vdots & \vdots \\ 0 & 0 & 0 & W^{in} \end{bmatrix}; X = \begin{bmatrix} x_{11} & x_{21} & \dots & x_{m1} \\ x_{12} & x_{22} & \dots & x_{m2} \\ \vdots & \vdots & \vdots & \vdots \\ x_{1n} & x_{2n} & 0 & x_{mn} \end{bmatrix}; Y = \begin{bmatrix} y_1 \\ y_2 \\ \vdots \\ y_n \end{bmatrix} \quad (9)$$

Where W^{ij} in equation 8 are observation weights assigned depending on a Kernel function and bandwidth that identifies observations to be included in the local regressions. Using the bi-square adaptive kernel function (figure 2.2), the weight of an observation at point (u_j, v_j) is determined by:

$$w_{ij} = \left[1 - \left(\frac{d_{ij}}{h}\right)^2\right], \text{ when } d_{ij} \leq h \text{, and } w_{ij} = 0 \text{ when } d_{ij} > h \quad (10)$$

Where d_{ij} is the space between i and j and h is the bandwidth so that the data points weight decreases with increasing distance from the focal point. The bandwidth can be expressed as k number of nearest neighbors.

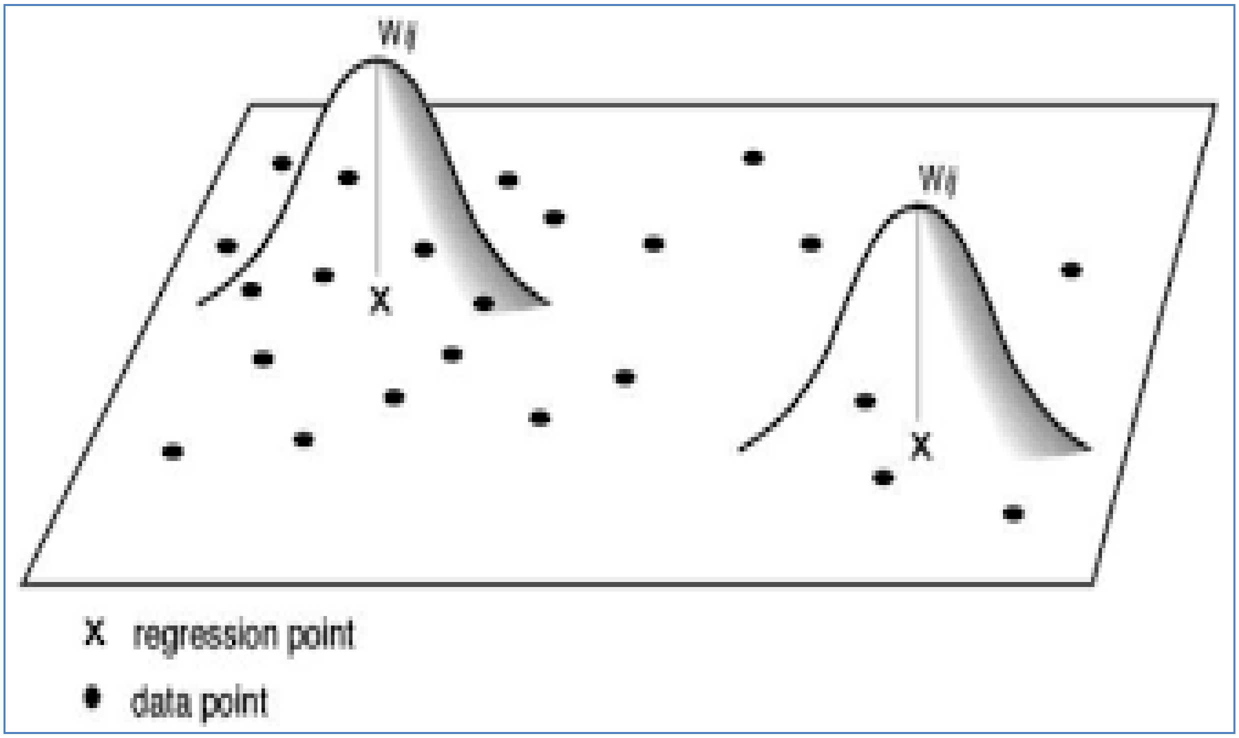

Figure 2.2 Adaptive Bi-Square Kernel Function

Source: Adapted from Fotheringham et al. (2002).

Figure 2.2 depicts the adaptive Bi-square kernel function used in the current study. The choice of kernel function used to assign weights to observations can have a significant impact on the accuracy and reliability of the resulting regression coefficients. The bi-square adaptive kernel function is the commonly used kernel function in GWR (Fotheringham et al., 2002). The study preferred the bi-square adaptive kernel function as it gives more weight to nearby observations and less weight to distance observations in line with Tobler's first law of geography (Tobler, 1970). Additionally, the bi-square kernel is more robust than other kernel functions to the presence of outliers, which can be problematic in GWR because it involves fitting a separate regression model for each observation point (Fotheringham et al., 2002).

2.4 EMPIRICAL REVIEW

The subsequent review focuses on empirical studies on quantification and mapping and CES in the natural ecosystems and studies on economic demonstration of the CES benefits using global and spatial HPMs in the context of tourism.

2.4.1 Quantification of Cultural Ecosystem Services

According to Stagarescue and Partidario (2014), quantification of CES involves discovering and expressing the quantity or magnitude of flows of the ecosystem services in a given area. Stagarescue and Partidario (2014) consider CES quantification as both a science and an art as it may entail an objective assessment of biophysical indicators or a subjective evaluation of socially constructed indicators of the services' benefits.

Neugarten et al. (2018) opine that quantifying benefits are instrumental in ecosystem conservation advocacy and making decisions on the allocation of resources for the management of protected areas. However, Hernandez-Morcillo et al. (2013) observe that quantification of CES is perhaps the least accomplished undertaking in ES research. Hernandez-Morcillo et al. (2013) add that difficulties in establishing a direct relationship between ecosystem and particular CES benefits also precipitate uncertainties in measurement. The authors further observe that CESs like religious reverence, sense of place, and inspiration are resistant to monetization. For these reasons, CES indicators are few and ambiguous. Hernandez-Morcillo et al. (2013) point out that in the MEA report (MEA, 2005), only 11% of the indicators related to CES, and 84% were for recreation and tourism.

La Rosa et al. (2015) highlight the subjective nature of CES and argue that CES's dependence on personal value systems renders their assessments difficult compared to the other ESs. The authors point out that ambiguity in the conceptualization of CES contributes to challenges in quantifying the services.

An indicator as a sign of the presence or lack of an item of interest and assert that indicators derive from actual measurements of a state, quantity, or process observed in nature. Hernandez-Morcillo et al. (2013. p.436) conceptualize an indicator as "...a measure based on verifiable data that conveys information about more than itself", and from a review of CES indicators in 42 CES publications covering twenty years, they classify CES indicators into five groups (Table 2.3).

Table 2.3 Classification of CES Benefits Indicators.

Indicator Type	**Description**	**Measure**	**CES Benefit**
Condition indicators	Indicators of physical and biological properties of an ecosystem that enable provision of CES	Wildlife species diversity Habitats diversity Sacred species population	Ecotourism Aesthetics Religious & Spiritual
Function Indicators	Indicators of processes by which ecosystems provide CES	Quality of river for swimming; Habitat regeneration	Recreation Ecotourism
Intermediate services indicators	Indicators of Ecosystem services that indirectly contribute to wellbeing	No of scenic roads	Aesthetics Recreation
Benefit indicators	Indicators of tangible ecosystem products directly consumed	Park visitor numbers No. of conservation educational programs	Ecotourism Education
Impact Indicators	Indicators of state of people's physical, mental, health due to effect of CES in an area	Stress levels	Recreation

Source: Adapted from Hernandez-Morcillo et al. (2013)

The choice of indicators in a CES assessment depends on the methodological orientation between quantitative and qualitative approaches. The techniques address different valuation questions, differ in data and time requirements, and need varying degrees of expert capacity (Neugarten et al., 2018). Quantitative metrics, such as condition indicators for wildlife species and habitat diversity, rely on biophysical measurements. Benefit indicators, such as park entry revenues, can be expressed in monetary units. In contrast, qualitative assessments for function indicators, such as the quality of swimming waters, and impact indicators, such as user stress levels, are obtained from interviews, surveys, and focus-group discussions (Neugarten et al., 2018)

In an empirical test of the social quantification techniques, Bieling and Plieninger (2013) tested a field survey method to record physical evidence of CES provision in a German Biosphere reserve. The study assumed that the use of CES leaves traces and borrowed from archeology the use of systematic field walks to collect data. The survey recorded 61 manifestations of seven CES categories. As expected, the majority (89%) of CES manifestations related to tourism and recreation use like hiking trails, recreational, and hunting facilities. Due to offsite consumption, the study failed to capture benefits associated with spiritual and inspirational values. However, a significant study finding is that CES benefits can be reflected across indicators justifying consideration of CES in bundles and combinations.

Braat and De Groot (2017) note progress in the CES quantification methods development and recognize the role of multidisciplinary efforts in this research trajectory. Emerging approaches borrow from social sciences to focus on indicators of human perception rather than on biophysical indicators of ecosystem state or processes to quantify CES benefits. The new methods are founded on stakeholder surveys to assess perceptions about non-material ecosystem benefits. The techniques include participatory, consultative, or deliberative assessment methods (Braat & De Groot, 2017).

The study adopted a social assessment approach to investigate respondents' perceptions of the supply of cultural ecosystem services (CES) in National Parks using qualitative measures. This approach provides insights into the social and cultural dimensions of CES that are often overlooked when using only quantitative biophysical indicators (Borie & Jaramillo, 2020). According to Raymond, Bieling, Fagerholm, Martin-Lopez, and Plieninger (2021), eliciting qualitative data on CES through surveys can yield a more comprehensive understanding of how people value and use CES in their daily lives. However, the researchers caution that results from the social CES assessment methods may not be readily compared with those from the assessment of other ES categories.

2.4.2 Mapping of Cultural Ecosystem Services

Mapping entails the spatial presentation of the CES benefits. From experience in surveys using social and physical CES indicators, research is now moving to the spatialization of CES. Crossman et al. (2013) note that this research trajectory is informed by the truism that the supply and demand of CES are spatially explicit. Geographical Information System (GIS) has contributed to CES mapping by automating capture, storage, analysis and communication of geospatial data. Researchers are experimenting with social assessment methods that leverage GIS capabilities to map CES:

Plieninger et al. (2013) experimented with a social assessment method that relied on local knowledge to identify and map CESs benefits and disservices in a German cultural landscape. The researchers relied on structured questionnaires and mapping exercises to collect primary data from a sample of 93 participants drawn from a community of 12,800 people living near the Biosphere

Reserve. The authors conclude that respondents were able to identify multiple CES benefits and associate them with different sites. Plieninger et al. (2013) noted that respondents frequently identified aesthetic, social relations, and educational values. The study uncovered bundles of services that allowed the researchers to associate the hotspots of CES benefits with landscape features and land-cover types. Notwithstanding methodological hiccups in this initial PGIS attempt, the study affirms the technique's utility in providing defensible input to the management and conservation of natural landscapes.

In a study conducted in an urban park in Rio de Janeiro in Brazil, Ribeiro and Ribeiro (2016) relied on a PGIS protocol to assess and map CES perceptions. The study targeted seven CESs viz., landscape aesthetics, recreation and ecotourism, knowledge systems, social relations, and religious reverence benefits in Pedra Branca State Park. The researchers excluded introspective CESs from the assessment due to complexities in measurement. The study found that aesthetics and recreation/ecotourism were the most frequently identified CESs. Spatial analysis of the identified sites uncovered significant correlations between areas of scenic beauty, recreation/ecotourism, and social relations suggesting co-occurrences of the CES benefits.

In a comparable study, Canedoli, Bullock, Collier, Joyce, and Padoa-Schioppa (2017) examined city park users and park managers' CES perceptions to assess congruencies between the views. The study in an Italian urban park relied on public workshops to collect data from randomly selected citizens. The researchers incorporated perspectives from park staff purposively selected based on their management roles. The study focused on ten (10) CES benefits and observed hotspots of CES benefits corresponding to artificial, historical, natural features, and land cover in the park. The results uncovered mismatches in stakeholder perceptions; according to users, the park was richer in CES than the park management perceived it. From their findings, Canedoli et al. (2017) argue that CES mapping can inform urban planning in exploring the demand and supply of ES and recommend the use of PGIS in integrating the ES concept in actual management decisions.

In a study that hinged on traditional knowledge, Angarita-Baéz et al. (2017) surveyed 11 indigenous communities in the Colombian Amazon to assess preferences for CESs. Using a deliberative protocol, the researchers asked 69 community members to identify CES benefits locations and rate the sites' importance. Study participants mapped and rated the sites' accessibility, suitability, pleasurability, similarity, memorability, and aesthetic beauty. From the feedback, the researchers constructed a GIS database and computed indices of diversity, intensity, and richness to characterize the spatial distribution of CESs. The results confirm the abundance of CES benefits but highlight the prevalence of recreation values in the Amazonian ecosystem. From their experience, Angarita-Baéz et al. (2017) vouch for participatory methods in CES assessment in marginalized communities. The researchers argue that the mapping process fosters CES awareness and empowers the indigenous people.

Tew, et al. (2019) used PGIS to survey and map CES values in an East Anglia commercial forest plantation. The study focused on four CES benefit categories (recreation, wildlife, heritage/education, scenic beauty) assessed using an online PGIS survey protocol. Tew et al. (2019) found that 60% of their sample regarded wildlife, scenic views, and recreation as "very important" while 36% felt that heritage was "very important". Analogous to Canedoli et al. (2017), Tew et al. (2019) observed CES hotspots at artificial, water, and historical features. Their results support the conclusion that CES values vary with land management options.

The current study trialed a new approach to ecosystem benefits spatialization using a social deliberative GIS procedure. The approach involved eliciting georeferenced data on park managers' perception of CES benefits, quantifying and mapping the benefits distribution in terrestrial national parks. The deliberative GIS approach builds upon the experiences from previous studies that have utilized GIS capabilities and social assessment methods to map the supply of CES in urban recreational parks but expands the scope to include natural spaces such as national parks. The social deliberative GIS procedure is an innovative step forward in CES assessment and mapping and provides new opportunities for quantifying and mapping intangible ecosystem benefits. Furthermore, the social deliberative GIS procedure allows for stakeholder engagement and participation in the assessment process, providing valuable insights from those who manage and interact with these spaces.

2.4.3 Determinants of Accommodation Facilities' Room Rates in HPM

As suggested by the Lancaster characteristics theory, accommodation facilities vary by location, structural amenities, level of visitor services, management, and ecological orientation, attributes that appeal differently to guests (Van der Merwe & Saayman, 2017). Recent studies have focused on understanding the tourist decision-making process and visitor preferences using the HPM framework. The current review examines these studies beginning with how researchers treat accommodation rates as a dependent variable in the HPMs:

2.4.3.1 Accommodation Room Rates in HPMs

Room rate setting is one of the critical marketing strategies for accommodation establishments since it directly impacts profitability. Hung, Shang, and Wang (2010) note that hotels face difficulties in making pricing decisions because of incomplete information on guests' preferences for the individual attributes of the accommodation experience. It is intuitive for hoteliers to adopt cost-oriented pricing in setting room rates; cost is also a function of hotel/room attributes.

Variability in room rate quotations in the accommodation markets complicates its description as a variable in HPM. Room rates are quoted depending on seasonal offers, trade discounts, various supplements on occupancy, or meal plans (Andersson, 2013). At the same time, room rates can be obtained from official tourist guides, online listings, hotel rack rates, or tour operator brochures. Hedonic modeling studies deal with room rates as the dependent variable in a variety of ways:

In a study of room choices for hotels in Stockholm, Andersson (2010) captured room rates as "transaction prices"- the rate paid by guests and obtained rates from internet listing of accommodation options on online travel agents (OTAs). Andersson (2010) argues that online rates are often substantially lower than published hotel rack rates or walk-in rates. Hotels are listed on multiple OTAs introducing rate differences. However, Chen and Rothschild (2010) argue that due to competition, rate differences among online travel agents tend to be negligible. Thus following Chen and Rothschild (2010), HPM studies rely on online sources to obtain rates offered by tourist accommodation facilities (Fleischer, 2013; Latinopoulos, 2018; Pawlicz & Napierala, 2017; Suarez-Vega & Hernandez, 2020; Yalcin & Mert, 2018; Zhang, Chen, Han & Yang, 2017). Recent studies also obtain prices from individual hotel websites (Meahan, 2016) on the premise that website rates are devoid of discounts or promotional offers included on travel booking sites.

Bilgihan, Kandampully, and Zhang (2016) investigated the impact of seasonality on hotel rates in beach destinations in the United States. The authors examined the relationship between hotel rates and factors such as seasonality, day of the week, hotel attributes, and location. Their findings suggest a significant seasonal effect on hotel rates, with higher rates during the peak season. The authors also found that hotel attributes such as star rating, amenities, and room size significantly affect room rates.

Soler & Germar (2018) also recognized the potential influence of a booking margin on rate differences. The authors defined the booking margin as the lead-time from the booking date to the check-in day. Soler & Germar (2018) controlled the booking margin effect by making it equal to zero in their price searches.

A recent study by Wang et al. (2019) provides further empirical evidence on the impact of temporal factors on accommodation rates. The study found that hotels in Beijing adjust their room rates based on time-related factors such as seasons, weekends, and holidays. The study treated these temporal factors as independent variables and showed that they significantly affected hotel room rates.

The findings from the reviewed literature underscore the need to control for seasonal variations in room rates when considering it as a dependent variable in HPM. However, the literature suggests that on account of the competitive nature of holiday accommodation markets, it is of no consequence whether room rates used in HPM are obtained from tour agent brochures, hotel websites, or OTAs as there is insignificant variation in prices quoted for particular rooms. For instance, Zhang, Li, and Chen (2020) collected room rates from six OTAs for hotels in Chinese cities and found that room rates in the OTAs were highly correlated, and there were no statistically significant differences in the rates provided by the OTAs.

Concerning differences introduced by occupancy, meal plans, discounts, and supplements, the modeler's task is a homogenization of room rate structure across the market and capturing actual transaction prices. However, studies from the city, beach, and sun holiday hotels point to the importance of controlling for seasonality, day of the week, and booking margin effects when specifying room rates (Bilgihan et al., 2016; Soler & Germar, 2018; Wang et al., 2019). Evidence from wildlife-based tourism is unavailable.

2.4.3.2 Effects of Accommodation Facilities' structural Amenities and Visitor Services on Room Rates

Hotel structural amenities influencing room rates are often operationalized as continuous variables: For instance, the rooms/beds (No.), hotel size- no of restaurants, area in acres (Agmapisarn, 2014; Kefela, 2014; Liu & Li, 2013; Pawlicz & Napierala, 2017), room size, a measure of guest accommodation comfort (Agmapisarn, 2014; Kefela, 2014; Kim & Jogaratnam, 2014), and facility age (Agmapisarn, 2014) are operationalized as ratio scale measurements.

However, in the reviewed studies (Appendix I: A selection of Tourism G-HPM Studies 2013-2017), a host of visitor amenities including the availability of a pool, LED TV, bath and shower, min-bar, bar, WIFI, garden balcony, free parking, and Gym facilities are captured using dummy variables that assume the value one (1) if the amenity is present and zero (0) otherwise. Similarly, the studies use the dichotomous scale to distinguish hotel types between Luxury, budget, motels, and other accommodation types (Napierala & Lesniewska, 2014).

Concerning intangible characteristics that signal services available to guests, the HPM studies reported in table 2.4 rely on dummy variables to operationalize visitor services such as the provision of complimentary breakfast, spa, fitness center, business center, indoor and outdoor sports amenities, 24 hour room service, and shuttle services among others (Appendix I)

It is noteworthy that star rating has been used as a signal of service quality simultaneously with hotel structural amenities in several HPM specifications (Choi & Heo, 2016; Kefela, 2014; Pawlicz & Napierala, 2017). However, Thrane (2007) had cautioned that such specifications are prone to multicollinearity problems. Thrane (2007) argued persuasively that star rating status is a measure of available visitor amenities. Still, Agmapisarn (2014) notes the ambiguity in star rating as defined from region to region and cautions against its use in HPMs as a global indicator of service quality.

Researchers recognize the brand as a possible determinant of room rates in various accommodation markets and typically include a dummy variable for chain affiliation in the HPM specification (Agmapisarn, 2014; Kefela, 2014; Pawlicz & Napierala, 2017).

Consistent with consumer utility theory that posits that additional utility-bearing hotel structural amenities enhance guests' accommodation experience, the HPM studies confirm positive relationships between room rates and the amenities in various markets: Larger rooms, availability of an LCD TV in the room, mini-bar, bar, WIFI, free parking, and gym facilities appeal to business tourists in city hotels and positively influence room rates (Agmapisarn; 2014; Choi & Heo, 2016; Kefala, 2014). On the other hand, rooms with a view have higher rates for luxury accommodation facilities in the sun and beach destinations (Liu & Li, 2013). However, hotel age negatively influenced room rates in city hotels while hotel size had a positive impact (Agmapisarn, 2014; Kefela, 2014; Pawlicz & Napierala, 2017).

The literature affirms a positive association between room rates and hotel visitor services contingent on the tourism market segment: The literature affirms a positive association between room rates and hotel visitor services contingent on the tourism market segment. For example, a recent study by Kim and Mattila (2015) found that higher room rates were associated with better-perceived service quality in luxury hotels in South Korea. The study found that hotels with a higher volume of positive online reviews were more likely to receive bookings. Additionally, hotels with more recent reviews were more likely to receive bookings. Similarly, in a study conducted in Seoul, South Korea, Kang and Lee (2018) established that factors such as the availability of fitness and spa facilities, high-quality room service, and room size were positively associated with room rates. In addition, the study found that the impact of these amenities on room rates was more significant for luxury hotels than for mid-range or budget hotels.

Lee, Kim, and Mattila (2018) investigated the determinants of hotel room rates in Seoul, South Korea. The study uncovered a significant positive association between chain affiliation and room rates in a sample of 115 hotels in Seoul and concluded that hotels affiliated with global chains charged higher room rates than independent hotels. The authors attributed this finding to the reputation and recognition of international hotel chains, which can positively affect consumers' perceived value and willingness to pay. Additionally, the study found that hotel location, star rating, and hotel size were also significant determinants of room rates.

In a comparable study, Zhao et al. (2019) examined the impact of hotel chain affiliation and star rating on room rates using a sample of 476 Chinese hotels. The study uncovered a positive association between chain affiliation and room rates, with branded hotels charging higher rates than independent hotels. However, the research did not find a significant impact of star ratings on room rates, which the authors attributed to the homogeneity of star ratings among hotels in China. The authors suggested that brand reputation and loyalty played a more significant role in influencing consumers' willingness to pay for hotel rooms.

The reviewed literature provides evidence of how researchers have operationalized accommodation facilities' structural amenities and visitor services in empirical HPM studies in various tourism markets. Evidence from the studies suggests mixed signals on the significance and direction of the marginal effects of the facilities' characteristics on room rates in the markets. The current research followed the HPM tradition and captured the presence or absence of park ecolodges' and lodges' structural amenities and visitor services using dichotomous scale measurements. However, the study extended the hedonic modeling to the wildlife tourism market to uncover empirical evidence of the influence of specific lodge/ecolodge attributes on room rates in the context of this market.

2.4.3.3 Effects of Environmental Attributes on Room Rates

Borrowing from the tradition in the property markets, HPMs studies in hospitality and tourism incorporate accommodation environmental attributes as possible price determinants in the form of both continuous and dichotomous measurement scales. Studies summarized in Table 2.4 operationalize accommodation neighborhood and locational characteristics as the nearest distance to key attractions like the Central Business District (CBD) in city hotels, distance to key transport hubs like airports and train stations (Agmapisarn, 2014; Kefela, 2014; Pawlicz & Napierala, 2017; Tung et al., 2012), location in the city center (Chen & Rothschild, 2010). Results of the models consistently show inverse price relationship with distance to utility-yielding environment amenities, negative association with proximity to an environmental "bad" such as congestion, and positive relationship with desirable hotel location attributes such as security:

For instance, Fleischer (2013) investigated the influence of aesthetic view and other market-induced attributes on room rates in Mediterranean hotels. The study analyzed the effect of room-specific environmental amenities like sea, side-sea, city, and garden views on room rates for beach hotels. Fleischer (2013) found that Mediterranean hotels whose rooms had ocean views charged 10-11% higher rates for a standard room. The study revealed a negative but insignificant effect for sea-side, city, and garden views on room prices. Fleischer (2013) relied on these findings to explain the spatial orientation of coastal resorts' architectural design to optimize ocean views.

Awoyemi, Li, and Xie (2014) investigated the relationship between scenic landscapes and room rates in star-rated hotels in Beijing, China relying on HPM for a sample of 118 classified hotels. The study examined the impact of scenic landscapes on room rates and controlled for hotel class, location, and amenities. The study's findings suggest that scenic landscapes significantly impacted room rates. The study shows that the presence of water features and natural scenery provided by mountains and forests positively affected room rates. The study also finds that the effect of scenic landscapes on room rates varies by hotel class and location.

Bilbao-Terol et al. (2017) analyzed the impact of environmental amenities on accommodation rates in Asturias, northern Spain. Bilbao-Terol et al. (2017) sought to elicit the implicit value of positive externalities associated with agricultural and silvicultural land uses. The researchers operationalized environmental amenities as the land proportion under different uses and measured geographical attributes as distances to the nearest beach and the CBD. The study indicated guests' services by cottage category, accommodation capacity, Wi-Fi, and Agro-tourism opportunities. A remarkable novelty of the work was its use of GIS to approximate cottage locations relative to points of interest like beaches and geo-referenced information on cottages' environmental attributes. The study found that the proportion of land under crops negatively influenced cottages rates while grassland had a positive influence.

Cirer-Costa (2018) conducted a similar study in the Balearic Islands in Spain. The study investigated the impact of environmental variables such as beach quality, accessibility, and scenic beauty on hotel room rates. The results showed that environmental factors, particularly the beach quality and scenic beauty, had a significant positive impact on hotel room rates. The study concluded that environmental attributes play a crucial role in shaping the demand for tourist accommodation and that hotels should consider these attributes when setting room rates.

Beginning from the notion that environmental attributes are a function of location that plays a differentiating role for place sensitive tourism products, Cai and Miao (2019) investigated the impact of location attributes on the room rate of hotels in Xiamen, China. The study used a hedonic model to analyze the effects of geographical factors such as distance to tourist attractions, transportation facilities, and natural scenery on hotel room rates. The results showed that these locational attributes significantly impacted hotel room rates, with natural scenery having a disproportional effect. These findings support the proposition that variability in CES supply across space can have a differentiating effect on tourist preference for accommodation types in these locations.

The reviewed literature suggests a long list of hotel structural, service, and environmental characteristics considered in the HPM studies. The literature contains a choice of quantitative and qualitative measurements of independent variables conditional on the source and accessibility of data. The review reveals that the signs of the independent variables conform to micro-economic tenets in consumer choice and decision making that underpins the theory of demand. However, the literature supports the conclusion that the sign of the variables' effects cannot be determined *a priori* for a given market scenario. Therefore, there is scope to investigate the influence of accommodation attributes in un-researched tourism markets.

A literature search for HPM studies in Kenya's tourism setting yielded no studies on determinants of tourists' accommodation rates. However, room rates are modeled as an explanatory variable in local studies on tourist consumer behavior. For instance, using a sample of 384 domestic tourists at various attractions within Nairobi and Nakuru, Kamau, Waweru, Lewa, and Misiko (2015) found the room rate to be the most significant marketing mix element influencing domestic tourist's accommodation choice. In a similar study, Kivuva, Kihima, and Nzioka (2014) demonstrated the significance of core product attributes like guestroom comfort, hygiene, and cleanliness as determinants of business guests' choices for non-classified hotels in Mtwapa. Kivuva et al. (2014) conclude that accessibility, hotel location, and environment are important factors affecting business guests' satisfaction. Consistent with the demand theory, the results reveal an inverse relationship between room prices and accommodation choice. The two local studies cited share with HPM research a foundation in consumer behavior theory. However, they seek to model the influence of hotel characteristics like accommodation prices on tourists' choice as the independent variable. In HPM formulation, price enters the analysis as a dependent variable.

Notwithstanding the criticism leveled against global HPMs, results in the literature indicate that the models satisfactorily predicted accommodation rates. In the reviewed studies, the independent variables explained between 49% and 89% of the variation in the room rates. It remains unconfirmed if HPM can produce theoretically sound and practically plausible results in the wildlife tourism market.

2.4.4 Determinants of Room Rate Using GWR- HPM

Owing to criticism against the G-HPM, alternative models that incorporate spatial aspects of accommodation data have emerged in the recent decade. Table 2.4 presents a summary of recent GWR HPM studies in the tourism setting. Borrowing from the traditional HPM practice, spatial hedonic models consider attributes of accommodation units categorized as structural, and situational/neighborhood/geographical attributes (Guedes & Rebelo, 2020; Hong & Yoo, 2020; Kim, Jang, Kang & Lim, 2020; Latinopolous, 2018; Suarez-Vega & Hernandez, 2020). The source of data, operationalization, and the theorized effects on price are contingent on the market characteristics. An overview of these studies follows:

Table 2.4 Summary of Tourism GWR-HPM Studies

				Dependent variable	**Independent Variable**		
1.					**Structural**	**Service**	**Environmental**
2.	Zhang et al. (2017)	Metro Nashville, Tennessee	Airbnb (794)	Rate per maximum guests	• Age	• Online rating • Review counts	• Distance to convention center; highway
3.	Hong & Yoo (2020)	Los Angeles, New York	Airbnb (44,291)	Listed price & cleaning fee	• No. of guest bedrooms/No. of bathrooms; • Rental type • Guest policy	• Review counts; • Online ratings; • Host attributes	• No of Airbnb within 1 km; • Local poverty index; • Closeness to attractions
4.	Kim et al. (2020)	Chicago	City hotels (387)	Room rate (Ave. per night/double standard room)	• No. of rooms; • Hotel age; • Hotel category	• Online rating;	• Road distance to nearest airport; highway; • Average proximity to top 7 attractions
5.	Suarez-Vega & Hernandez, (2020)	Gran Canaria, Spain	Peer to peer accommodation (2259)	Price per room	• No of beds, rooms, • Amenities e.g. air conditioning, hot-tub e.t.c	• Host attributes; • Review counts/rental policy	• No. of neighborhood Airbnb; • Distance to beach; main city; ship port, airport and tourist attractions
6.	Soler & Gemar (2018)	Malaga, Spain	City Hotels (57)	Room rate	• No of rooms;	• Star rating • Booking day and margin; Online rating;	• Distance to city center; airport; train station
7.	Guedes & Rebelo (2020)	Douno, Portugal	Rural Hotels (130)	Room rate	• No. of rooms; • Type of facility	• Online rating	• Distance to river; vineyard, heritage site; winery; train station and main road

Source: Research data (2023).

Using a dataset of 794 observations, Zhang et al. (2017) compared the performance of traditional HPM and GWR-HPM models for Airbnb listings rates in Metro Nashville, Tennessee. The study used distances from the city center, proximity to the highway, age, number of online reviews, and overall rating scores of the listings as explanatory variables regressed on lodging rates. The geographically weighted regression model uncovered spatially varying effects of the explanatory variables on the explained variable; the negative influence of distance to the city center was more in the central Metro Nashville region than in the remote areas.. The authors found the GWR-HPM model ($\bar{R}^2$ = .25) better in explaining price variations than the G-HPM ($\bar{R}^2$ = .11). Also, the GWR model returned larger coefficients, reduced AIC, and reduced residuals

Hong and Yoo (2020) explored locational variations in relationships between shared accommodation rates and its determinants in Los Angeles and New York. The authors relied on Multiscale Geographical Weighted Regression (MGWR), a variant of GWR that allows for the scale of explanatory variables influence to vary (Fotheringham et al., 2017; Sachdeva, 2020). Using 44,291 listings of Airbnb options, the researchers investigated the effect of listed facility attributes, host characteristics, reputation, and environmental attributes on price. The investigation focused on the influence of distance to multiple recreational opportunities operationalized by an index of inversed Euclidean distance to 30 popular tourist attractions. Results show that the MGWR models were better in terms of explanatory power ($\bar{R}^2$ = .71 and $\bar{R}^2$ = .60) than the global HPM ($\bar{R}^2$ =.37 and $\bar{R}^2$ =.21) for the cities. The results demonstrated spatial variance in rate determinants in Los Angeles and New York depicting local, regional, and global influences.

Kim et al. (2020) explored spatial variation in factors influencing hotel room rates in 387 Chicago hotels. The authors examined the effect of hotel age, size, class, service quality, distances to the airport, and proximity to local attractions on room rates. The GWR uncovered significant spatial variability in the effect of all factors on accommodation rates. However, the model's prediction power improved marginal ($\bar{R}^2$ = .58 – .69) compared to $\bar{R}^2$ = .62 in the traditional HPM, while the Akaike information criterion (AIC) decrease by 9.43 points. The authors conclude that GWR offers a better fit than the OLS model.

Suarez-Vega and Hernandez (2020) tested a framework for selection of price determinants for peer-to-peer hospitality facilities from a list of 150 variables. The study obtained data from an online listing of property characteristics, distances from GIS computation, and social media posts of tourist attractions in Gran Canaria, Spain. Overall, the study's GWR results corroborate other studies' findings on non-stationarity in the influence of hotel size, level of services, and locational factors on accommodation rates in this market segment. The findings suggest that additional guest services positively influence price while the distance to environmental amenities has an inverse relation. Like other studies, Suarez-Vega and Hernandez (2020) provides evidence that GWR models give better indicators of goodness of fit than the OLS regression method (OLS $\bar{R}^2$ = .60, AICc = 1,425.46; GWR $\bar{R}^2$ = .62 - .66, AICc =1,346.58 – 1,219.69).

Guedes and Rebelo (2020) estimated the marginal local effects of winescape aesthetic views on rates for lodging accommodation in the rural vineyards of Douno, a Portuguese a low-density monoculture environment. The research relied on nine explanatory variables grouped as landscape factors (distances to the nearest vineyard, winery, heritage site, and river); accessibility (the proximity to the train station and closeness to the main road); site-specific attributes (room count and type of facility) and reputation (booking.com ratings). Results of the G-HPM confirm all four factors as significant accommodation rate determinants ($\bar{R}^2$ = .34). The authors report a small improvement in the goodness of fit for the semi-parametric GWR that returns a lower AIC (-0.31) and a marginal improvement in explanatory power ($\bar{R}^2$ = .35). Although the study did not find evidence of spatial dependency in the lodging rates, the GWR model uncovered non-stationarity in the effects of landscape, accessibility, and site-specific factors on lodging rates while the influence of reputation remained stationary.

The extant literature presents consistent evidence of superior performance by GWR in terms of goodness of fit statistics and model predictive power in different markets. The literature supports the view that spatial regression techniques can improve the informative values of HPM by accounting for spatial dependency in room prices and spatial variations in the effects of independent variables on the dependent variable. However, the review highlights mixed results in the magnitude, direction, and significance of the influence of the accommodation rate determinants in various markets. From the review, it is noteworthy that the incipient spatial hedonic modeling research focuses on tourism markets in urban areas and coastal resorts. The literature confirms the assertion by Guedes and Rebelo (2020) that little attention has been given to tourism markets in low-density and less diverse "monoculture" markets such as tourism accommodation in national parks.

2.5 SUMMARY OF REVIEWED LITERATURE AND RESEARCH GAPS

The review focused on appraising literature on concepts, theories, and empirical studies about CES as a specific category of ES in terrestrial national parks. Appendix II summarize the reviewed literature and underscore knowledge gaps and research opportunities identified in the literature.

The literature shows that researchers attribute the inadequate number of CES studies to the subjective nature of the services. The literature stresses that lack of knowledge and proper demonstration of the services has contributed to their exclusion or under presentation in policy and management decisions. However, the literature reveals progress in the conceptualization of CES in more operational terms aimed at improving their measurement. The review noted evidence of efforts to distinguish between final and intermediate CES and between CES values and CES benefits. On account of limited empirical evidence, there remains scope for research to demonstrate the links between hitherto under-researched ecosystems such as national parks and human welfare through the variety of cultural non-material benefits. Additionally, the importance of interactions between cultures and ecosystems in realizing CES provides the impetus for studies to examine site-level stakeholder CES perceptions in specific ecosystems.

Environmental economists have formulated the TEV framework to assign values to CES in a metric amenable to the language of policy and decision-makers. The reviewed literature presents evidence of the application of this framework in ES valuation techniques in different ecosystems. However, the review noted scarcity of evidence of application of the concept in national parks. This lacuna lays a basis for testing the applicability of the TEV concept to CES valuation in the national parks to advance the frontier of monetary valuation in terrestrial wildlife PAs.

The literature showed a consensus on the suitability of HPM for modeling consumer choices for heterogeneous commodities. However, based on evidence from city/urban, peer-to-peer, and beach luxury accommodation markets, there are reservations about the models' suitability in handling spatial data. A literature search in mainstream peer-reviewed journals and online web search engines did not yield any research that applied the S-HPM in the wildlife tourism accommodation market. There is scope to extend application of the S-HPMs in assessing tourist preferences in this accommodation market. At the same time, there is scope to interrogate the criticisms against HPM studies in this market.

The literature review reveals sustained advocacy for the adoption of spatial HPM in tourism studies. Evidence from urban, peer-to-peer and beach holiday tourism showed superior performance of GWR relative to global HPM in terms of improved model goodness of fit statistics and predictive power. The reviewed literature suggests that the GWR-HPM captures spatial heterogeneity and accounts for spatial dependency in the accommodation data improving HPM results. This proposition is uninvestigated in the wildlife tourism accommodation markets. This research gap justifies the investigation of spatial effects in the determinants of accommodation rates in this market. At the same time, due to a lack of empirical evidence, there is still a lack of clarity on the relative performance of global and spatial HPMs in the wildlife tourism accommodation market.

The reviewed literature indicates growing popularity in the use of participatory techniques in quantification and mapping of CES as a prerequisite to their valuation. Empirical HPM studies measure CES using accessibility/proximity indicators specified as dichotomous variables or distances to areas of attractions. Evidence from PGIS studies points to improvements in the quantitative characterization of CES and better describing spatial variation in supply using GIS analytical capabilities. The development of the GIS analytical framework presents an opportunity to improve quantification and demonstration of the spatial nature of CES. The current research explored whether more defensible and acceptable HPM valuation results can result from an assessment framework that simulates spatial variations in the provision of CES benefits.

2.6 CONCEPTUAL FRAMEWORK

A conceptual framework provides a visual representation of the study's variables and illustrates the theorized interrelationships between the variables. Adom, Hussein, and Agyem (2018) regard a conceptual framework as a depiction of the researcher's theory of how the variables in the study are related. Figure 2.3 depicts the hypothesized relationships between CES, accommodation facilities structural attributes, services and room rates for tourist accommodation facilities in the national parks.

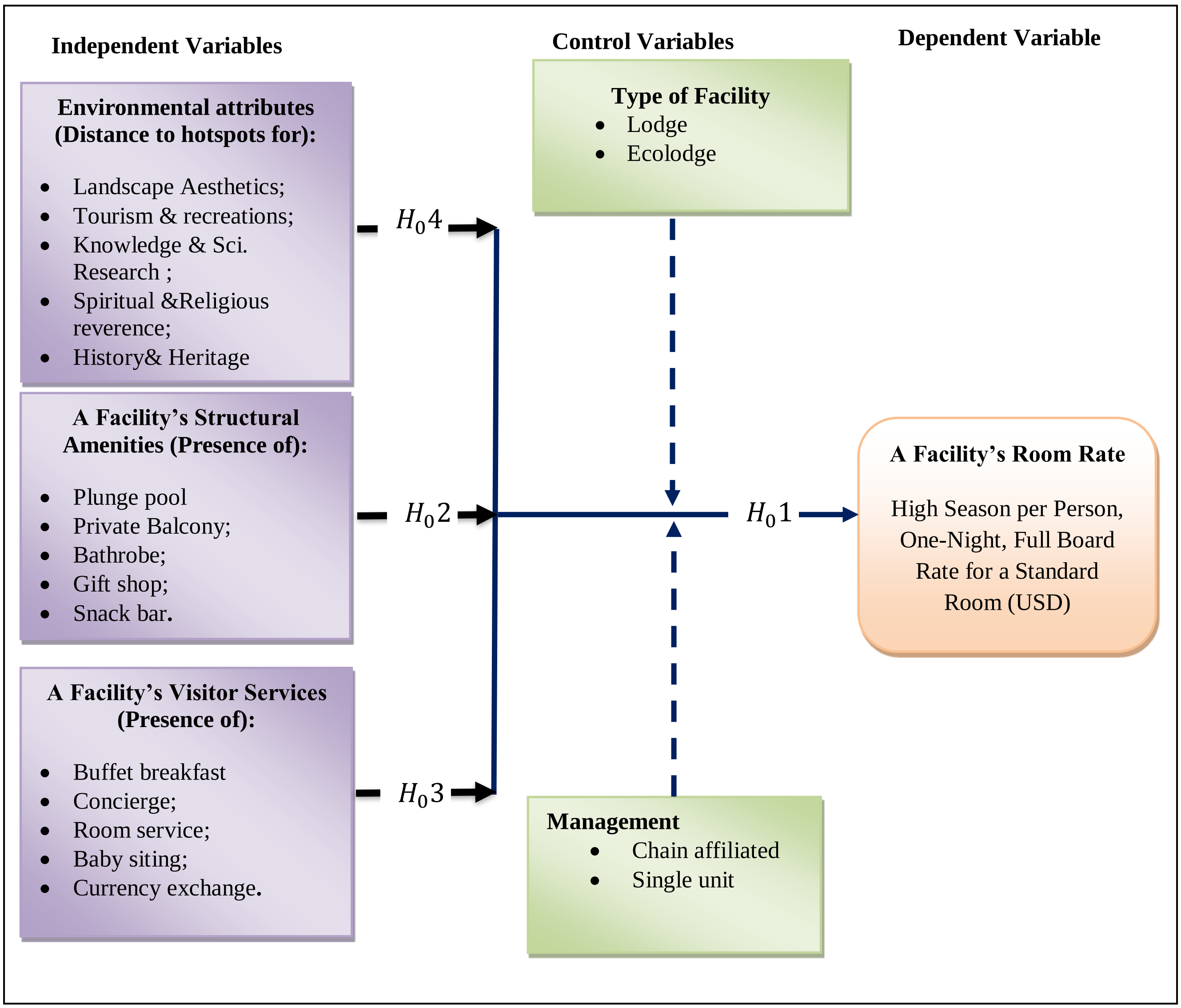

Figure 2.3 Research Conceptual Framework – The Impact of Tourist Accommodation Facilities Attributes on Room Rates in the Tsavo-Amboseli Wildlife Tourism Destionation Area.

Source: Research Data (2023)

The MEA (2005) conceptualizes the ability for parks to provide non-material *in- situ* welfare-enhancing services as CES which can accrue through tourism experiences as CES benefits. Randall and Stoll's (1980) TEV framework posits that CES enter tourists' production functions in combination with time and other commodities in the production of tourism experiences and provides a basis for the valuation of the intangible benefits. The HPM proposed by Rosen (1974) advances the view that the implicit value of CES can be revealed from the tourist's WTP for the benefits as included in prices for associated market commodities such as park accommodation.

Based on the HPM theory, the study theorized that the room rate for privately operated tourist facilities in the TAWTDA is a function of the facility's structural attributes, visitor/guest services, and environmental characteristics described as CES benefits. The study measured room rates as USD lowest one night, full-board adult per person rate paid for a standard room weekday booking during the high season (Pawlicz & Napierala, 2017; Tochaiwat, 2019). The room rate was considered as the dependent variable.

The study proceeded from the premise that park accommodation facilities are bases for enjoying ecotourism/recreation, aesthetic, spiritual, educational, and heritage park values to consider the effect of proximity to CES on room rates. Comparable studies examine proximity to scenic spots (Zhang et al., 2011), heritage sites (Guedes & Rebelo, 2020), tourist attractions (Hong & Yoo, 2020; Kim et al., 2020; Suarez-Vega & Hernandez, 2020), and forest areas (Latinopolous, 2018). As compared to the previous studies, the research considered differences in the provision of the CES benefits in the terrestrial national parks and computed indices of spatial variability in the concentration of the CES benefits. Facilities environmental attributes were operationalized as proximity to high CES hotspots and entered the hedonic pricing function as independent variables:

Empirical evidence suggests that parks confer utility to visitors due to their scenic appeal and landscape aesthetics, and park accommodation facilities provide a base for visitors to enjoy this CES benefit. Rogerson and Rogerson (2021) observe that visitors to Australian National Parks place a high value on the scenic beauty of the parks and the opportunities for landscape appreciation they offer. Similarly, Kline et al. (2020) find evidence to suggest that visitors to national parks in the United States value scenic beauty and natural features and are willing to pay more for accommodations that offer better access to these features. Kline et al (2020) find that lodges and other accommodations located within national parks were popular with visitors who sought to maximize access to the park's natural beauty. The current study captured the provision of landscape aesthetics in the parks as the presence of natural features with aesthetic appeal and scenic places and hypothesized that proximity to the hotspots for landscape aesthetics positively impacts room rates. As the opportunities for landscape aesthetic appreciation vary within the park, the study expected the positive influence of landscape aesthetics on room rates to differ spatially in the study area.

In the same vein, parks are cultural spaces that confer heritage benefits to visitors (MEA, 2005). Tourists are attracted to parks with landscapes that represent valuable human history, for instance, historical battlegrounds. It stands to reason that facilities near places with a high concentration of heritage resources afford tourists better opportunities to enjoy this benefit. The study theorized that proximity to heritage resources positively influences room rates in the parks. As place-specific CES benefits, the influence of a park's heritage values on room rates was expected to vary with relative access to heritage sites.

Studies on ecotourists' motivation suggest that their choices for places to visit are influenced by destinations' natural attributes (Mackoy & Osland, 2004). Opportunities for leisure activities like biking, hiking, camping, bird watching, photography, and ideal prospects for viewing iconic mega fauna indicate a location's suitability for ecotourism and recreation. Owing to spatial variability in ecotourism recreation opportunities within parks, facilities' locations vary in their suitability as bases for ecotourism recreation activities. Therefore, tourists' WTP for park accommodation was expected to positively relate with proximity to the high concentration of ecotourism recreation opportunities.

Examples abound relating modern religious dogma to the natural environment. For instance, eastern religions and indigenous traditional African belief systems promote an ecocentric view attaching reverence to elements of the natural environment (Verschuuren, Wild, Oviedo & McNeely, 2010). Ament et al. (2017) assert that tourists are attracted to visit parks to partake in their religious values. It follows that park accommodation facilities located near elements with spiritual value provide better opportunities for a deeper spiritual reflection and a feeling of closeness to nature. However, owing to variability in the endowment of elements with religious value, accommodation locations differ in their suitability as bases for a religious experience. Thus the study expected that opportunities for spiritual/religious experiences at a facility's site positively influence tourists' WTP for the accommodation. The research expected spatial heterogeneity in the relationship between room rates and opportunities for spiritual reverence.

National parks are established for the preservation and conservation of species diversity, cultural features, and habitats as resources for education and scientific research. Stolton et al. (2015) observe that estuaries and game sanctuaries may be designated for research and placed under stricter protection to restrict disturbance. The authors note that parks develop educational programs to support visitor learning. However, as parks do not uniformly provide learning opportunities, locations within the parks differ in their suitability as bases for an educational experience and scientific research. The study expected that the availability of educational opportunities near a facility's site would positively influence tourists' WTP for accommodation at the facility.

Hedonic modeling in the holiday accommodation sector supports the notion that tourists' WTP for accommodation is influenced by facilities characteristics (c.f. Appendix I). The HPM theory considers a tourist's accommodation purchase as a decision to acquire temporary access to the facility's amenities and services including its (i) structural attributes e.g. a plunge pool, room with a private balcony, bathrobe in bathrooms, Gift shop, snack bar, restaurant etc.; (ii) Visitor services e.g. buffet breakfast, concierge services, laundry services, baby-sitting, currency exchange etc. As they are desirable attributes, the amenities and services were expected to positively affect room rates and entered the hedonic function as explanatory variables. However, a number of typical attributes such as restaurants and bars are widely available and were expected not to feature in guests' accommodation decisions.

Control variables, such as the type of facilities management (chain affiliated or single unit) and the type of facility (ecolodge or lodge), are included in a Hedonic Pricing Model (HPM) to account for the effects of other factors that may influence the dependent variable (room rates) but are not the primary focus of the study (Berger & Blomquist, 1992). The current study examined the impact of a facility's structural amenities, visitor services, and environmental attributes on room rates for park accommodation facilities in the TAWDA while also controlling for the effects of the type of facilities management and the type of facility.

Studies show that visitors prefer single-unit facilities in national parks, such as in Grand Canyon and Yosemite in the USA (Kim & Usyal, 2019; Park et al., 2020), and in South African National Parks (Brouder & Teixeira, 2020), for their intimate and peaceful settings. Evidence in the literature shows that wildlife tourists in Kenya value small-scale units for their authenticity and personalized service (Hughes & Ensor, 2019). The study thus hypothesized that the type of management influences visitors' preference for accommodation and the room rates in the TAWTDA.

Studies demonstrate a growing preference for ecolodges among park tourists due to the increasing awareness of environmental sustainability. Choi and Kim (2020) found that the green attributes in ecolodges, such as their natural settings and unique design, positively influence customer satisfaction. Similarly, Mihelcic and Hrzenjak (2018) found that tourists in South Africa preferred ecolodges due to their green attributes, natural surroundings, and cultural authenticity. Moreover, evidence from Maasai Mara in Kenya attests to wildlife tourists’ preference for ecolodges over traditional lodges due to their environmentally friendly features (Ondieki & Karanja, 2021). On the strength of the evidence in the literature, the current study hypothesized that a facility’s status as an ecolodge or traditional lodge influences visitor preference for accommodation and thus impacts the facility’s room rate in the study area.

CHAPTER THREE

2. METHODOLOGY

2.1 INTRODUCTION

This chapter details the study's methodology: The chapter explains the research philosophy, design, study area, and target population and follows with a description of sampling and data collection strategies. Then the chapter details the procedures employed in pre-testing the research instruments, the types of data used, and the analytical protocol adopted in the research. The chapter ends with a discussion of the ethical issues considered in the study.

2.2 RESEARCH PHILOSOPHY

In scientific inquiry, the researcher's world view or philosophy influences the transformation of what people believe to be true – doxa into what is known to be true- episteme (Creswell & Creswell, 2017; Saunders, Lewis, & Thornhill, 2009). Neuman (2014) observes that a research philosophy determines what constitutes knowledge (epistemology), informs the general approach and assumptions about how research is conducted (research paradigm), and knowledge developed.

According to Neuman (2014), two major divergent philosophical orientations have emerged in western scientific inquiry; the positivist philosophy or the scientific world view first advanced in the mid-19th Century by Auguste Comte, a French philosopher and the interpretivist or anti-positivist philosophy proposed in the late-19th century by a Germany philosopher, Wilhelm, Dilthey. As distinguished from the anti-positivist philosophical leaning, positivism assumes that social reality comprise s objectively verifiable facts measurable using value-free metrics on which researchers apply statistics to test causal theories and develop knowledge through replication (Neuman, 2014).

The positivism emphasizes empirical evidence and scientific methodology as the foundation for developing knowledge and has profoundly impacted the development of scientific knowledge in social science disciplines, including tourism, economics, and geography (Babbie, 2015). Additionally, the positivist paradigm has contributed to the development of replicable and verifiable scientific methods in the social sciences, helping to ensure the reliability and validity of research findings (Kivunja & Kuyini, 2017).

However, scholars criticize the positivist philosophy for its limited focus on observable and measurable data and its failure to account for phenomena resulting from complex social interactions (Mcleod, 2017). For example, in the current study, strict adherence to the positivist paradigm would have failed to capture the immeasurable, introspective benefits of society's interactions with natural ecosystems in the natural parks - CESs. This exclusion of intangible benefits would have hindered the articulation of some park values.

In response to the limitations of the positivist approach in explaining human behavior in social contexts, other research philosophies have emerged. One such philosophy is the Critical Realism (CR) paradigm proposed by Bhasker in 1975. The central tenet of this school of thought is that the real world exists independently of human knowledge and is governed by causal laws and mechanisms, not well understood by humanity. However, the CR research philosophy also maintains that society's knowledge of the real world, although imperfect, is always subject to revision and improvement through scientific inquiry (Bhasker, 1975).

The stratified reality concept is a defining feature of the CR research philosophy (Bhasker, Collier, Lawson & Norrie, 1998). According to Bhasker, reality consists of three distinct domains: The empirical, which includes all observable phenomena; the actual reality, which encompasses all entities and events regardless of whether they are perceptible and the real world, which consists of all the causal structures and mechanisms that underlie empirical and actual reality. According to the CR paradigm, the role of research is to help understand the underlying causal structures and processes that give rise to observable phenomena in the social world. The paradigm has gained greater acceptance in social science research, where scholars are often concerned with explaining relationships between complex unobserved, and often subjective constructs. For instance, in a HPM study, Liu and Zhou (2020) rely on the CR perspective to investigate the underlying mechanisms that drive the relationships between urban park benefits and residential property values in China.

In a recent trend, scholars have come to recognize that many of the challenges facing humanity today are complex and cannot be addressed solely by solutions from a single discipline. As a result, social scientists now understand the significance of interdisciplinary research, which incorporates knowledge from diverse fields of study to develop new insights, solutions, and approaches to complex problems. Bhasker (2013), the originator of the CR paradigm, suggests that this philosophy is particularly amenable to interdisciplinary research. He argues that it encourages scholars and practitioners to adopt broader and more systemic perspectives and provides a meta-theoretical framework to guide and inform scientific inquiry. The philosopher posits that by examining the causal mechanisms that underlie social phenomena, interdisciplinary research hinged on the CR paradigm can prescribe effective and sustainable solutions that account for a range of social, ecological, and economic factors (Bhasker, 2013).

The study utilized the positivist approach to develop an econometric model using quantitative data on facility room rates, structural amenities, visitor services, and proximity to CES hotspots. Creswell and Cresswell (2017) opine that the positivist philosophy assumes a deterministic reality in which cause probably determines effects. The positivist philosophy informed the study by guiding the development and testing of hypotheses regarding the global and spatial effects of facility attributes on room rates in the study area. In line with the positivist philosophy, the study proceeded from Lancaster characteristics and hedonic pricing method theories that allowed the research to propose and test hypotheses in a deductive approach (Kanazawa, 2017). Following the positivist principles of replicability and verifiability, the study documented the deliberative GIS mapping protocol for future researchers to use in similar studies and will contribute to knowledge advancement in park CES benefits mapping.

The CR philosophy's assertion of the existence of an actual reality that may not be readily observable influenced the study to adopt the ES framework, which recognizes intangible, non-market values resulting from park users' interactions with the natural ecosystem. To articulate these intangible CES benefits, the study drew on the tenet of actual reality and collected qualitative georeferenced data on park managers' perceptions of CES supply in the parks using the deliberative GIS mapping method. The philosophy enabled the study to consider park benefits beyond those measurable in biophysical and monetary terms. Additionally, the CR philosophy's tenet of the existence of the real world informed the exploration of underlying mechanisms and contextual factors that shape the relationships between room rates and their determinants at the global and local levels in the study area.

By integrating the principles of the positivism and critical realism research philosophies, the study adopted a mixed-method interdisciplinary approach that combined knowledge and methods from geography, environmental sciences, and tourism. The Study applied the deliberative GIS CES mapping protocol to capture qualitative data on the spatial distribution of CES benefits in the parks. Furthermore, the research integrated knowledge and methods from economics, tourism studies, and geography to develop an econometric model using quantitative data. The model was used to explain the impact of CES benefits, facilities' amenities, and visitor services on room rates in the study area.

2.3 RESEARCH DESIGN

The study utilized a mixed-methodology approach, using a cross-sectional survey design to collect qualitative and quantitative data. Table 3.1 presents a summary description of the research approach and design.

Table 3.1 Description of Research Approach and Design

Research Approach	Research Design	Data Collection Technique	Type of Data	Variables
Mixed Methods	Cross-sectional survey	Questionnaire	Quantitative	• Respondent's park knowledge & experience; • Respondent's demographics; • Perception of parks suitability for CES provision; • CES benefit identification
		Deliberative GIS CES Mapping	Qualitative	• Location of CES provision.
		Online Checklist	Quantitative	• Facilities' structural amenities; • Facilities' visitor services; • Facilities management; • Type of facility; • Room rates.

Source: Research data (2023).

Table 3.1 shows that the study used surveys to obtain georeferenced qualitative data on the supply of park CES benefits from park staff using the deliberative GIS CES mapping technique, obtained quantitative data on respondent's characteristics using a questionnaire and used an online checklist technique to collect online quantitative data on accommodation facilities structural attributes, visitor services, and room rates.

According to Creswell (2002), a mixed-methods approach is a research approach that involves the collection, analysis, and integration of both quantitative and qualitative data in a single study. This approach is ideal for studies that explore subjective individual perceptions and explain relationships using statistical analysis. Creswell (2002) notes that the mixed-methods approach allows researchers to address research question and test hypotheses at the same time which provide a more comprehensive understanding of the research problem.

Creswell and Creswell (2017) define a survey as a research method that involves collecting data from a sample of study units through standardized questions. The authors recommend using a survey for a study that measures a group of explanatory variables (such as attributes of accommodation facilities) to explain their influence on an outcome variable (such as room rates). They note that the method is cost-effective and allows standardization to ensure consistency and accuracy in collecting data on attitudes, beliefs, and opinions. The data can then be used to test hypotheses and establish relationships between study variables.

The study adopted the cross-sectional design to collect data transversally on park tourist accommodation facilities' attributes and park managers' perceptions of their parks' CES supply (Creswell & Creswell, 2017). Pajo (2017) describes the cross-sectional design as a type of research design that involves the collection of data from a sample of study units at a single point in time. Pajo (2017) points out that a cross-sectional inquiry structure avoids temporal effects on the research variables.

Researchers using hedonic pricing models recognize that prices for surrogate market commodities are influenced by temporal variability in their determinants. To control for seasonality in price determinants, the studies often adopt a cross-sectional survey design to collect data transversally. For example, Jadhav (2016) collected data on residential property sales in New York over one year to model the influence of property attributes, accessibility, neighborhood characteristics, and environmental attributes on residential property sale prices. Similarly, Kim, Yoon, Yang, and Thapa (2020) surveyed a cross-section of 152 properties in Jacksonville Beach, Florida to study the impact of structural, neighborhood, and environmental attributes on house sale prices in 2017. The current research also adopted a cross-sectional approach to minimize room rates and CES provision seasonal variations for pragmatic considerations to allow for quick and inexpensive data collection for a study targeting voluminous data (Pajo, 2017).

2.4 STUDY AREA

The study was conducted in Amboseli National Park (ANP) – (392 Km^2), Tsavo East National Park (TENP) -13,747 Km^2 and Tsavo West National Park (TWNP) – (9,065 Km^2). Tsavo East National Park is located at $2^0 46' 43''$S $38^0 46' 18''$E, the adjoining TWNP is at $3^0 21' 44''$S $38^0 35' 38''$E and ANP is located at $2^0 39' 07''$S $37^0 15' 38''$E. Figure 3.1 shows the spatial distribution of the privately operated lodges and ecolodges in the study area.

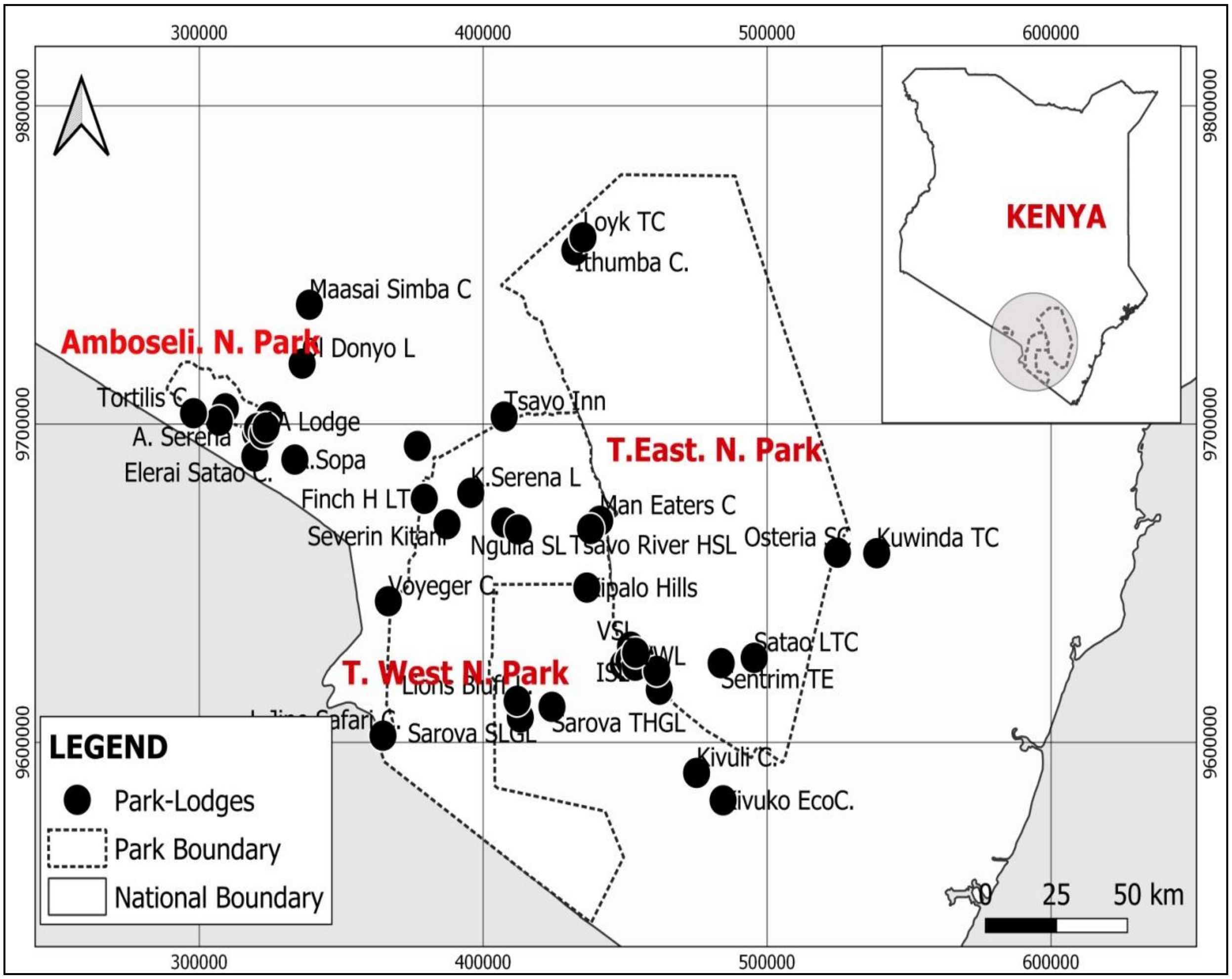

Figure 2.1 Tourism Accommodation Facilities in the Study Area (Inset: Map of Kenya).

Source: Research data (2023)

The three parks form a contiguous ecosystem that creates a distinct wildlife tourist destination area in Kenya (Akama & Kieti, 2003; Muteti et al., 2014). The Tsavo-Amboseli Tourism Destination Area (TAWTDA) is the largest contiguous wildlife tourism destination area in the country. This destination area is ideal as the study location, as it represents a geographically distinct region with a unique set of ecological characteristics that influence tourism demand. These characteristics make it possible to construct a surrogate market for an environmental commodity. Ruhanen, Foley and Ritchie (2013) suggest that tourism clusters with shared attributes, such as ecosystems, can be viewed as distinct geographic regions that form identifiable markets with specific characteristics, including demand for accommodation.

Still, the three parks have a mix of habitats: TENP and TWNP feature *Acacia-Commiphora* woodlands interspersed with baobab trees (*Adansonia digitata)*. *Y*ellow Gul Mohur (*Delonix elata)* and Melia (*Melia volkensii)* shrubs are typical south of TENP. Open grassy plains dominate the southern parts of TWNP (Muteti, Ngene, Muya & Maingi, 2014). One can describe the adjoining ANP by its dry Acacia woodland vegetation, open savannah grassland, and seasonal swamps. The parks have diverse megafauna species like the black rhinoceros (*Diceros bicornis*), the Cape buffalo (*Syncerus caffer)*, the African elephant (*Loxodonta africana)*, and an array of ungulates. There are also iconic carnivores like the African lion (*Panthera leo*), the cheetah (*Acinonyx jubatus*), and the leopard (*Panthera pardus)* (Okello, D'Amour & Manka, 2008). The parks are critical bird areas and play host to over 400 species like Palearctic migrants.

Between 2014 and 2018, the three were the most-visited rural parks in Kenya and accounted for 12% percent of tourists who visited the country's parks yearly. In this period, an average, 128,009 tourists visited ANP, 110,153 tourists visited TENP, while 52,702 visitors were recorded in TWNP annually (GoK, 2019). The choice of the three parks was thus motivated by their importance in terms of the proportion of total annual wildlife tourist visitation and their relatively well-developed park accommodation infrastructure. The other rural parks have less developed park accommodation infrastructure and shared 25% of visitation. Visitors to the urban national parks like Nairobi, Hell's Gate, and Lake Nakuru rely on city hotels for accommodation.

Ten-year management plans (2008 - 2018) guide conservation activities in the parks including ecological, tourism, community, and law enforcement programs (KWS, 2009a, 2009b). The 2008-2018 Tsavo Conservation Area Management Plan divides Tsavo East and Tsavo West National

Parks into zones reflecting levels of visitor use. The three user zones in TWNP are Murka low use zone (LUZ), Lake Jipe LUZ, and Mzima High Use Zone (HUZ). (Figure 3.2).

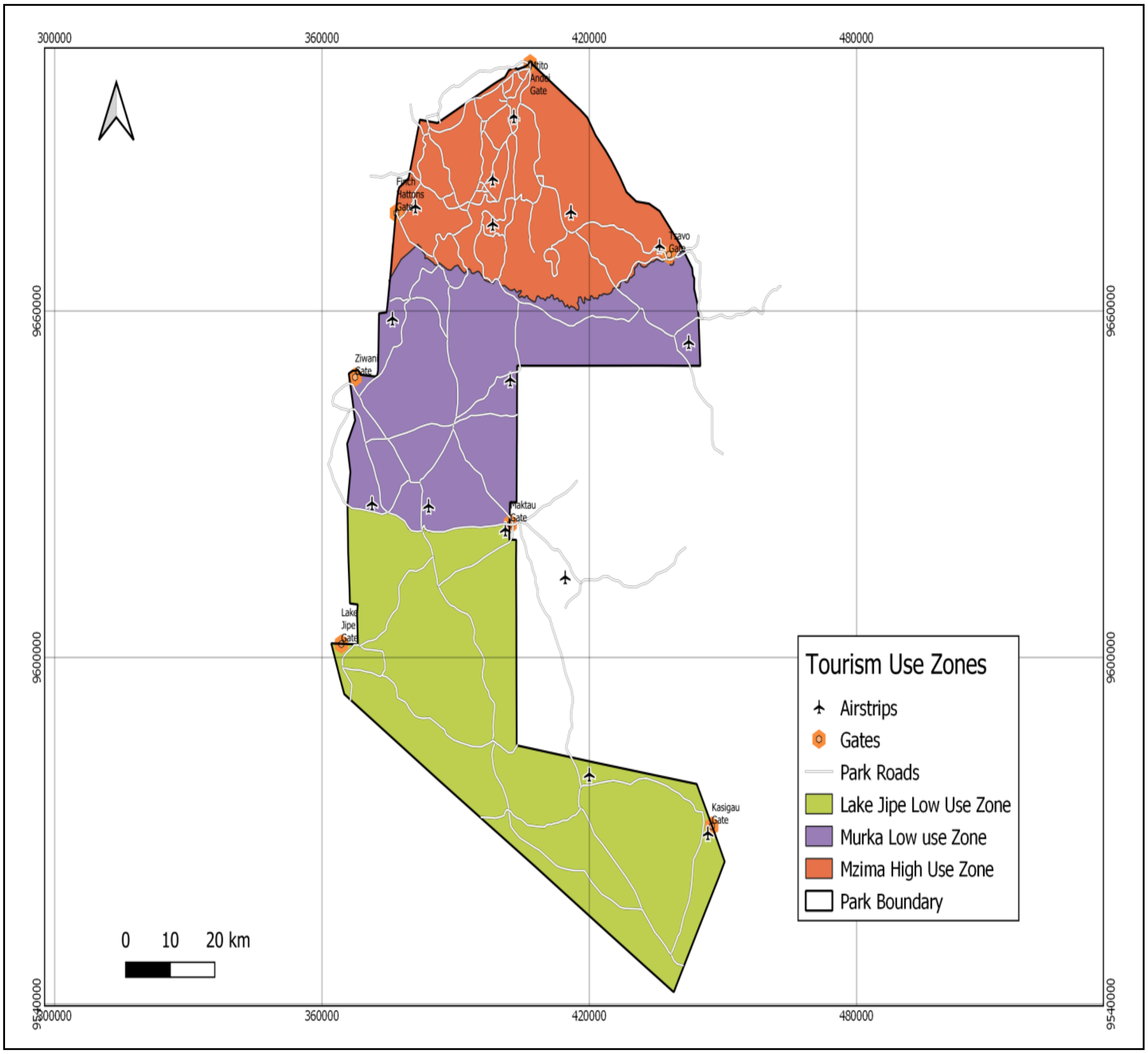

Figure 2.2 Tourism Use Zones in Tsavo West National Park.

Source: Research data (2023)

In TENP, the three designated zones are Emusaya wilderness zone (WZ), Ithumba LUZ, and Voi HUZ (KWS, 2009a) (Figure 3.3).

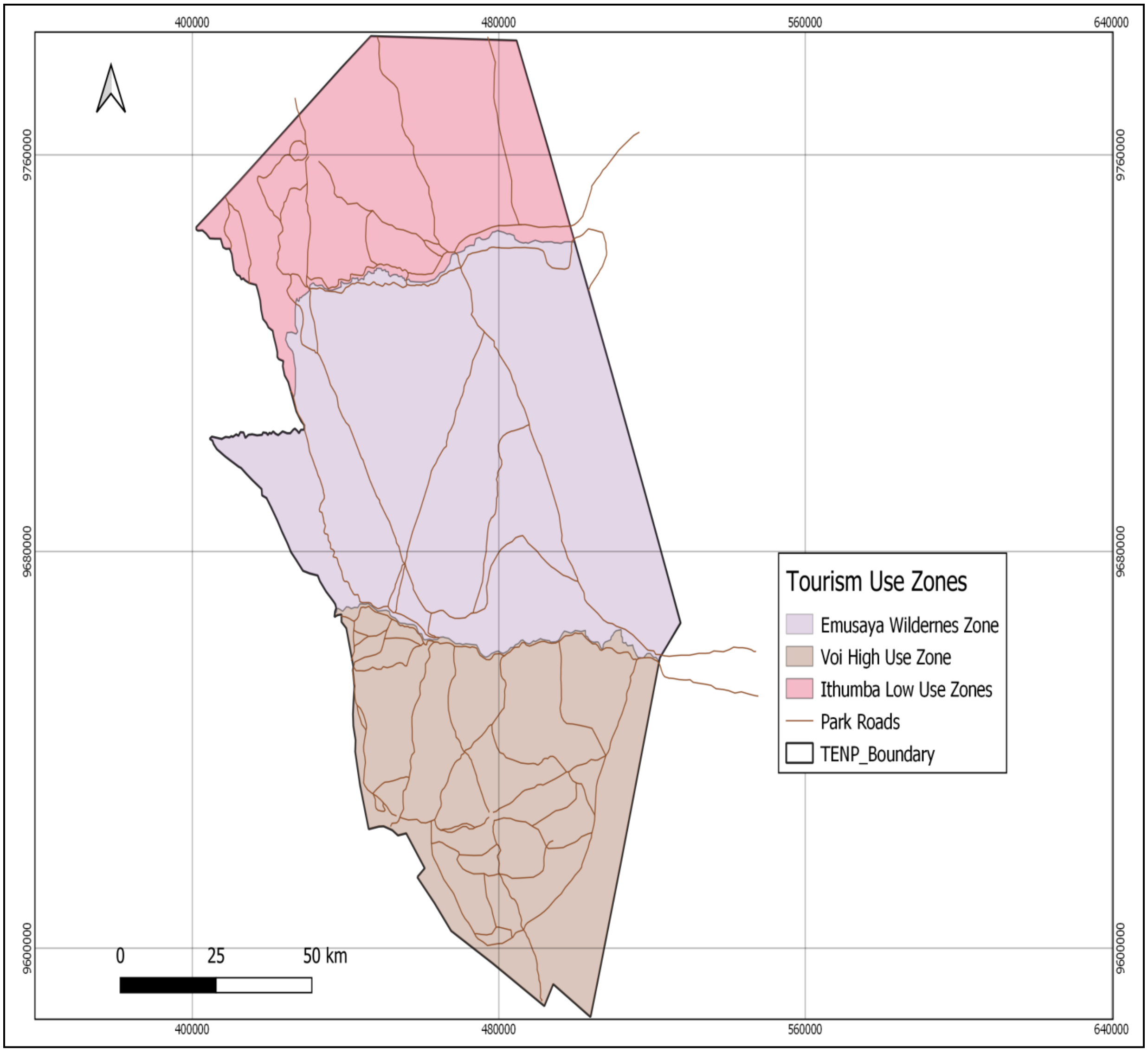

Figure 2.3 Tourism Use Zones in Tsavo East National Park.

Source: Research Data (2023)

On the other hand, the 2008-2018 Amboseli Ecosystem Management Plan (AEMP) describe a HUZ in the central parts of the park surrounded by a LUZ in Amboseli National Park (KWS, 2009b) (Figure 3.4).

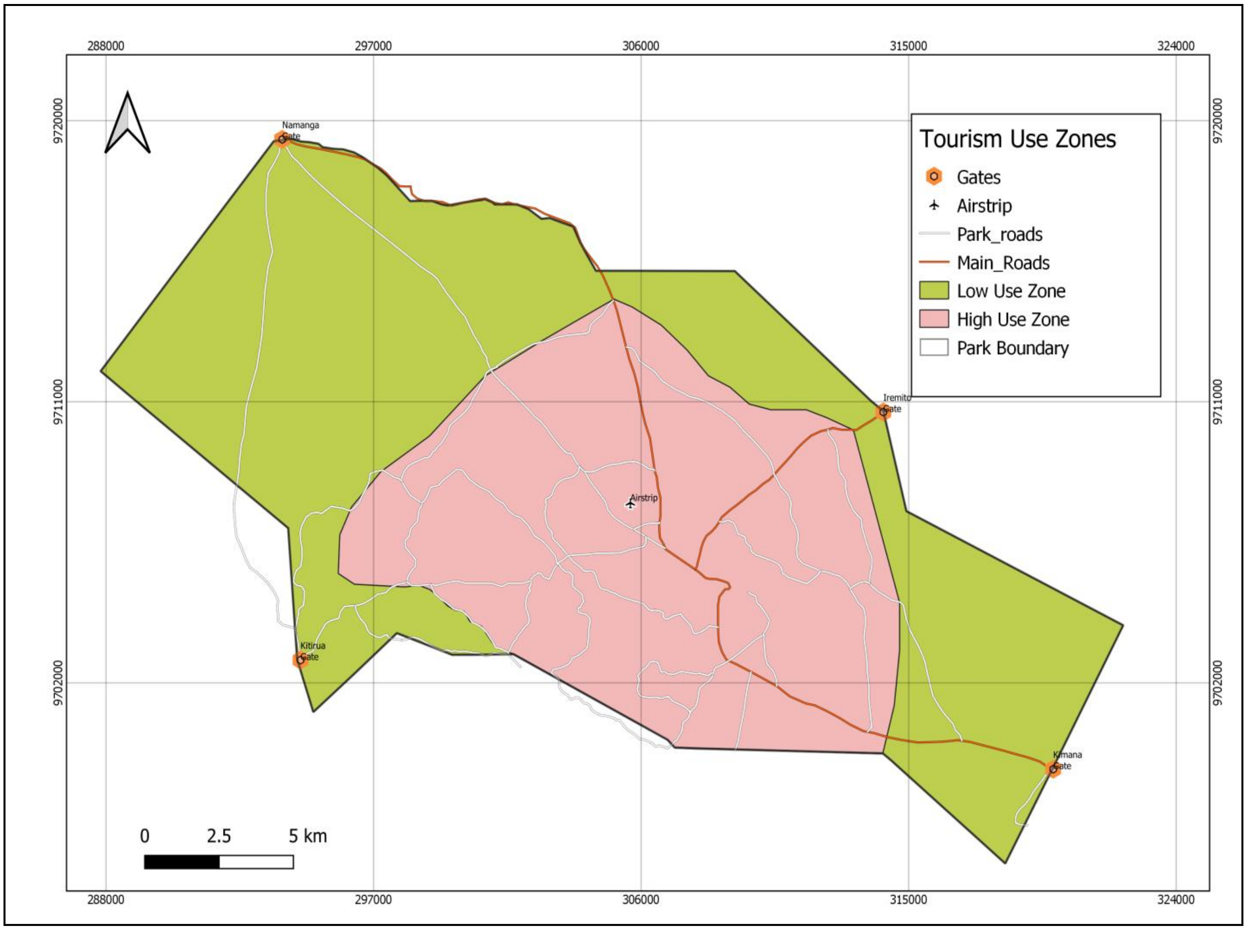

Figure 2.4 Tourism Use Zones in Amboseli National Park.

Source: Research data (2023)

2.5 TARGET POPULATION

Veal (2018) describes the target population as the universe about which research intends to provide knowledge or understanding and is the population to which the research finding is generalizable and to which conclusions and recommendations are to be applied. Following this definition, the current study targeted privately operated tourist facilities providing accommodation to wildlife tourists visiting the country's national parks and reserves network.

Babbie (2015) defines the study population as a subset of the target population from which researchers draw their sample. In cases where the target population is too large or dispersed, social science researchers often rely on an accessible study population. In this research, the study population comprised privately operated tourism facilities within a five-kilometer radius of the parks' boundaries in the TAWTDA. These facilities include ecolodges and lodges that depend on wildlife tourists and constitute the market for wildlife holiday accommodation within the destination area. The operational facilities within the parks are listed in the current Conservation Area Management Plans (KWS, 2009a, 2009b) (see Appendix III). The study excluded facilities that had been closed for more than 12 months before the data collection.

As defined by Chan et al. (2007), ecolodges are accommodations that prioritize environmentally sustainable operations. They are often situated in natural settings, and aim to minimize their impact on the environment while offering guests authentic experiences in natural environments. Ecolodges may employ sustainable design and construction practices, use renewable energy sources, promote conservation and environmental education, and provide economic benefits to local communities. On the other hand, Chan et al (2007) distinguish lodges in national parks as large-scale accommodations that are located within the boundaries of a national park, and are typically operated by the government or private companies under concession agreements. These lodges may provide basic amenities such as food, lodging, and guided tours, and may offer activities such as hiking, wildlife watching, and cultural experiences (c.f. Table 2.2). Community campsites, special campsites, public camping grounds, youth hostels and KWS self-catering bandas provide alternative accommodation in the parks. The research excluded the latter accommodation types due to differences in operational orientation.

The second target population for the study was park employees. A study population was made up of the nominal roll of staff at the three parks from which a sample was selected representing seven (7) operational departments (administration, research, security, community, tourism, education, and veterinary) who are directly involved in day-to-day park operations (N = 21). The study acknowledges that other stakeholders and park users potentially have valuable knowledge about the park that could complement data obtained from park officials. However, following Klain and Chan (2012) the current research excluded these stakeholders from the inquiry as its focus was on trialing the deliberative CES mapping protocol.

2.6 SAMPLING STRATEGY

2.6.1 Purposive Sampling of Park Staff

Neuman (2014) defines purposive sampling, also known as judgmental sampling, as a nonrandom sampling technique that involves selecting individuals or cases based on a specific criteria relevant to the research problem. This technique is ideal when the researcher seeks to recruit participants who can provide particularly informative data to deepen their understanding of the phenomenon under investigation. Pajo (2017) notes that purposive sampling is particularly suitable for studies focusing on a specific subpopulation with unique characteristics. Although purposive sampling does not provide a representative sample of the larger population, it can still yield valid and valuable results for the specific research context. However, the researcher must provide a logical rationale for the selection criteria and support their choices with relevant literature (Pajo, 2017).

The study purposively sampled three participants from each of the seven operational departments in the three parks to complete a questionnaire and participate in a deliberative GIS mapping exercise to identify CES in the protected areas (n =21). The study aimed use this subpopulation to trial whether socially constructed intangible benefits of the park ecosystem could be spatially articulated using the deliberative GIS mapping technique. The criteria for respondent selection was their familiarity with the park's values gained through their operational responsibilities in their respective places of work. The study assumed that these participants were the most knowledgeable about their protected area and could accurately locate sites for CES benefits.

Researchers have previously relied on nonrandom sampling techniques, such as judgmental or purposive sampling, to recruit participants in social ecosystem services assessment studies. For instance, Palomo et al. (2013) used purposive sampling to select a sample of thirteen park managers and five research scientists with deep knowledge of the park to map ecosystem services provision hotspots in Donana National Park, Spain, to ensure precision and accuracy of the deliberative mapping results. Similarly, Canedoli et al. (2017) used purposive sampling to select a sample of six staff members with expertise in park planning, environmental education, security, and cartography to map CES in Parco Nord in Milan, Italy, in a one-day workshop.

2.6.2 Census of Park Accommodation Facilities

A census is a research method that aims to collect data from all study units rather than a sample (Groves et al., 2004). According to Groves et al. (2004), researchers often use censuses in studies where accurate information about the population characteristics is needed. The method is favorable when the study population is small, well-defined, and relatively homogeneous. The current study aimed to collect primary data from a census of all operational privately managed accommodation facilities in the study area listed in the park management plans (N = 50) (KWS 2009a; 2009b) (Appendix III).

Previous HPM tourism and hospitality studies have justified the census approach rather than a sample: Zhang et al. (2014) collected data from a census of all hotels in Hangzhou, China, to examine the impact of air quality on hotel room prices, while Li and Sun (2019) conducted a census of all hotels and B&Bs in the core tourist area of Xiamen, China, to analyze the determinants of accommodation prices. The census method was favorable for these studies as it allowed the collection of accurate information from small, well-defined, and relatively homogeneous populations in destination areas comparable to the study area in the current research.

2.7 TYPE OF DATA

The study relied on primary data collected from park employees on their demographics, parks' supply of five categories of CES benefits, and the location of the CES benefits. The study also obtained primary data on park tourist accommodation facilities' types, management, structural amenities, visitor services, location, and room rates.

Secondary data from previous studies (see table 2.3, 2.4, and 2.5) was referred to in operationalizing variables to measure CES benefits and accommodation facilities attributes in the research.

2.8 DATA COLLECTION

The research relied on a deliberative GIS mapping protocol and an online checklist to collect primary data. Vira, Mant, and Wynne-Jones (2018) describe deliberative GIS CES mapping as a process whereby stakeholders or experts map ecosystem services in a given area using spatially explicit data and GIS technology and note that the goal of deliberative GIS mapping is to produce maps that reflect the experts' perceptions and preferences of CES provision in the area. On the other hand, an online checklist survey is a quantitative data collection process that involves checking off the research subject's attributes from an online listing like an OTA page or facility website using a standardized survey instrument. The study trained three research assistants and used them as field enumerators in the data collection exercise:

2.8.1 Deliberative GIS CES Mapping

Following Braat and De Groot (2017), the study adopted a deliberative GIS mapping technique to elicit primary data from park staff. The approach first involved surveying park staff to complete a questionnaire at their place of work. Willcock et al. (2017) advise that site surveys are suitable for collecting data on subjective constructs like perceptions. Based on this opinion, the study visited park employees in the three parks between 21st August 2019 and 3rd October 2019. During the survey, participants in the mapping exercise were briefed on the objective of the study and asked to complete a self-administered questionnaire (see, Jones et al., 2019; Plieninger et al., 2013). Each respondent completed the questionnaire in an average of twenty minutes.

The second part of the procedure involved mapping CES benefits in the parks by the staff in each department. Palomo et al. (2013) describes deliberative GIS mapping as an interactive procedure where stakeholders with particular knowledge of an ecosystem identify, rate, and map non-material social values of the ecosystem using a structured survey tool and a cartographic map of the area. The study employed individualized data collection because of the subjective nature of the data sought. During the survey pretesting stage, the researcher observed differences in familiarity with the ES concept in the respondents. This observation informed the use of individualized and supervised mapping as it allowed the respondents to interact with the field enumerator and seek clarifications on aspects of the mapping that was not clear.

The GIS mapping exercise started by orienting participants to their respective park topographic maps. Subsequently, the process followed a technique described in Plieninger et al. (2013), in which participants identified CES benefits using thirty (30) indicators (Table 3.2). Participants then drew lines, polygons, and point geometries to indicate locations of CES supply and used color-coded pencils and letter code marks to distinguish different CES benefits on the maps. The protocol allowed participants to identify multiple sites for each CES benefit. On average, each respondent spent 45 minutes mapping the benefits under the supervision of a field enumerator.

Table 3.2 Description of CES and Indicators Used in Deliberative GIS Mapping

CES Benefit	Description	Indicators	Geometry	Letter Code	Color Code
Ecotourism and recreation	Park user well-being from participation in recreational and tourism activities in the park.	Campsite;	Point	C	RED
		Sport fishing;	Point	SF	
		Bird watching;	Polygon	BW	
		Wildlife viewing/photography	Polygon	WV	
		Walking	Line	W	
		Biking;	Line	N	
		Boating;	Point	RC	
		Cave exploration;	Point	CE	
		Rock climbing	Line	RC	
		Salt/mineral lick;	Point	SL	Brown
		Watering pans;	Point	WH	
		Viewing hide;	Point	VH	
		Migratory route	Polygon	MR	
		Breeding grounds	Polygon	BG	
		Known wildlife range/habitat	Polygon	KH	
		Grazing area	Polygon	GA	
		Species sanctuary	Polygon	SS	

CES Benefit	Description	Indicators	Geometry	Letter Code	Color Code
Landscape aesthetics	User welfare gained from the appreciation of aesthetically beautiful park landscapes and features	Feature of natural beauty;	Point	NB	Pink
		Landscapes of notable aesthetic appeal	Polygon	AA	Blue
Knowledge development and scientific research	User welfare resulting from the development of a persons' knowledge and research	Riverine forest;	Line	RF	Green
		Iconic species range;	Polygon	SR	
		Roosting grounds;	Polygon	RG	
		Wilderness area	Polygon	WA	
		Nature trail;	Line	NT	Yellow
		Bird walk;	Line	BWK	
		Educational/visitor information center	Point	EC/IC	
Spiritual and religious reverence	User wellbeing resulting from visit to sites/feature of spiritual/religious and other forms of worship in the park	Shrines (e.g. cave, Hills, mountain, grooves)	Point	SRN	Purple
History and heritage	User welfare from visit to sites/features of particular relevance to human history and way of life	Historical/heritage sites	Point	HF	Black
		Cultural features e.g. Hills	Point	CF	Light Green

Source: Research data (2023)

2.8.2 Online Accommodation Facilities Checklist

The study surveyed an Online Travel Agency (OTA) (www.tripadvisor.com) listings of the accommodation facilities in the study area to obtain data on their room rates, facilities' structural amenities, and guest services (Yalcin & Mert, 2018). Tripadvisor.com provides comparative rates from three other OTAs viz., www.bookings.com, www.expedia.com, and www.hotels.com for the same booking making it an ideal data source on the lowest room rates at the destination. The online checklist survey captured the lowest rates available by simulating a one-night, standard room full-board adult double occupancy booking on a weekday (Tuesday) in mid-November 2019. The booking timing was necessary to control for rate distortions due to seasonality and day-of-the-week effects (Chen & Rothschild, 2010). The research collected room rate data in two days to reduce booking lead time distortions (Soler & Gemar, 2018; Yalcin & Mert, 2018). For facilities whose rates were not on www.triadvisor.com, the study captured the average room rates on the three other OTAs to mirror prospective customer search behavior. The study obtained Universal Transverse Mercator (UTM) coordinates, details on the type of facility – whether lodge or ecolodge, and chain affiliation status from respective hotel websites.

2.8.3 Research Instruments

2.8.3.1 Deliberative GIS CES mapping questionnaire

The questionnaire used in the deliberative GIS CES mapping procedure consisted of three preliminary parts; an introduction giving particulars of the research and the researcher, a background to the CES concept, the aim of the research, and an informed consent form. The questionnaire then provided a mixture of closed and open-ended question items divided into four thematic sections: (i) Staffs' knowledge of the park, (ii) perceptions on park suitability to provide CES benefits, (iii) demographics (iv) identification and mapping of CES benefits. The questionnaire items operationalized research variables borrowing from literature on previous ES mapping studies (Palomo et al., 2013; Canedoli, 2017; Ribeiro & Ribeiro, 2016). Table 3.3 details how the research operationalized the study variables and the scales of measurement used in the questionnaire.

Table 3.3 Operationalization and Measurement of Research Variables

Question	Variable	Description	Measurement	Scale
Part A	**Respondent's knowledge of the park**			
A1	Employment	Operational departments	Multichotomous-	Nominal
A2	Park knowledge	Level of knowledge of park unique values	5-point likert	Interval
A3	Park experience	Years of experience	Multichotomous-	Nominal
Part B	**Perception on CES benefits of the Park to Visitors**			
B1	Park suitability	Ecotourism;	5-point likert	Interval
		Recreation;		
		Landscape aesthetics;		
		Scientific research;		
		Knowledge development;		
		Spiritual/religious reverence;		
		History;		
		Heritage		
Part C	**Respondents' Demographics**			
C1	Gender	Male/Female	Dichotomous	Nominal
C2	Age	Age groups	Multichotomous	Categorical
C3	Educational Level	Highest level of formal education	Multichotomous	Ordinal
Part D	**CES benefits identification** (*if yes indicate location on the map*)			
D1	Recreation	Biking;	Dichotomous	Nominal

Question	Variable	Description	Measurement	Scale
		Campsite;		
		Sport fishing;		
		Bird watching;		
		Wildlife viewing/photography		
		Walking		
		Cave Exploration;		
		Boating;		
		Rock climbing		
D2	Ecotourism	Water hole;	Dichotomous	Nominal
		Viewing hide;		
		Salt/mineral lick;		
		Migratory route		
		Grazing area		
		Species Sanctuary		
		Breeding grounds		
		Known wildlife range/habitat		
D3	Landscape aesthetic	Feature of natural beauty;	Dichotomous	Nominal
D4	Landscape aesthetic	Landscapes of notable aesthetic appeal.	Dichotomous	Nominal
D5	Scientific research	Riverine forest;	Dichotomous	Nominal
		Iconic species range;		
		Roosting grounds;		
		Wilderness area		
D6	Knowledge development	Nature trail;	Dichotomous	Nominal
		Bird walk;		
		Educational/visitor information center		

Question	Variable	Description	Measurement	Scale
D7	Spiritual & religious reverence	Shrines (e.g. cave, Hills, mountain, grooves)	Dichotomous	Nominal
D8	Heritage & historical benefits	Landscape feature of human history	Open Ended	Nominal
D9	Heritage & historical benefits	Cultural features	Open Ended	Nominal
D10	Heritage & historical benefits	Scared species	Open Ended	Nominal

Source: Research data (2023)

The deliberative GIS CES mapping exercise relied on A1 thematic maps for TWNP (1:500,000), TENP (1:650,000), and ANP (1:50,000) to collect spatial explicit data on the respondents' perception of the park's suitability to provide various CES benefits (Angarita-Baez et al., 2017; Canedoli et al., 2017; Palomo et al., 2013; Plieninger et al., 2013; Ribeiro & Ribeiro, 2016).

2.8.3.2 Accommodation facilities online checklist

The study used a binary scale checklist with twenty-six (26) items that indicated the presence (1) or absence (0) of eighteen facility structural amenities (Hong & Yoo, 2020; Kim et al., 2020; Latinopoulus, 2018; Yalcin, & Mert, 2018), and eight visitor services (Latinopoulos, 2018; Yalcin & Mert, 2018) to collect primary data from the OTA. The OTA (Tripadvisor.com/) provides a standardized listing of hotel characteristics and data on the room rate for each surveyed facility. Additional data on the checklist included facility type, name, name of the park, and a provision to record the facility's UTM coordinates. (Appendix IV).

2.8.4 Pretesting of Research Instruments

The research refined the data collection instruments in two stages suggested by Brancalion et al. (2014). First, the study subjected the draft instruments to a review by faculty members in the school of hospitality and human ecology at the Technical University of Kenya. The initial review assessed the questionnaire and checklist for alignment with the study objectives and theory, focusing on the accuracy of the operationalization of study variables. The faculty review also examined the sequencing, language, and format of questionnaire items and suggested changes. The study then redesigned the instruments following the reviewers' recommendations.

The second stage involved a respondent-driven piloting conducted at Lake Nakuru National Park (LNNP). Ferketich, Phillips, and Verran (1993) recommend pretesting on a subsample with demographic and psychographic profiles analogous to the targeted sample. The study selected LNNP for the pretests based on its significance in tourist visitation, the number of tourist accommodation facilities, and accessibility. The research conducted piloting visits between 15th and 18th July 2019, during which the research instruments were tried on three (3) park officers and five (5) lodge managers (Ferketich et al., 1993). The purpose of piloting was to identify and correct any potential problems with the research instruments, like confusing questions, unclear instructions, or missing response categories. Piloting helped refine the research instruments before administering them to the study population and ensured that the questionnaire and checklist were valid and reliable. The respondents and park accommodation used during the piloting stage were not included in the study.

Following the procedure suggested by Demaio, Rothgeb, and Hess (1998), the tests on the research instruments during the piloting relied on behavior coding to observe and respondent's behavior and reactions to questionnaire items. The procedure entailed noting any hesitation, confusion, signs of frustration, skipped questions, or erased markings when completing the study instruments. The test subjects were encouraged to voice their comprehension of the questions to gauge the instruments' clarity. The study relied on the pretest subjects' feedback to fine-tune the questionnaire, online survey checklist, and deliberative mapping protocol.

2.8.5 Validity of Measurements

Pajo (2017) defines validity as the ability of a data collection tool to measure observations accurately. Pajo (2017) underscores the importance of research instruments' validity in social sciences and notes that most concepts in social sciences are capable of multiple interpretations. For instance, CES benefits have different contextualized interpretations. However, validity requires that the research instrument captures the same idea from each respondent. The study considered the construct and content validity of the research instruments:

Construct validity relates to whether the questionnaire items (variables) measure salient and relevant aspects of the latent variables under investigation or the extent to which the questions in the research instruments accurately capture what is intended (Creswell & Creswell, 2017). On the other hand, content validity relates to whether a survey tool captures the construct in its entirety and refers to the extent to which the survey instrument's questions or items adequately represents the content of the construct being measured (Pajo, 2017).

To ensure construct validity in the design of the survey questionnaire, the study operationalized latent variables with multiple dimensions like CES benefits to capture their salient aspects relying on extant literature to comprehensively operationalize multi-item constructs. For instance, landscape aesthetics was conceptualized as user welfare gained from the appreciation of aesthetically beautiful park landscapes and features following MEA (2005) and was captured by indicators of features of natural beauty and landscapes of notable aesthetic appeal in the parks (Table 3.3).

For content validity, the study employed expert judgment in the pretesting and piloting of the questionnaire. During the pretest, faculty members from the university's Department of Hospitality and Leisure Studies reviewed the research instruments to evaluate whether they covered all relevant aspects of the study's constructs and suggested modifications where necessary. During the piloting phase, experts from the park accommodation sector, including lodge managers, reviewed the facilities checklist to ensure that it included structural amenities and visitor services relevant to park accommodation facilities.

2.8.6 Reliability of Measurement

Babbie (2015) describes the reliability of a survey instrument as its ability to obtain similar measurements of a variable repeatedly and suggests that unreliable measurements are common in surveys due to respondents' lack of knowledge about the research subject. In this case, respondents may give varied responses to a question in repeated observations. The study mitigated this source of bias in the data by targeting respondents knowledgeable about the parks' unique values. At the same time, the survey instrument development and pretesting process ensured clarity of the language used in framing the constructs to remove ambiguities.

The study employed standardized measures in eliciting data on respondents' perceptions. The Likert scale allowed the researcher to fit wide-ranging subjective views like perceptions on park suitability to provide CES benefits into a limited number of predetermined response categories. The checklist design archived standardization by relying on a single format facility attribute listed on the OTA. Compared to individual hotel websites that give varying details about a facility, the OTA provides information in uniform categories allowing standardization of the data.

Kanazawa (2017) asserts that for social science studies, reliability goes beyond a researcher's ability to reproduce their findings to include replicability by others. Following this counsel, the study documented all its survey data, data processing, and analysis procedures and maintained consistency in the definitions of the variables. The research also makes explicit its methodological to permit other researchers to replicate its results.

2.9 DATA ANALYSIS

The research relied on descriptive statistics to summarize the data and answer research questions and used inferential statistics to test hypotheses. The data analysis procedure relied on SPSS (Ver.20) to compute descriptive statistics and estimate the global HPM model. Factor (Ver.10.10.03) was used to carry out the poly-choric correlation analysis of the dichotomous-scale independent variables. The research relied on GeoDa (Ver. 1.14.0.0) to examine spatial autocorrelations and analyze regression model residuals (Anselin, Syabri & Kho, 2010). The data analysis relied on MGWR (Ver.2.2.1) to estimate the GWR-HPM and used QGIS (Ver.3.10.2) for geospatial analysis and mapping of the results. Table 3.4 at the end of this section summarizes the study's data analysis protocol:

2.9.1 Preliminary Data Analysis

The first activity in the analysis process entailed systematically organizing the analog raw data from completed park staff questionnaires, facilities checklists, and marked topographic maps into a form that is readable by a computer. Following Neuman (2014), the research developed a codebook for the open-ended questionnaire items and a coding scheme to categorize all responses to open-ended questionnaire items. The coding scheme was used to assign numeric codes to the open-ended responses and convert them to quantitative data. For the mapping exercise, the study adopted the color and letter codes for the CES benefits maps (Table 3.2) to create rules for the transfer of the raw spatial data from analog to digital form.

The analytical procedure then involved first entering the raw data from the questionnaire and checklist into separate excel datasheets using the codebooks and coding scheme. Following Neuman (2014), the study inspected the spreadsheets using the contingency cleaning method to check for coding and entry errors. This procedure involved cross classifying the variables and checking the results for illogical combinations. The cleaned-up datasets were then transferred to SPSS.

Maps on which participants in the deliberative GIS CES mapping ($n = 21$) had marked CES benefits were scanned and georeferenced in Arc1960 (EPSG: 4210) geographic coordinate reference system (CRS) to prepare a geospatial database in QGIS (Sutton, Dassau & Sutton, 2009). Using the heads-up procedure described by Sutton et al. (2009), the analysis digitized point features, routes, and areas representing identified CES benefits from each respondent as points, lines, and polygon shape files in QGIS. The shape files were re-projected to UTM Zone 37S (EPSG: 21037) projected coordinates system (PCS) for subsequent geospatial analysis (Sutton et al., 2009).

2.9.2 Geospatial Analysis

The analysis used mode, mean, median, and standard deviation to describe the demographic and psychographic attributes of the study units. The study relied on paired correlation analysis to assess the association between participants' ratings of parks' suitability to provide the CES benefits and used the absolute magnitude of the Pearson correlation coefficients to study the strength of association between the ratings ($p < .05$). The American Psychological Association (APA) describes the Pearson correlation as a measure of the strength and direction of the linear relationship between two continuous variables that is computed as the ratio of the covariance of the two variables to the product of their standard deviations (APA, 2019). The Pearson correlation coefficient (r) ranges from -1 to +1, where a coefficient of -1 indicates a perfect negative linear relationship, 0 indicates no linear relationship, and +1 indicates a perfect positive linear relationship.

The analytical procedure summarized data on CES benefits identified using the frequency distribution of raw counts and percentages. The study computed polygon centroids and mean coordinates for line CES benefit layers and merged them with point shape files to produce consolidated CES benefits shape files in each park. The geospatial analysis then created heat maps using Kernel Density Estimation (KDE) to visualize the CES benefits distribution in each park. KDE is a non-parametric method used to estimate the probability density function of a random variable, such as the occurrence of a CES benefit in a national park. It involves placing a kernel function on each location of the identified CES and summing the kernel functions to obtain a smoothed density estimate. This estimate is then rendered as a raster shape-file in the form of a heatmap, which visualizes the areas with high and low densities of the CES benefit (Brown & Fagerholm, 2015; Jones et al., 2019; Tew et al., 2019).

To quantify CES benefits distribution, the analysis calculated spatial intensity and diversity indices from counts of CES benefits in 25km^2 grid cells (see Fagerholm et al., 2012; Plieninger et al., 2013). The cell size was ideal for capturing CES in rapidly changing physiographical conditions. Spatial intensity considered counts per unit area while the Shannon index (H^*) (equation 11) was computed to study the diversity of aggregated CES benefit counts (See Angarita-Baez et al., 2017; Fagerholm et al., 2012).

$$H^* = -\sum_{i=1}^{s} p_i \cdot log p_i \qquad (11)$$

Where:

H^* = Shannon diversity Index;

p_i = Proportion of the i^{th} CES benefit;

s = Number of CES benefits.

According to Angarita-Baez et al. (2017), the Shannon Diversity Index measures diversity by accounting for the number of CES benefits sites and the relative abundance of the different CES benefit categories. The index ranges from 0 to a maximum value that depends on the number of CES at a unit of analysis and the evenness. A higher (H^*) Index value indicates a more even distribution of CES benefits across different locations in the park, while a lower value indicates a more uneven distribution.

The study carried out hotspot analysis to identify locations of the statistically significant intensities of the five CES categories. The analysis computed the Getis-Ord (Gi*) statistic using the CES benefit intensity indices and used the Z score to classify the hotspots. The study adopted Oxoli, et al. (2017) definition of hotspots as places of high CES intensity surrounded by similar high CES intensity places. Equation 12 gives the general formula for the Gi* statistic calculated in QGIS:

Getis-Ord Gi* statistic:

$$Gi^* = \frac{\sum_{j=1}^{n} w_{i,j} \cdot x_j - \bar{X} \sum_{j=1}^{n} w_{i,j}}{s\sqrt{\frac{n\sum_{j=1}^{n} w_{i,j} - \left(\sum_{j=1}^{n} w_{i,j}\right)^2}{n-1}}} \tag{12}$$

Where:

x_j= is the intensity index at the j^{th} location;

$w_{i,j}$ = The spatial weight between the i^{th} and j^{th} locations;

n = Number of locations.

And:

$$\bar{X} = \frac{\sum_{j=1}^{n} x_j}{n} \tag{13}$$

$$S = \sqrt{\frac{\sum_{j=1}^{n} x_j^2}{n} - (\bar{X})^2} \tag{14}$$

The Getis-Ord (Gi*) statistic is a spatial autocorrelation measure that identifies clusters of high or low values of a variable of interest across a study area (Oxoli et al., 2017). In this study, the Gi* statistic was used to compare the intensity of a CES benefit within a focal area with the CES benefit intensity in the study area. A positive Gi* value indicates a location with high CES intensity surrounded by other locations of high intensity or a hotspot, while a negative Gi* value indicates a location with low intensity surrounded by other locations of low intensity or a cold spot. A Gi* value close to zero indicates a randomly distributed CES benefit.

The study incorporated facilities' UTM coordinates and attribute data into the CES GIS database. The spatial analysis then calculated Euclidian distances matrices of facilities to CES benefits hotspots (equation 11) to generate variables for facilities CES characteristics. Descriptive statistics of the facilities CES attributes were then calculated.

2.9.3 Econometric Model Estimation

2.9.3.1 Variable description and selection

The study described facilities' amenities and visitor services measured using a dichotomous scale using their modes, distances to CES hotspots using the means, standard deviation, and range. Room rates were summarized using the mean and standard deviation.

The HPM framework does not prescribe a theoretical basis for variable selection and inclusion in the OLS regression model. The study relied on measures of dispersion to select independent variables for inclusion in the model. Following Borza (2019), the analysis excluded variables that had a low variance for being typical in wildlife tourism accommodation facilities. Further, the study excluded highly correlated variables ($r \geq .60$) from the model to mitigate against multicollinearity in HPM (Adams & McGuire, 2022; Fagerholm et al., 2012).

2.9.3.2 Global hedonic pricing model estimation

The research estimated a global HPM (equation 6) using stepwise regression to evaluate the relative effect of accommodation facilities attributes on room rates. However, the analysis first used Shapiro–Wilk's test ($p > .05$) to examine the dependent variable for compliance with the OLS requirement of normality (Shapiro & Wilk, 1965). The study then examined the point-biserial correlations between the independent and dependent variables for linearity ($r > .30$) and the OLS model's Variance Inflation Factor (*VIF*) to test check for multicollinearity in the independent variables (Aladwan & Ahmed, 2019). The analysis relied on the Breuch Pagan Langrage Multiplier test ($p < .05$) to confirm the non-violation of the homoscedasticity assumption and examined the Cooks distance to assess the presence of outliers in the variables (Agmapisarn, 2014).

The analysis used results of the G-HPM to test the study hypothesis for joint/simultaneous effect of the independent variables on the dependent variable:

$\boldsymbol{H_0 1}$: Tourist accommodation facilities' structural amenities, visitor services and environmental attributes do not significantly influence room rates in the study area.

$$H_0 1: B_S = B_Q = B_N = 0$$

The test statistic was:

$$F_o = \frac{SS_R/k}{SS_E/(n-k-1)} \text{ , Reject } H_0 \text{ if } F_o > F_{\alpha,k,n-p} \quad (15)$$

Where:

B_S = Regression coefficients for the vector of facilities' structural amenities;

B_Q = Regression coefficients for the vector of facilities' visitor services;

B_N = Regression coefficients for the facilities' environmental attributes;

SS_R = Regression sum of squares; 0

SS_E = Residuals sum of squares;

n = Number of facilities;

k = Number of independent variables

The analysis then evaluated the regression model's goodness of fit by examining the adjusted coefficient of determination ($\bar{R}^2$) to comment on the global model's explanatory power. Subsequently, the study assessed the coefficients (B_i) for magnitudes and direction of impact at conventional levels of significance (Aladwan & Ahamad, 2019). The analysis used results of the G-HPM to test the following study hypothesis for marginal effect of the independent variables on the dependent variable:

$\boldsymbol{H_0 2}$: Tourist accommodation facilities' structural amenities do not significantly influence room rates in the study area.

$$H_0 2\text{: } B_S = 0$$

$\boldsymbol{H_0 3}$: Tourist accommodation facilities' visitor services do not significantly influence room rates in the study area.

$$H_0 3\text{: } B_Q = 0$$

$\boldsymbol{H_0 4}$: Tourist accommodation facilities' environmental attributes do not significantly influence room rates in the study area.

$$H_0 4\text{: } B_N = 0$$

Where the test statistic in each hypothesis was:

$$t_o = \frac{B_i}{Standard\ Error\ of\ B_i}\text{ ; Reject } |t_o| > t_{\alpha/2,n-p} \tag{16}$$

The relative influence of the independent variables on the dependent variables was assessed by examining the magnitudes of their standardized regression coefficients (β_i).

2.9.3.3 Geographically weighted regression hedonic pricing model estimation

Before estimating the GWR-HPM, the study assessed the variable and residuals of the G-HPM for spatial dependency using global Moran I statistic (I) with $k = 8$ nearest neighbors as the bandwidth for the spatial weighted matrix. The analysis computed the global Moran's I with equation (17) and 17 using GeoDa:

$$I = \frac{n}{S_0} \cdot \frac{\sum_{i=1}^{n} \sum_{j=1}^{n} w_{i,j} z_i z_j}{\sum_{i=1}^{n} z_i^2} \tag{17}$$

Where:

z_i= = the deviation of an attribute of a facility (i) from its mean$(x_i - \bar{X})$;

$w_{i,j}$: = the spatial weight between a facility (i) and (j); n is the number of facilities and

S_0: = the aggregate of all spatial weights:

$$S_0 = \sum_{i=1}^{n} \sum_{j=1}^{n} w_{i,j} z_i z_j \tag{18}$$

Subsequently the study estimated a GWR-HPM model (equation 7) using the MGWR 2.2 software and mapped significant local regression coefficients of the GWR-HPM to visualize the spatially varying relationship between room rates and its determinants (Kim et al., 2020). Moran I statistic for the GWR residuals were computed to assess spatial autocorrelation in the error term. The global regression model and the GWR models were compared in terms of changes in the models residuals and $(\bar{R}^2)$.

Table 3.4 Summary of Data Analysis Procedure

Research Objective	Data Collection Technique	Statistics
1. To map the provision of CES benefits in the Tsavo-Amboseli Wildl ife Tourism Destination Area	Deliberative GIS mapping	• Percentage; • Kernel Density Estimation (KDE); • Intensity Index; Shannon Diversity Index; • Gertis-Ord Gi* statistic.
2. To assess the room rates for park tourist accommodation facilities in the Tsavo-Amboseli Wildlife Tourism Destination Area	OTA online survey	• Mean; Standard deviation, range.
3. To assess the structural amenities, visitor service and environmental attributes of accommodation facilities in Tsavo-Amboseli Wildlife Tourism Destination Area	Deliberative GIS mapping; OTA online survey	Mode, Mean; ,Standard Deviation, range;
4. To evaluate the global and spatial effects of accommodation facilities' structural amenities, visitor services and environmental attributes on room rates for the facilities in the Tsavo Amboseli Wildlife Tourism Destination Area.	Deliberative GIS mapping; OTA online survey	• Pearson's Correlation coefficient; Variance; • Shapiro–Wilk's test statistic; Breusch-Pagan test statistic; Cooks' Distance; Variance Inflation Factor (VIF) • ANOVA, F statistic(F_o), T—statistic (t_o); • Standardized Regression Coefficients (β_i); • Residual Sum of Squares • Regression Coefficients (B_i);Adjusted coefficient of multiple determination ($\bar{R}^2$); • Global Moran I statistic (I);

Source: Research data (2023)

2.10 ETHICAL CONSIDERATIONS

The study conducted every phase of the research process in accordance with accepted standards for ethical conduct in social sciences research. The standards emphasize the centrality of people as participants in the inquiry process, subjects of research, and eventual consumers of research output (Creswell & Creswell, 2017; Neuman, 2014; Pajo, 2017).

Upon registration of the study with the university's School of Graduate and Advanced Studies and receipt of university approval to proceed for fieldwork (Appendix VII), the researcher applied to KWS and obtained a permit to conduct research in the parks (Appendix VIII). Subsequently, in accordance with the Science Technology and Innovation Act 2013, the researcher sought and obtained a research license to conduct research in the country (Appendix IX).

In keeping with acceptable ethical practices, research participants were recruited on a voluntary basis and were properly informed of the criteria for their selection as well as their roles. Neuman (2014) recommends researchers to not only seek respondents' permission to participate in the study but also adequately inform them in order to obtain informed consent. Following Neuman (2014), survey participants were informed of the research purpose and procedures, they were guaranteed anonymity and confidentiality of their data before being requested to indicate a willingness and agreement to participate in the study.

Creswell and Creswell (2017) warn that a study can occasion psychological, legal, and career damage to participants and emphasized the need for social science researchers to be cognizant of their study's socio-ecological footprints. Following this counsel, the researcher sought to treat all respondents with respect. For instance, the study formulated research questions in a way that does not humiliate or embarrass the respondents. Additionally, the researcher accorded fair and consistent treatment to every participant. The research personnel adhered to a strict code of environmental sensitivity and observed park rules during visits to the parks.

The researcher was obligated to make objective observations, analyze the data with fidelity to statistical rules, and report results as objectively and accurately as possible. The study documented all procedures used in handling, summarizing, and querying the data. The study's findings will also be availed to institutions and stakeholders directly involved in the research in the form of the research publications and thesis.

CHAPTER FOUR

2. RESULTS AND DISCUSSION

2.1 INTRODUCTION

This chapter presents and discusses the results of the quantitative and geospatial data analysis. The chapter begins by reporting response rates for the online facilities survey checklist and the deliberative GIS mapping questionnaire before profiling the study participants. The chapter then addresses the research questions and presents the research findings for each objective. Subsequently, the chapter elaborates on the results of hypotheses tests and concludes with an assessment of the performance of the models used in the analysis.

2.2 RESEARCH INSTRUMENTS RESPONSE RATES

2.2.1 Deliberative GIS CES Mapping

The study collected primary data through a deliberative GIS CES mapping procedure from park staff. Table 4.1 details the count of park staff that participated in the GIS mapping exercise.

Table 4.1 Responsiveness of the Deliberative GIS CES Mapping Exercise.

Operational Department	**Respondents**
1. Research & biodiversity	3
2. Security and law enforcement	6
3. Community wildlife service	3
4. Tourism	6
5. Conservation education	3
Total	***n* = 21**

Source: Research data (2023)

Results in Table 4.1 show that twenty-one staff members from five (5) park operational departments participated in the CES mapping exercise: Park administration officers did not participate in the mapping exercise because their responsibilities overlapped with the tourism and education departments, while veterinary services staffs were inaccessible during the data collection period. The number of participants in the study is comparable with extant social GIS CES mapping studies that relied on expert respondents to map CES. For instance, Canedoli et al. (2017) relied on 30 respondents, Palomo et al. (2013) sampled 41 experts, Raymond et al. (2009) used 28 officials, Ribeiro & Ribeiro (2016) incorporated views from 11 park officials, and Ruiz-Frau et al. (2011) used a sample of 22 stakeholders in their studies.

2.2.2 Online Census of Accommodation Facilities

The study obtained data from all operational private accommodation facilities in the three parks ($N = 50$) (figure 3.1). (KWS, 2009a, 2009b). Table 4.2 details the facilities in the census by type and park.

Table 4. 2 Operational Tourist Accommodation Facilities in the Study Area.

	Population	
.Park	**Ecolodges**	**Lodges**
Tsavo East National Park	11	7
Amboseli National Park	10	6
Tsavo West National Park	19	4
Total (N)	**30**	**17**

Source: Research data (2023).

The census excluded three (3) facilities from the study because of incomplete data on their OTA (www.tripadvisor.com) listing, reducing the facilities to forty-seven (N = 47).

2.3 RESPONDENTS' PROFILE

2.3.1 Demographic Profile of the Deliberating GIS CES Mapping Participants.

The study captured the participants' gender, educational level, and age group and used descriptive statistics to characterize the participants by these demographic attributes. The results show that slightly over three-quarters of the park staff who participated in the study were males reflecting gender disparity in wildlife protected areas field staff (Males = 76%; Females = 24% ; $n = 21$). Table 4.3 shows the sample distribution by age group and reveals that older participants accounted for a large proportion of the group; the modal age category was 31 - 40 years (43%). Only one participant was below 30 years indicating a mature sample.

Table 4.3 Distribution of Participants by Age Group (n=21)

Age Group	Frequency (x)	Frequency (%)	Cumulative frequency %
21 -30 years	1	4.8	4.8
31 -40 years	9	42.9	47.6
41 – 45 years	3	14.3	61.9
> 45 years	8	38.1	100

Source: Research data (2023)

The participants consisted of well-educated staff; a majority (86%) had attained between college diploma and university degree qualification. On the other hand, 14% of the participants had a college certificate as their highest qualification. As can be seen in table 4.4, this group of lowest educated participants was drawn from the security department. However, from the cross-tabulation results in table 4.4, there was no evidence to suggest an association between staffs' educational levels and deployment ($\lambda = 0.19; p = .21ns$).

Table 4.4 Participants' Deployment vs. Educational Qualification (Results in Proportion of the Sample n=21)

	Number of Highest Qualification n (%)		
Respondents' Department	**University Degree**	**College Diploma**	**College Certificate**
Biodiversity Research	2(10)	1(5)	-
Security & Enforcement	1(5)	2(10)	3(14)
Community Wildlife Service	2(10)	1(5)	-
Tourism	3(14)	3(14)	-
Conservation Education	-	3(14)	-
n	**8(38)**	**10(48)**	**3(14)**

Source: Research data (2023)

The mapping procedure asked participants to indicate a category of years that best described their working experience in the parks. The study noted that more than 80% of the participants had over 11 years of experience in park employment. The median years of work experience was 13.5 years and 62% of the participants had over 15 years of working experience in the parks.

In summary, the participants' demographic profile allows the assertion that they were mature in age, sufficiently experienced in their wildlife conservation career, and educated. In addition to operational roles that exposed the staff to field experiences, their employment record and educational profile suggest that they could competently identify park values.

2.3.2 Park Knowledge and Participants' Rating of Park Suitability to provide CES benefits

The deliberative CES mapping questionnaire required participants to rate their park knowledge on a five-point Likert scale where (1) equaled to "not at all knowledgeable" and (5) equaled to "extremely knowledgeable". Results of the self-rating corroborated the participants' years of experience in park employment: All participants' rated their park knowledge between (4) and (5) on a scale where (5) represented the highest rating. On average, the ratings were indicative of a very knowledgeable group ($\bar{x} = 4.14, SD = 0.36$) and affirmed the assumption about the capacity of the expert sample to identify and accurately map the park CES benefits.

The questionnaire required participants to rate their park's suitability to provide opportunities for CES benefits experiences using a scale where (1) equaled "not at all suitable" and (5) equaled "extremely suitable" Table 4.5 presents descriptive statistics of the participants' ratings. The results show that the park staff considered the three parks extremely suitable for opportunities for landscape aesthetics appreciation ($\bar{x} = 4.62; SD = 0.59$), ecotourism ($\bar{x} = 4.52; SD = 0.51$), and Scientific research ($\bar{x} = 4.43; SD = 0.60$). On the other hand, the staff viewed the parks as moderately suitable for recreation ($\bar{x} = 3.38; SD = 1.07$) and spiritual & religious reverence ($\bar{x} = 2.81; SD = 1.21$).

Table 4.5 Participants Rating of Parks' Suitability to Provide CES Benefits.

	Suitability Rating Score	
CES Benefit	**Mean**	**Std. Deviation**
Landscape aesthetics	4.62	0.59
Ecotourism	4.52	0.51
Scientific research	4.43	0.60
Knowledge development	4.10	0.94
History	4.00	1.05
Heritage	3.71	1.38
Recreation	3.38	1.07
Spiritual & religious reverence	2.81	1.21

Source: Research data (2023).

The lower suitability of the parks for recreation and spiritual & religious values is attributable to park rules that restrict outdoor activities to few designated picnic sites and discourages the host community from using the park for religious & spiritual purposes. At the same time, the finding suggests that park managers may have been less aware of the spiritual benefits of places or features in the park, values that are more relevant to the host community. Having lived in and interacted with the national parks for centuries, the local people have better knowledge and experience with sites and places in the protected area that are associated with spiritual/religious values (Bernbaum, 2017).

The analysis conducted paired comparisons of the participants' ratings of the park's suitability to supply CES benefit opportunities using Pearson's correlation analysis. The study interpreted the results as representing participants' ability to distinguish the benefit categories as conceptualized in MEA (2005). Table 4.6 presents a matrix of the Pearson's correlation coefficient (r) from the paired comparisons of the ratings.

Table 4.6 Correlation of Participant's Rating of Parks' Suitability to Provide CES Benefits.

CES Benefits	1	2	3	4	5	6	7	8
1. Ecotourism	1							
2. Recreation	-.200	1						
3. Landscape aesthetics	.032	.241	1					
4. Scientific research	.210	.201	.061	1				
5. Knowledge development.	.202	.358	.338	.545**	1			
6. Spiritual/religious reverence	-.073	-.018	.174	-.089	.280	1		
7. History	.186	.000	.243	.000	.101	.197	1	
8. Heritage	.151	.246	-.263	-.147	-.323	-.243	.069	1

$^{*}P < .05$; $^{**}P < .01$

Source: Research data (2023)

The results of Pearson correlation analysis of pairs of participants rating of respective parks' suitability for visitor experiences (Table 4.6) indicate a significant strong associations between scientific research benefits and knowledge development ($r = 0.55, p < .01$). Strong correlations between CES benefits support the conclusion that participants were able to recognize closely related CESs and group them into MEA (2005) categories. On the other hand, weak and statistically insignificant associations imply that participants could differentiate the CES benefits and demonstrate the viability of social assessment methods in identifying non-material park values (Garcia-Llorente et al., 2018).

2.4 SPATIAL DISTRIBUTION OF CES BENEFITS

The study's first objective was to map the supply of CES benefits in the TAWTDA parks. This section presents the identified CES benefits and their spatial distribution including concentration, intensity, diversity, and hotspots in the parks:

2.4.1 Identified CES Benefit Sites

In its first objective, the study relied on the deliberative GIS CES mapping procedure to address the question of the CES benefits provided in the TAWTDA parks. The deliberative GIS CES mapping procedure required the participants to indicate the presence of ideal sites for CES benefits in their park using color-coded polygons, points, and lines, and the indicators in Table 3.1.

To count the number of CES identified in the study area, the geospatial analysis processes involved computing centroids and mean coordinates for the georeferenced vector shape-files, merging them into consolidated point feature shape-files for the five CES categories. The procedure then summarized data on CES benefits identified using the frequency distribution of raw counts and percentages. The participants identified and mapped CES benefits in 994 sites within the study area.

Figure 4.1 shows the proportion of CES identified in the study area. Of the sites identified, 63% ($n = 626$) were considered ideal for ecotourism and recreation, while 18% ($n = 183$) were designated for knowledge development and scientific research. Another 13% ($n = 132$) were suitable for landscape aesthetic appreciation, 5% ($n = 45$) for history and heritage, and only 1% ($n = 8$) were of spiritual and religious importance.

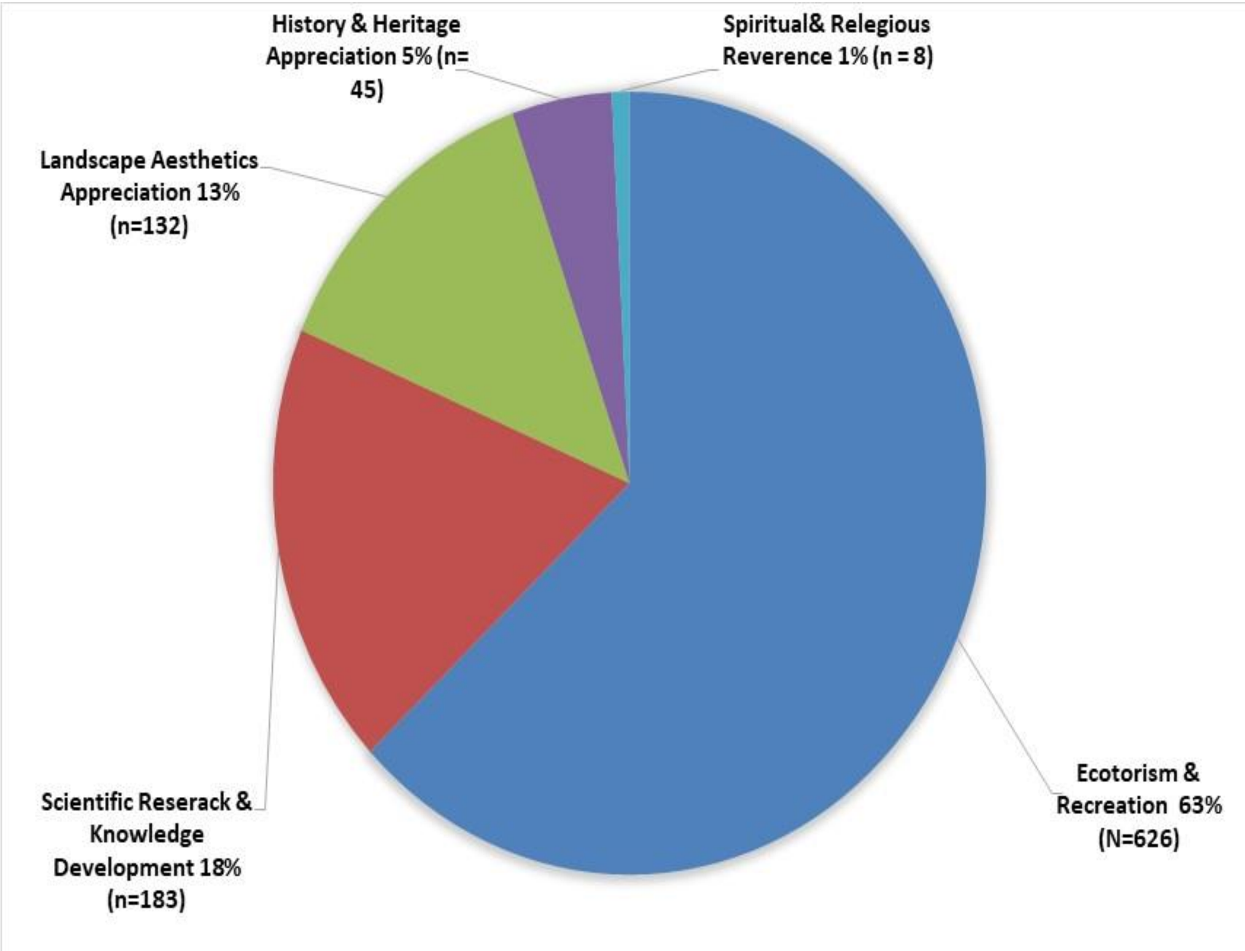

Figure 4.1 Cultural Ecosystem Services Identified by Park Staff in the Tsavo- Amboseli Wildlife Tourism Destination Area

Source: Research Data (2023)

Figures 4.2 to 4.4 present the results of the study's CES mapping procedure, providing a count of the five CES categories identified and mapped in each of the three parks. Specifically, Figure 4.2 illustrates that a total of 359 sites were identified in TENP, with the highest number of CES falling under the "tourism and recreation" category.

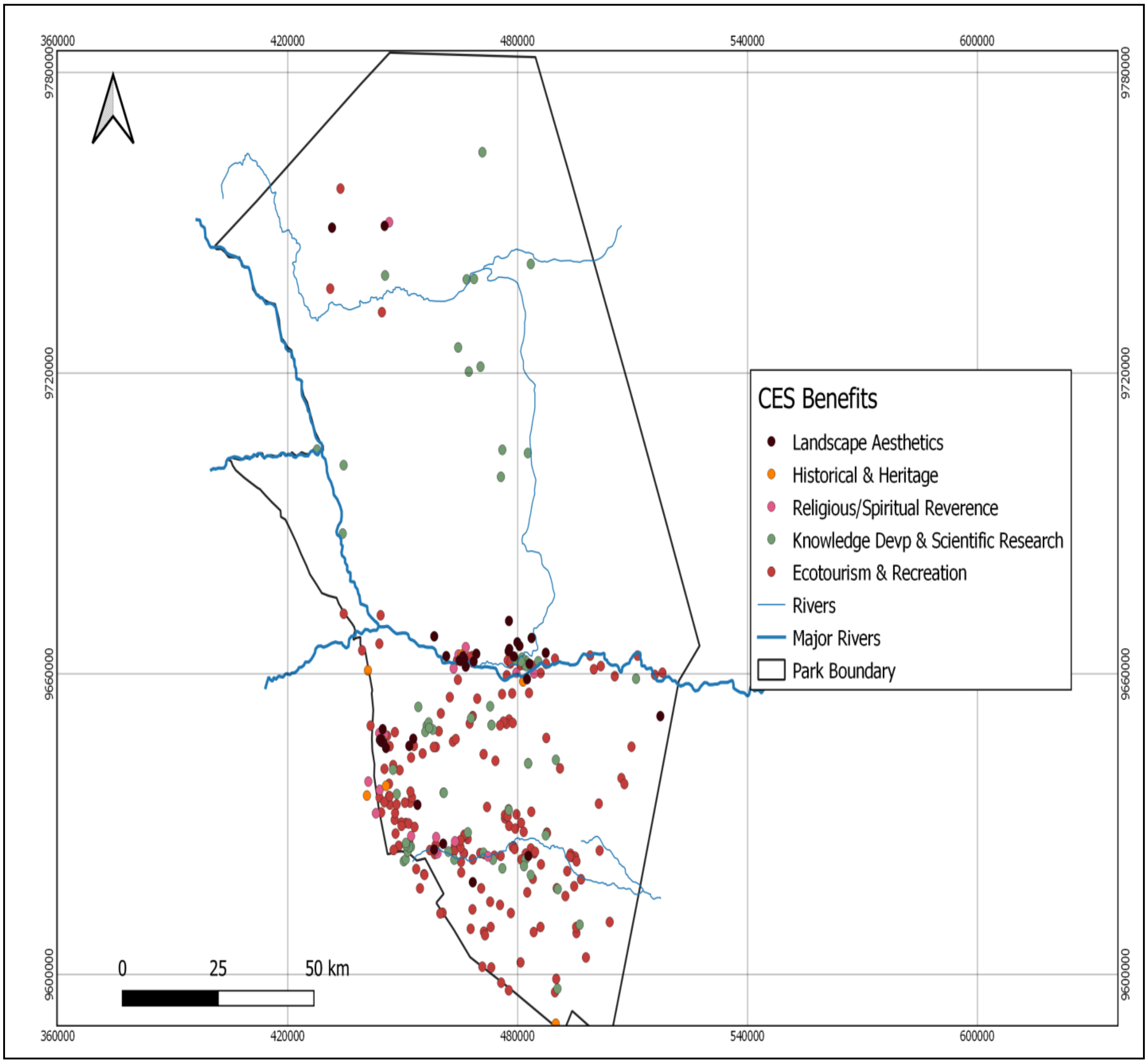

Figure 4.2 Identified CES Benefit Sites in Tsavo East National Park.

Source: Research data (2023)

The results in figure 4.2 show that locations for tourism and recreation experiences like bird-watching, camping, wildlife watering, and wildlife photography sites accounted for 67% of the sites. Breeding areas, roosting grounds, walking routes, bird walks for knowledge development, and scientific research accounted for 16% of the sites, while spiritual/religious sites accounted for not more than 1%.

Figure 4.3 shows the spatial distribution of the 387 sites mapped in TWNP.

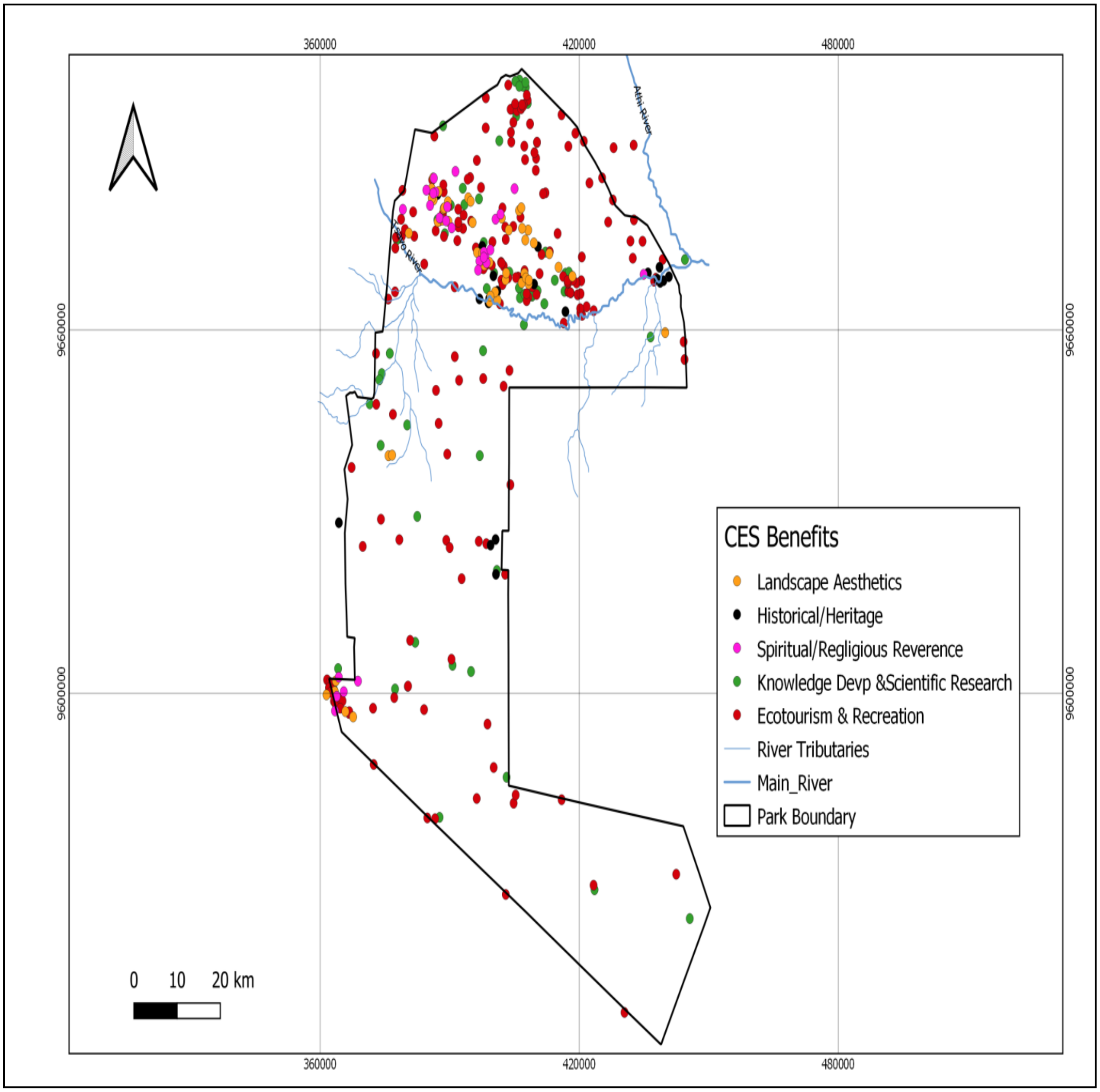

Figure 4.3 Identified CES Benefit Sites in Tsavo West National Park

Source: Research data (2023)

Results indicate that ecotourism and recreation sites were readily cited and mapped in TWNP (>63% of total sites). Knowledge development and scientific research (16%), landscape aesthetics (14%), History and heritage (6%), and spiritual/religious reverence (<1%) (Figure 4.3).

Figure 4.4 maps the location of 248 CES benefits site after consolidation of indicators of the 5 CES benefit categories in Amboseli National Park.

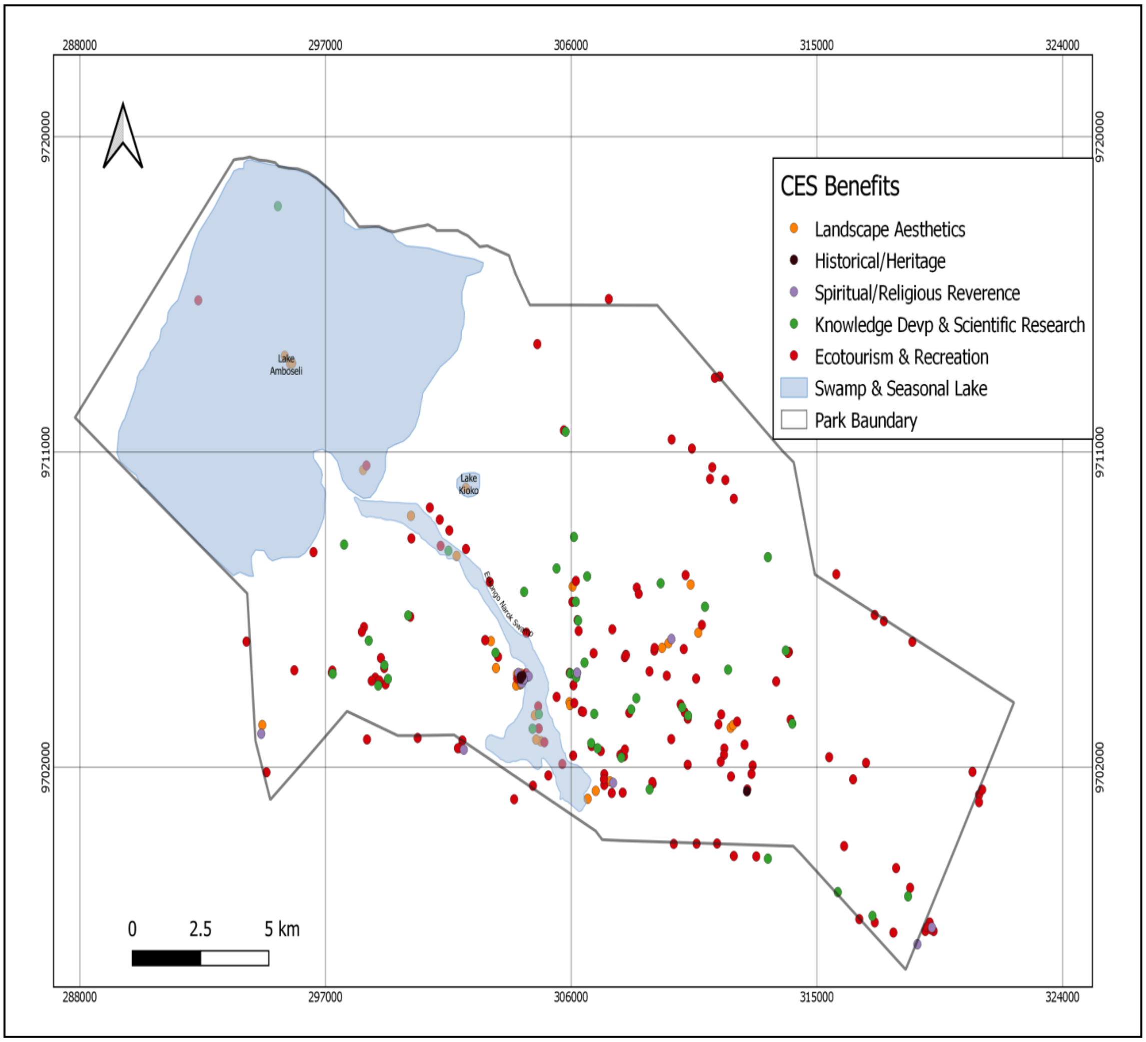

Figure 4.4 Identified CES Benefit Sites in Amboseli National Park

Source: Research data (2023)

Analogous to TENP and TWNP, ecotourism and recreation sites were the highest cited in ANP (65%), 45 sites (18%) knowledge development and scientific sites, 35 landscape aesthetics (14%) and two site (<1%) sites for spiritual/religious reverence were identified.

The results (Figures 4.2 – 4.4) confirm the relative ease of identifying the least intuitive commercially non-consumptive direct uses like ecotourism, recreation, knowledge development, and scientific research (Mburu et al., 2005). The results also affirm extant literature that ecotourism & recreation are the most commonly recognized and frequently accounted for CES benefits (Muller et al., 2019; Raymond et al., 2019; Ribeiro & Ribeiro, 2016; Tew et al., 2019).

On the other hand, the results confirm that the more introspective benefits like historical /heritage and spiritual/religious reverence are difficult to indicate. Consequently, fewer participants identified them in the parks (Canedoli et al., 2017; Ribeiro & Ribeiro, 2016). This suggests that heritage and spiritual values were less readily relevant to park managers

2.4.2 Heat Maps of CES Benefits in the Parks

The second question addressed in the study's first objective was about the spatial distribution of the CES benefits in the parks. To investigate this, the study initially focused on examining the concentration of identified CES. To achieve this, the study generated heatmaps of the CES benefits in the study with the aggregated CES benefits shapefiles in each park using the KDE procedure. Following the methodology of Brown and Fagerholm (2015), the heatmaps were rendered as raster surfaces of CES benefits, classified using Jenkins natural breaks to show areas of high and low concentration in each park. Figures 4.5 to 4.7 present the resulting heatmaps:

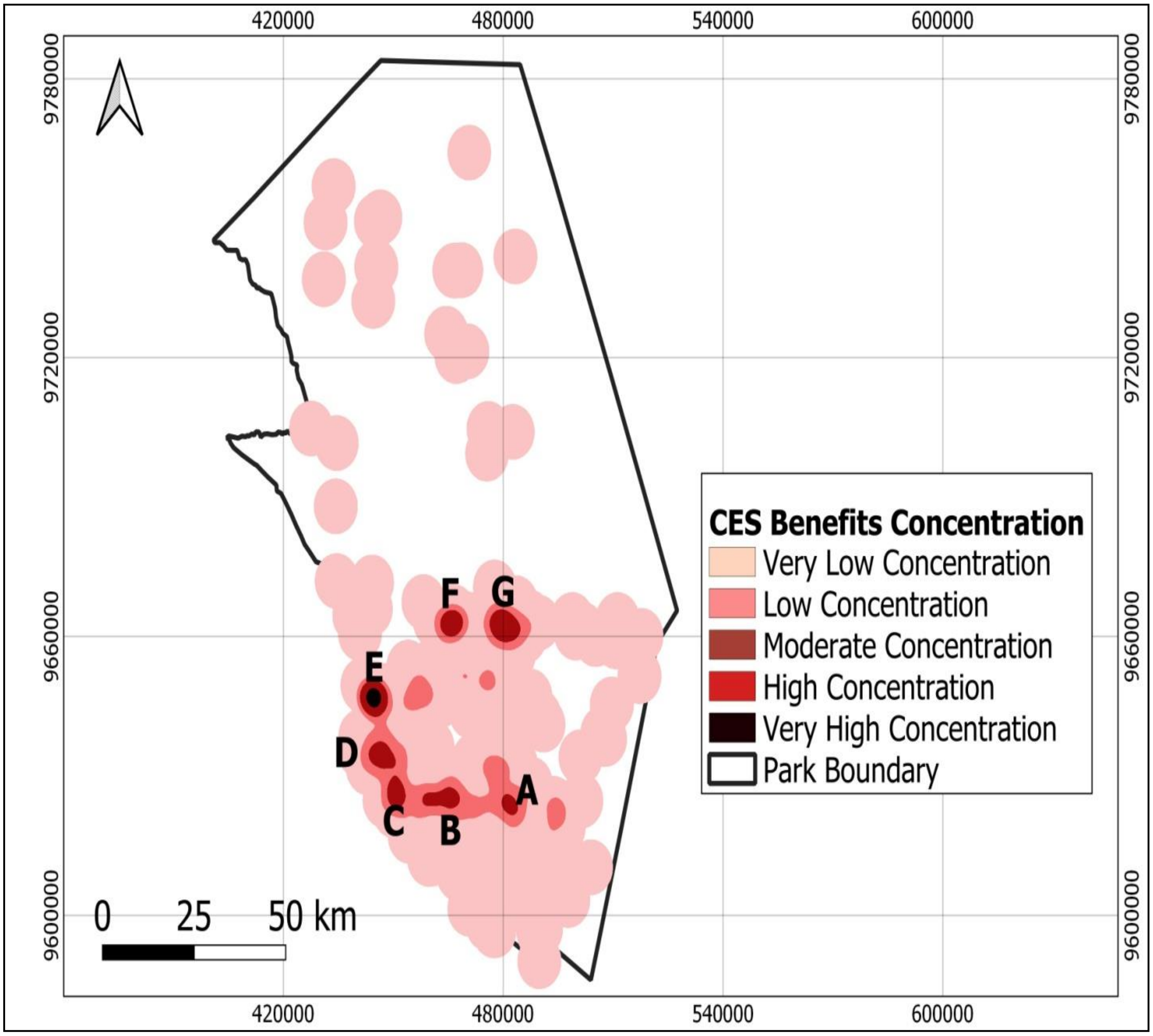

Figure 4.5 Heatmap of CES Concentration in Tsavo East National Park.

*KEY: A = Aruba Dam; B = Kanderi-Ndololo; C = Voi Gate; D = Pipeline; E = Mudanda Rock, F=Lugards Falls; G = Sobo Rock.

Source: Research data (2023)

Figure 4.5 reveals that CES benefits in TENP clustered in seven points with very high and high concentrations marked A-G*:* Ecotourism and recreation benefits occurred widely in the Voi area because of the numerous watering pans, saltlicks, grazing areas, and migratory routes. The results reveal lucrative wildlife viewing and photography opportunities at Sobo Rock and the Lugard's falls on the Galana River. Intense ecotourism opportunities are shown along the Voi River in the Ndololo-Kanderi circuit, at the pipeline area, and at the Aruba dam. Lugard's falls and Mudanda Rock on the Galana were cited for introspective benefits like scenic appreciation, experiences of closeness with nature, heritage appreciation, and spiritual & religious reverence. On the other hand, the results show the diffusion of CES benefits in the southern sector due to scientific research potential in species ranges and riverine forests found in the area. There was a moderate concentration of opportunities for scientific research in the wilderness habitat in the northern sector of TENP. Figure 4.6 presents the heatmap of CES identified in TWNP.

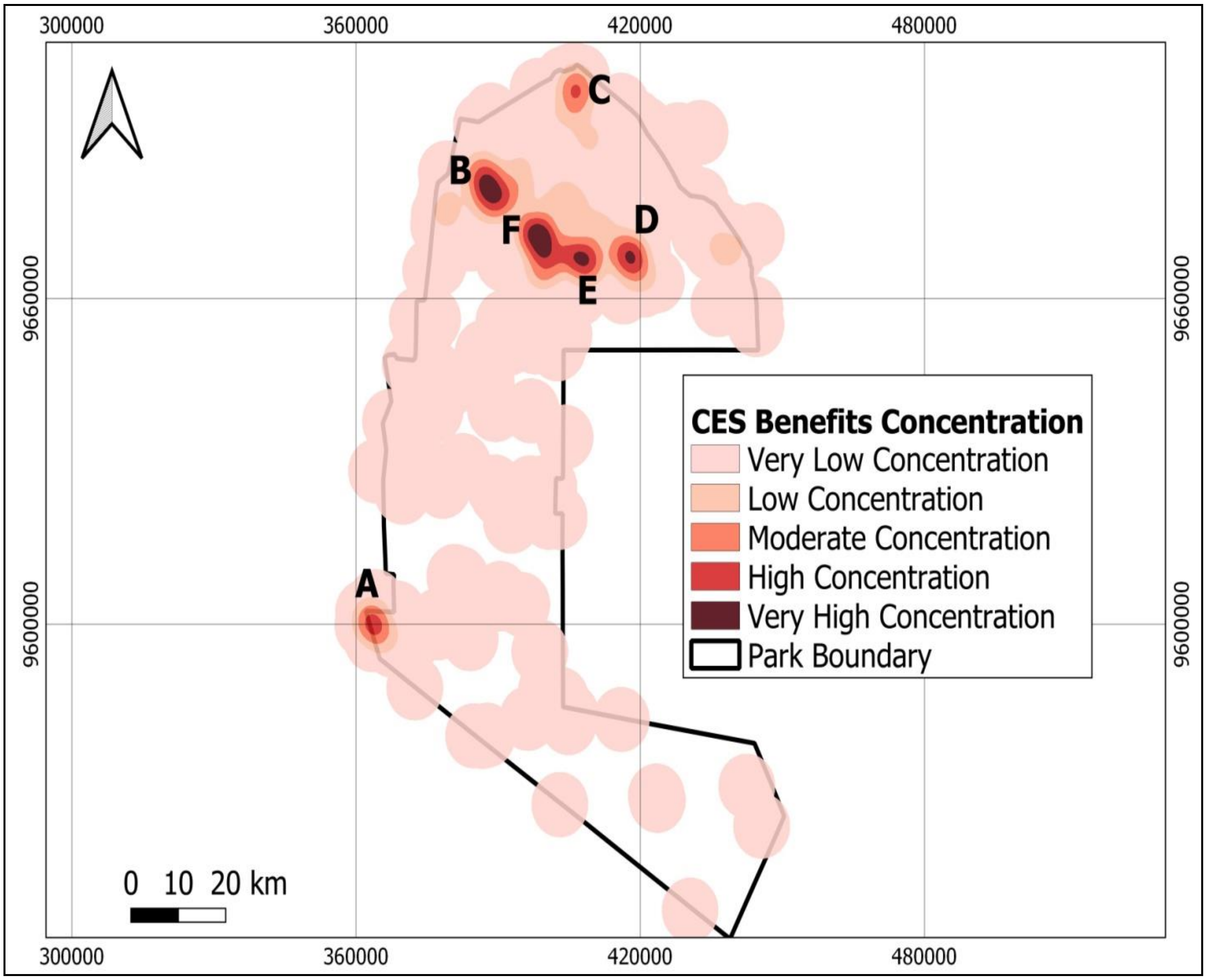

Figure 4.6 Heatmap of CES Concentration in Tsavo West National Park.

*Key: A = L.Jipe; B = Shetani Lava; C = Kamboyo; D = Ngulia Rhino Sanctuary; E = Kichwa Tembo, F= Mzima Springs.

Source: Research data (2023)

Results presented in figure 4.6 show that opportunities for appreciation of various CES benefits were ubiquitous in TWNP albeit to varying degrees. Notable locations with very high concentration of tourism benefits in the park were at Ngulia Rhino sanctuary, a black rhino intensive protection zone (IPZ) ideal for wildlife viewing, Kamboyo, Mzima springs, and Lake Jipe. The results show scenic appreciation benefits concentration at Mzima springs, Kichwa

Tembo, and Shetani lava corresponding to notable natural features. On the other hand, Lake Jipe, rhino valley, and Ngulia hills diffuse opportunities for scenic appreciation over a wide area. A concentration of CES benefits at Kamboyo area is due to opportunities for personal knowledge development and scientific research at the visitor education center and a known wildlife habitat. Also identified was a focal point for spiritual/religious reverence around Shetani lava while heritage/historical benefits were prominent at the Rhodesia war bridge on Tsavo River and at the Man-eaters cave in accounting for the moderate CES benefits concentrations in these areas.

The results in figure 4.7 show that in Amboseli, the central part of the park (A) had the highest concentration of CES benefit opportunities due to yearlong wildlife viewing opportunities at the Enkongo Narok and Oltukai Orok Swamps. The results identify high concentration of CES benefits at the observation hill (B), the highest point in the park cited as a focal point for scenic appreciation, spiritual & religious benefits, and recreation activities. The public campsite (D) was noted for ecotourism & recreation, and opportunities to experience closeness to nature. Due to the imposing presence of Mt Kilimanjaro that provides a backdrop for scenic vistas from any point in the park, the presence of migratory corridors around the park boundaries, and several known wildlife habitats, CES we ubiquitously distributed (C).

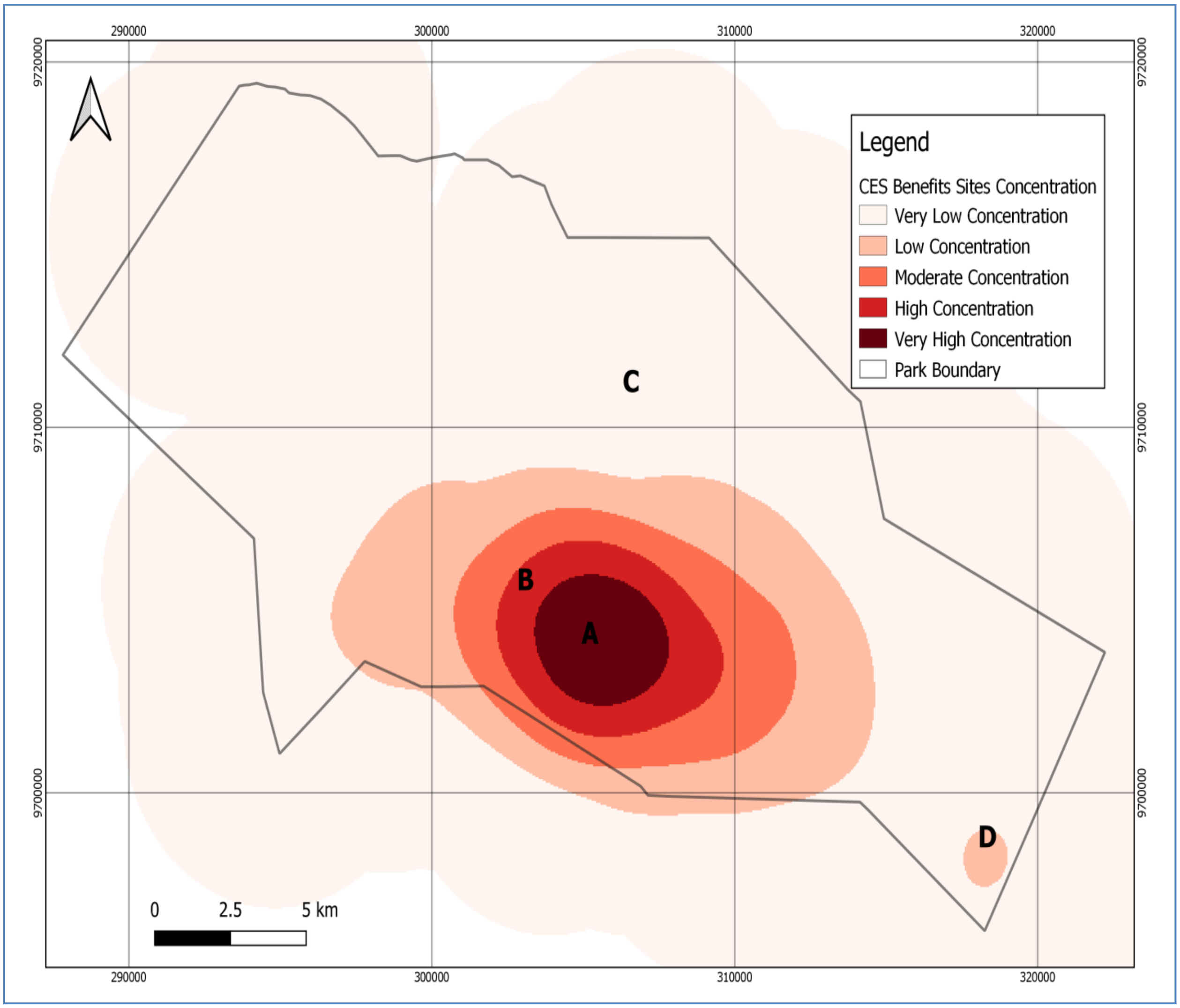

Figure 4.7 Concentration of CES Benefits in Amboseli National Park.

*Key: A = Enkong Narok & Oltukai Orok Swamp; B = Observation Hill; C = Diffused CES benefits; D = Public Campsite.

Source: Research data (2023)

High point densities of CES benefits depicted in Figures 4.5 – 4.7 attest to the axiom that; like in other landscapes, CES benefits in TWPAs occur in patterns that show high concentrations that coincide with hydrological features, ecological habitats, geological features, and socially significant sites, (Fagerholm et al., 2012; Muller et al., 2019). Conversely, a low concentration of

CES benefits opportunities coincides with inaccessible, poorly developed locations characterized by habitats that are not suitable for the enjoyment of park use values. In the Northern sector of TENP, habitats characterized by dense *Commiphora* spp, *Delonix* spp, and *Melia sp* shrubs support limited ecotourism and recreation opportunities (Ngene et al., 2011). In TWNP, low CES benefits concentration is in habitats with low wildlife populations, inadequate fodder, limited vegetation cover, and scarce water for wildlife. These habitats correspond to the dry lands of Murka LUZ. Ngene et al. (2011) observed many dry water pans and livestock incursions in Murka. According to Jones et al (2019), heatmaps are a useful tool for visualizing the concentration of phenomenon on a map. However, heatmaps do not generate quantitative indices of the distribution that can be used in subsequent spatial analysis.

2.4.3 Intensity and Diversity of CES Benefits in the Parks

To quantitatively analyze the spatial distribution of the CES benefits and further address the study's first objective, the geospatial analysis produced indices of intensity and diversity of the CES benefits across the study area.

To quantify the CES benefits distribution, the analysis computed spatial intensity by calculating the count of sites per unit area, and used the method described by Angarita-Baez et al. (2017) to calculate the Shannon diversity index (H^*) as a measure of the diversity of aggregated CES benefits per unit area (as shown in Equation 10). Figures 4.8 - 4.9 depict the diversity of CES benefits in the parks as represented by the H^* index of 25km^2 grids

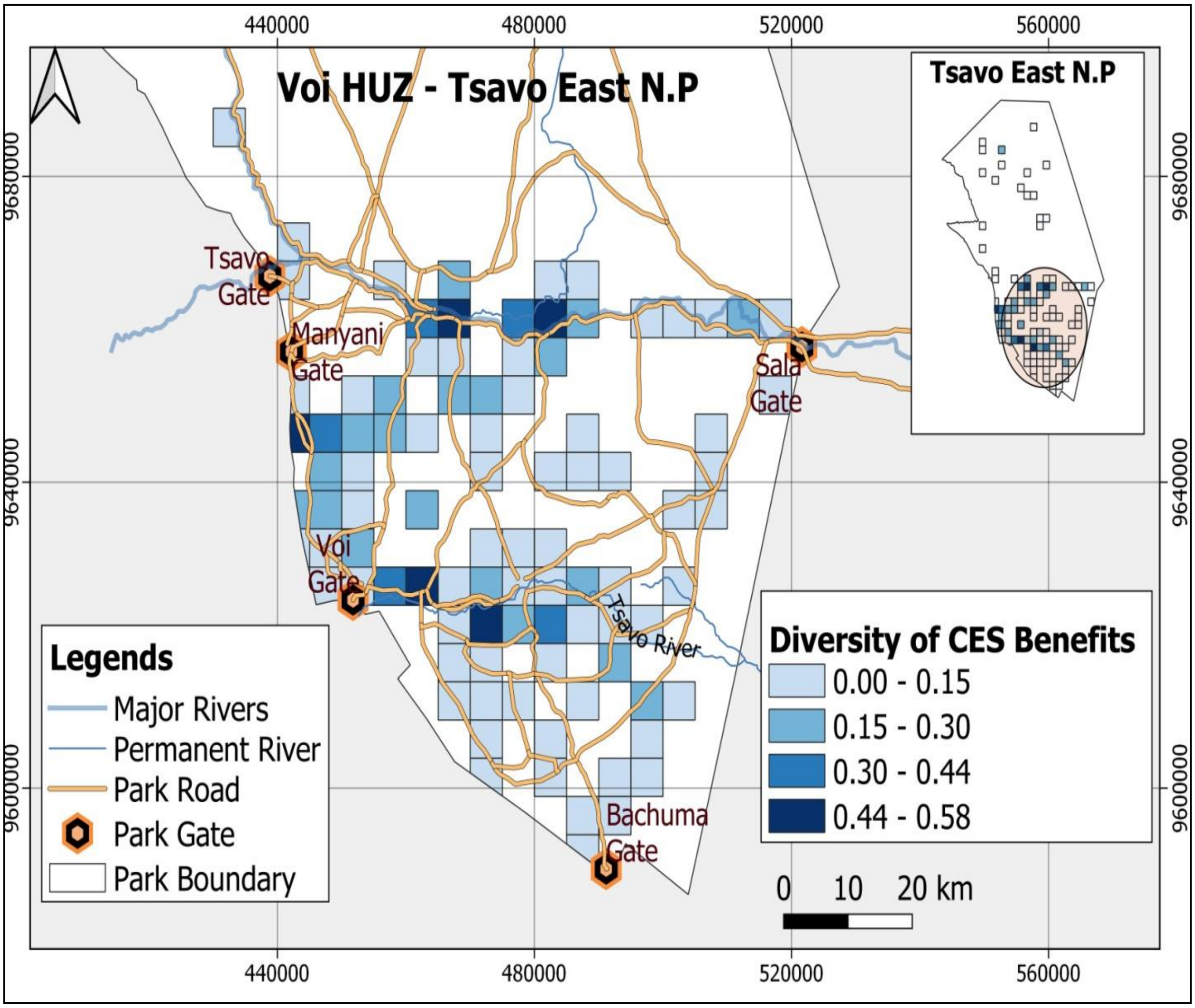

Figure 4.8 Diversity of CES in Tsavo East National Park (Insert, TENP).

Source: Research data (2023)

The map of benefits Shannon diversity indices in TENP (Figure 4.8) show Mudanda rock, a 1.6 km inselberg in TENP popular for wildlife viewing, photography, picnicking, and historical heritage appreciation, had the highest CES benefits per unit area (I = 0.44 - 0.78/Km2). In the same park, Lugard's falls and Sobo rock on the Galana River were second, with intensities between 0.24 – 0.44/Km^2. Mudanda Rock, Lugards falls, and Sobo Rock had the highest diversity of CES benefits in TENP ($H*$ = 0.48 – 0.58).

Figure 4.9 shows the diversity of distribution of CES benefits in TWNP.

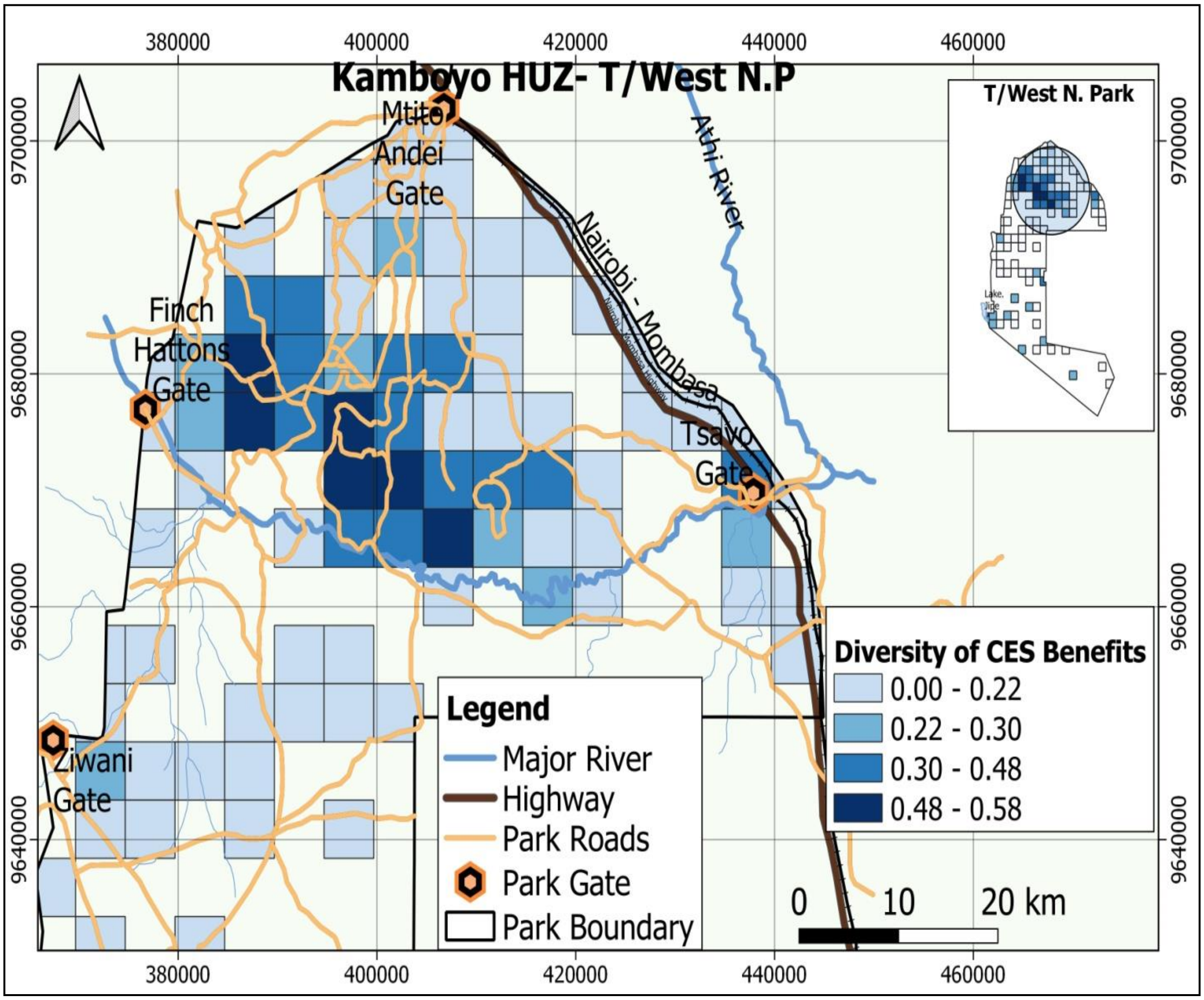

Figure 4.9 Diversity of CES Benefits in Tsavo West National Park (Insert: TWNP).

Source: Research data (2023)

The results depicted in Figure 4.9 attest that Ngulia sanctuary, the IPZ in TWNP, the neighboring rhino valley, Mzima springs, and Lake Jipe had the highest CES benefit count per unit area (I = 0.44 - 0.72/Km^2) and CES diversity index (H*= 0.48 - *0.58*).

In ANP, the areas around Normatior (observation hill), a cone shaped hill that provides a 360 degrees vantage point for vistas of the park and Enkongo Narok Swamp, a known wetland habitat for the “amphibious” elephants of Amboseli returned the highest benefits count per square kilometer (I = 1.60 -2.93/km^2). The same locations had the highest variety of CES benefit types over 25km^2 areas (H^* =0.48-0.62) in the park (Figure 4.10).

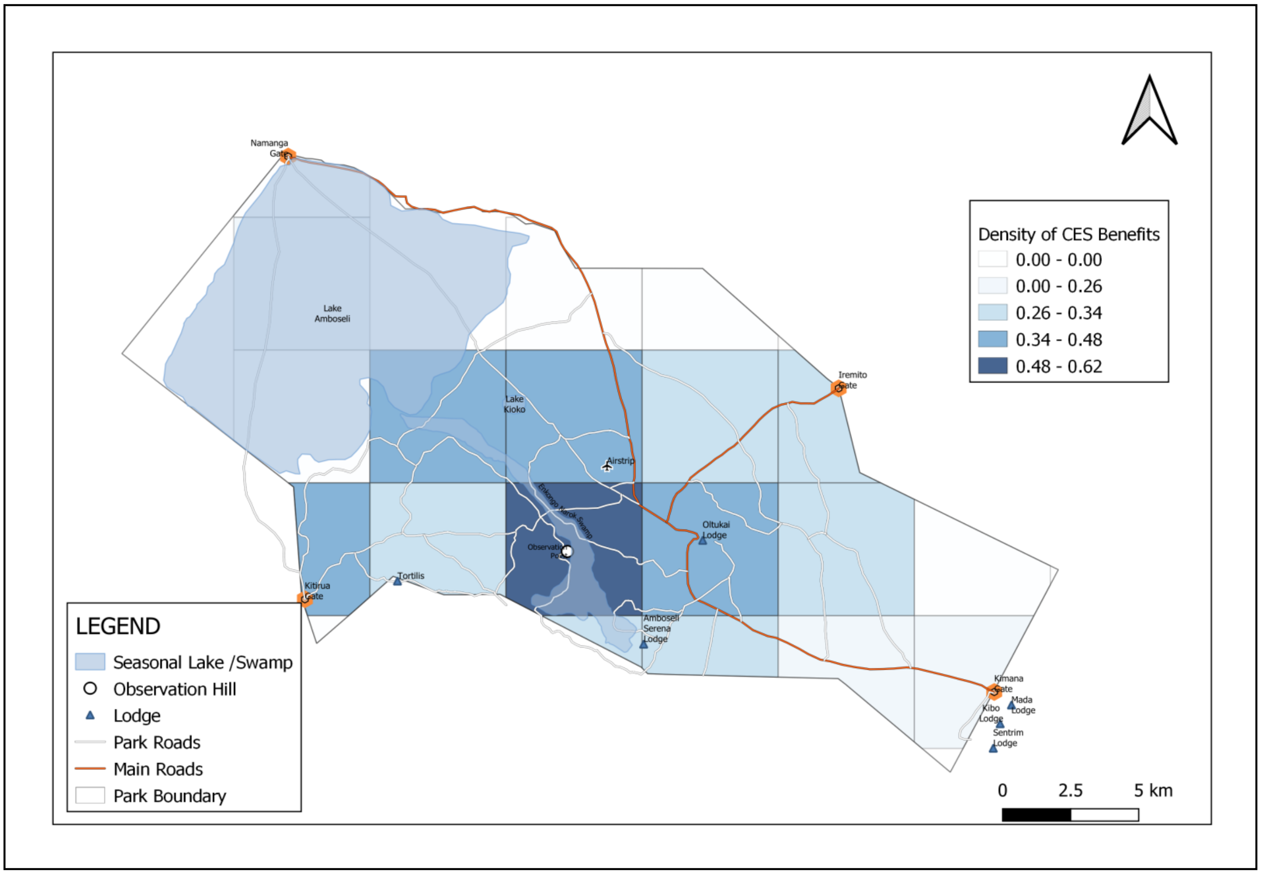

Figure 4.10 Diversity of CES Benefits in Amboseli National Park.

Source: Research data (2023)

The study's findings are comparable to those of Angarita-Baez et al. (2017), who mapped the abundance of CES benefits enjoyed by indigenous communities and the diversity of recreational values in an Amazonian ecosystem. In addition, the CES diversity maps (Figures 4.8 - 4.10) support the results of the heatmaps (Figures 4.5 - 4.7) and confirm the presence of clusters with high counts of CES and diversity of benefits per unit area. However, it is important to note that the heatmaps and diversity maps did not yield statistically reliable quantitative measures of the distributions.

2.4.4 Hotspots of Cultural Ecosystem Services in the Parks

The study conducted hotspot analysis based on the intensities of CES per unit area to identify statistically significant locations of concentration of the CES benefits (equation 11). Table 4.7 details the $Gi*$ for locations of high CES intensities that are surrounded by similar high CES intensity sites in the three parks. The *GI** statistic indicates concentration of high/low CES intensity values. The results of the test are interpreted within the context of the null hypothesis that there is no spatial clustering (Oxoli et al., 2017).

Results in table 4.7 provide statistical evidence of clustering of CES in specific locations. The positive signs on the Z-Scores imply the concentration of high CES intensity values in the identified hotspots (Oxoli et al., 2017). In TENP, the results confirm Mudanda rock as a hotspot for landscape aesthetic appreciation $(z = 4.94, p < .01)$ and history and heritage appreciation$(z = 5.71, p < .01)$. Similarly, the results show Sobo Rock along the Galana River as a must-visit location for landscape aesthetic appreciation $(z = 4.94, p < .01)$ and spiritual/religious reverence$(z = 5.27, p < .01)$. The area around Voi gate is identified for knowledge development $(z = 3.35, p < .01)$ but importantly for ecotourism and recreation opportunities$(z = 3.74, p < .01)$.

The results in table 4.7 depict hotspots for four CES benefit categories viz., landscape aesthetics, ecotourism and recreation, history and heritage, knowledge development, and scientific research in the area described as Ngulia (E 402177, N 96700893 – E 422177, N 9660893). On the other hand, the results identify the Shetani lava flow for its religious/spiritual significance $(z = 5.67, p < .01)$.

In ANP, the results identify the observation hill as a hotspot for landscape aesthetic appreciation ($Z = 2.50$; $p = .01$) and spiritual/religious reverence ($Z = 2.39$; $p = .02$) but more significantly a hotspot for ecotourism and recreation benefits ($Z = 3.03$; $p < .01$).

Table 4.7 Hotspots of CES Benefits in the Study Area

Park Name	CES Benefit Category	Location (UTM Coordinates, name)			*Gi**	
		Name	**E**	**N**	***Z***	***P-value***
TENP	Spiritual & religious benefits	Sobo Rock	467507	9666394	5.27	<.01
	Landscape aesthetics	Mudanda Rock	443590	9651360	4.94	<.01
		Sobo Rock	467507	9666394	4.94	<.01
	Ecotourism & recreation	Voi River	452507	9631394	3.74	<.01
	History & heritage	Mudanda Rock	443590	9651360	5.71	<.01
	Knowledge dev. & scientific research	Voi gate	457507	9626394	3.35	<.01
TWNP	Spiritual & religious benefits	Shetani lava	392177	9675893	5.67	<.01
	Landscape aesthetics	Kichwa Tembo	402177	9670893	5.83	<.01
	Ecotourism & recreation	Ngulia R. Sanctuary	422177	9660893	4.30	<.01
	History & heritage	Rhodesia Bridge	402177	9665893	4.69	<.01
	Knowledge dev. & scientific research	Ngulia	412177	9665893	4.10	<.01
ANP	Spiritual/religious reverence	Observation Hill	305696	9701462	2.39	.02
	Landscape aesthetics	Observation Hill	305696	9701462	2.50	.01
	Ecotourism & recreation	Observation Hill	305696	9701462	3.03	<.01
	History & heritage	Enkong Narok Swamp	309457	9700990	1.96	.05
	Knowledge dev. & scientific research	Oltukai Orok Swamp	304466	9704655	2.39	.02

Source: Research data (2023)

2.5 PARK TOURIST ACCOMMODATION FACILITIES ATTRIBUTES

The study's second objective was to profile of tourist accommodation facilities in the TAWTDA parks based on their room rates, while the third objective aimed to evaluate the structural amenities, visitor services, and proximity to CES hotspots of these facilities. In this section, we present the findings of this assessment, which were based on data collected using a checklist on the www.tripadvisor.com listing of 47 facilities in the study area:

2.5.1 Park Tourist Accommodation Facilities Management and Ecolodge Status

The online census checklist was used to capture the operational status of facilities as either a lodge or an ecolodge. The study defined an ecolodge as a facility with non-intrusive architecture, operating with sensitivity to the environment, and offering an exclusive visitor experience as compared to a conventional wildlife lodge (see Table 2.2). The study computed percentage frequencies of the facilities operational and management status. Results showed that 66% of the facilities in the study areas were ecolodges while 34% were lodges (n = 47). The study also distinguished between chain-operated and single-unit facilities and found that seven in ten facilities were chain-affiliated.

2.5.2 Accommodation Facilities' Room Rates

The online checklist captured the lowest rates available by simulating a one-night, standard room full-board adult double occupancy booking on a weekday (Tuesday) in mid-November 2019 during the high season. The rates were captured in United States Dollars (USD) and were summarized using measures of central tendency and dispersion. Descriptive statistics of room rates for ecolodges and lodges in the study area are presented in Table 4.8:

Table 4. 8 Descriptive Statistics-Facilities' Room Rates.

Park	Mean	SD	Minimum	Maximum
Tsavo East N. Park	213.25	173.79	47.00	825.00
Tsavo West N. Park	247.77	197.21	90.00	770.20
Amboseli N. Park	434.95	243.32	53.30	856.40

Source: Research data (2023)

The facility room rates ranged from USD 47.00 to USD 856.40. Results of a one-way between samples ANOVA to examine the differences between room rates in the three parks confirms significant differences between average room rates for facilities in the study ($F(2,44) = 5.46; p = .01$). Post hoc analysis using the Scheffé post hoc criterion for significance showed that the average room rate for facilities in TENP ($\bar{x} = \text{USD } 213.25; SD = 173.79$) was significantly lower than for facilities in ANP ($\bar{x} = \text{USD } 434.95; SD = 243.32$). However, room rates for facilities in TENP and TWNP were not significantly different.

The room rates in the three national parks suggest that they target different market segments. Research shows that Tsavo East National Park is a popular destination for day excursionists who combine beach and wildlife tourism. In contrast, the average length of stay for tourists to Amboseli and Tsavo West National Parks is about three days (Kibicho, Van der Merwe & Saayman, 2017). Day excursionists are typically budget-conscious and prioritize affordability over luxury amenities and services, unlike guests who stay longer. According to the UNWTO in 2014, tourists in the budget category spend an average of USD 243 per person daily on full-board accommodation, while those in the luxury market spend about USD 753 per person daily on wildlife tourism (UNWTO, 2014). The results (table 4.8) suggest that higher priced facilities in the three parks target the high-end or luxury park tourists while the average facility in the parks is priced for the budget tourists.

2.5.3 Accommodation Facilities' Structural Amenities and Visitor Services

The study's third objective was to inventory the structural amenities and visitor services of accommodation facilities in the study area. A 26-item checklist with binary response options (1 indicating presence and 0 indicating absence) was used to collect data from OTA listings (see Appendix IV). Descriptive statistics, including mean, standard deviation, and variance, were used to analyze the data and profile the facilities. Table 4.9 presents descriptive statistics for the facility attributes captured in the online census.

Results in Table 4.9 show that restaurant, bar & lounge, mosquito nets, and public WIFI were present in most facilities ($\bar{x} \geq .80$) and were excluded from the analysis.

Table 4.9 Descriptive Statistics -Facilities' Structural Amenities and Visitor Services

Structural Amenities	Description	Mean	SD	Var.
1. Plunge pool	Facility has a plunge pool =1, if not = 0	.77	.428	.183
2. Free WIFI	Facility has free WIFI =1, if not = 0	.87	.337	.114
3. Outdoor Fire	Facility has outdoor fire =1, if not = 0	.53	.504	.254
4. Water Hole	Facility has wildlife water hole =1, if not = 0	.43	.500	.250
5. Bar & Lounge	Facility has bar & Lounge =1, if not = 0	1.00	.000	.000
6. Snack Bar	Facility has snack bar =1, if not = 0	.19	.398	.158
7. Restaurant	Facility has restaurant =1, if not = 0	.96	.204	.042
8. Conferencing Venue	Facility has conference venue =1, if not = 0	.28	.452	.204
9. Meeting Room	Facility has meeting room =1, if not = 0	.23	.428	.183
10. Gift Shop	Facility has gift shop =1, if not = 0	.60	.496	.246
11. Mosquito nets	Facility has mosquito nets in the rooms =1, if not = 0	.81	.398	.158
12. Private Room Balcony	Facility room with private balcony =1, if not = 0	.64	.486	.236
13. Bath and Shower	Facility has bath and shower =1, if not = 0	.68	.471	.222
14. In room safe	Facility in room safe =1, if not = 0	.43	.500	.250
15. Desk in Room	Facility has desk in rooms =1, if not = 0	.49	.505	.255
16. Business center	Facility has business center =1, if not = 0	.23	.428	.183
17. Library	Facility has library =1, if not = 0	.09	.282	.080
18. Bathrobe	Facility offers bathrobe in rooms =1, if not = 0	.06	.247	.061
Guest Services				
1. Baby sitting	Facility provides babysitting =1, if not = 0	.19	.398	.158
2. Buffet breakfast	Facility offers buffet breakfast =1, if not = 0	.79	.414	.171
3. Concierge	Facility offers concierge services =1, if not = 0	.40	.496	.246
4. Currency exchange	Facility offers currency exchange =1, if not = 0	.26	.441	.194
5. Hiking	Facility offers hiking =1, if not = 0	.26	.441	.194
6. Children's buffet	Facility offers children's buffet =1, if not = 0	.38	.491	.241
7. Laundry service	Facility provides laundry service =1, if not = 0	.70	.462	.214
8. Room service	Facility provides room service =1, if not = 0	.62	.491	.241

Source: Research data (2023)

An examination of the non-positive definite polychoric correlations matrix of the independent variables revealed strong correlations between pairs of facilities attributes ($r \geq .6$). Consequently, the study dropped six more variables *viz.,* out-door fire, water hole, meeting room, laundry service, hiking, and kids buffet. Were dropped from list of variables due to strong pair-wise correlations. Table 4.10 presents descriptive statistics of facilities attributes selected for inclusion in further analysis as independent variables.

Table 4.10 Descriptive Statistics- Selected Independent Variables.

Variable	Min	Mean	Max	SD
Facility is an ecolodge	0.00	0.66	1.00	0.48
Chain affiliation	0.00	0.70	1.00	0.46
Plunge pool	0.00	0.77	1.00	0.43
Snack bar	0.00	0.19	1.00	0.40
Conferencing venue	0.00	0.28	1.00	0.45
Gift shop	0.00	0.60	1.00	0.50
Private room balcony	0.00	0.64	1.00	0.49
Bath and shower	0.00	0.68	1.00	0.47
In room safe	0.00	0.43	1.00	0.50
Desk in room	0.00	0.49	1.00	0.51
Business center	0.00	0.23	1.00	0.43
Library	0.00	0.09	1.00	0.28
Bathrobe	0.00	0.06	1.00	0.25
Baby sitting	0.00	0.19	1.00	0.10
Buffet breakfast	0.00	0.79	1.00	0.41
Concierge	0.00	0.40	1.00	0.50
Currency exchange	0.00	0.26	1.00	0.44
Room service	0.00	0.62	1.00	0.49

Source: Research data (2023)

Table 4.10 lists eleven (11) facilities' structural amenities and five (5) visitor services. The list includes a variable capturing whether the facility was an ecolodge or a conventional lodge and a variable capturing whether the facility was chain affiliated or an individual unit. The subsequent analysis considered eighteen (18) facility objective attributes.

2.5.4 Accommodation Facilities' Environmental Attributes

In objective three (3), the study aimed to profile the facilities by their environmental attributes. The study operationalized accommodation facilities' environmental attributes as their proximity to hotspots for the five CES benefits. The study relied on geospatial analysis to construct a matrix of Euclidean distances from facilities to the CES benefits hotspots in QGIS (Table 4.7). Descriptive statistics were computed to characterize the facilities' proximity to CES benefit hotspots in the three parks. Table 4.11 shows summary statistics of the facilities' proximity to CES benefits hotspots:

Table 4.11 Descriptive Statistics - Facilities' Proximity to CES Hotspots.

	Distance (kms)			
Cultural Ecosystem Service Hotspot	**Min**	**Max**	**Mean**	**Std. Dev.**
Ecotourism & recreation	1.79	122.96	31.83	24.98
Landscape aesthetics	4.40	112.63	37.53	28.40
History& heritage	4.40	112.63	36.00	26.57
Knowledge development & scientific research	4.13	133.43	36.30	33.31
Spiritual & religious	4.40	112.63	36.17	27.17

Source: Research data (2023**)**

Results in table 4.11 affirm that the facilities are in equal relative proximity to the CES benefit hotspots($\bar{x} = 31.83, SD = 24.98 - 37.53, SD = 28.40$). This finding supports the assertion that facilities developers strategically locate the units to provide an ideal base for guests to access and enjoy various park CES benefits.

Pair-wise comparison of facilities proximity to hotspots for CES benefits revealed strong positive associations between benefit hotspots ($r(45) > .69; p < .01$) (Table 4.12). The results can be explained by the co-occurrence of CES benefits in the national parks.

Table 4.12 Correlation between Facilities' Proximity to CES Benefits Hotspots.

CES Benefits categories	1	2	3	4	5
1. Ecotourism & recreation	1				
2. Landscape aesthetics	$.69^{**}$	1			
3. History & heritage	$.75^{**}$	$.97^{**}$	1		
4. Knowledge development & scientific research	$.77^{**}$	$.92^{**}$	$.87^{**}$	1	
5. Spiritual & religious	$.74^{**}$	$.98^{**}$	1.0^{**}	$.89^{**}$	1

$^{**}p > .01$. *Source:* Research data (2023)

Agmapisarn (2014) warns that an OLS regression model risks serious multicollinearity challenges if the independent variables in the model are highly correlated. To mitigate multicollinearity, the study considered facility proximity to hotspot for landscape aesthetics in ($\bar{x} = 37.53\ km, SD = 28.40$) further analysis. The study selected landscape aesthetics for inclusion in the hedonic models based on the respondents' evaluation of the parks' suitability to provide CES benefits. Among the five benefits, landscape aesthetics received the highest rating from the respondents ($\bar{x} = 4.62; SD = 0.59$).

2.6 THE GLOBAL EFFECTS OF ACCOMMODATION FACILITIES' ATTRIBUTES ON ROOM RATES

The fourth objective of the study was to develop a model of the global effects of facilities' structural amenities, visitor services, and CES on room rates in TAWTDA parks. This section presents the estimated global hedonic pricing model, the results of the hypothesis tests on the joint and marginal effects of the facilities' attributes on room rates, and an analysis of the relative influence of the independent variables on room rates. The section also describes the estimated spatial hedonic pricing model that it relies on to investigate whether there was spatial dependency and non-stationarity in the relationships between independent variables and room rates in the study area.

2.6.1 The Global-Hedonic Pricing Model

To develop a quantitative model of the influence of facilities attributes on room rates in the study area, the research regressed eleven facilities attributes, five visitor services, ecolodge status, chain affiliation (Table 4.10) and log of distance to hotspot for landscape aesthetics (Table 4.11) on log of room rates (Table 4.8) using equation 6. The analysis estimated the G-HPM using stepwise OLS regression that fits a regression model by selecting independent variables to include automatically based on a criterion like a sequence of F-tests or T-tests prescribed *a priori*. Table 4.13 shows results of the estimated G-HPM:

Table 4.13 The Global Hedonic Pricing Model for Room Rates

Variables		**Coeff.**	**SE**	**Std. Coeff.**	**T**	***p* –value**	**VIF**
Dependent Variable	Log. Room Rate						
Independent Variables	(Constant)	1.994	0.185		10.771	< 0.001	
	Chain affiliation	0.145	0.077	0.213	1.895	0.066	1.453
	Ecolodge	0.273	0.064	0.414	4.259	< 0.001	1.089
	Plunge pool	0.147	0.074	0.199	1.995	0.053	1.144
	Buffet breakfast	0.165	0.079	0.215	2.075	0.045	1.241
	Concierge	0.132	0.068	0.207	1.941	0.060	1.313
	Private balcony	0.097	0.067	0.149	1.440	0.158	1.236
	Bathrobe	0.258	0.127	0.202	2.025	0.050	1.144
	Log. Distance to aesthetics hotspot	-0.202	0.096	-0.219	-2.109	0.042	1.246
	$\bar{R}^2 = 0.60$						

Source: Research data (2023)

Table 4.13 shows that from the nineteen (19) independent variables (Table 4.10), the stepwise OLS regression procedure selected eight independent variables for inclusion in the final model.

2.6.2 Model Diagnostics

The estimated global hedonic pricing model (G-HPM) was tested for conformity with the assumptions of ordinary least squares (OLS) regression. Following OLS regression analysis tradition, the study first confirmed normality of the dependent variable. Visual inspection of histograms of the facilities' room rates dataset suggests a positive skew in the distribution of rates for ecolodges (Figure 4.11) while rates for lodges were approximately normally distributed (Figure 4.12).

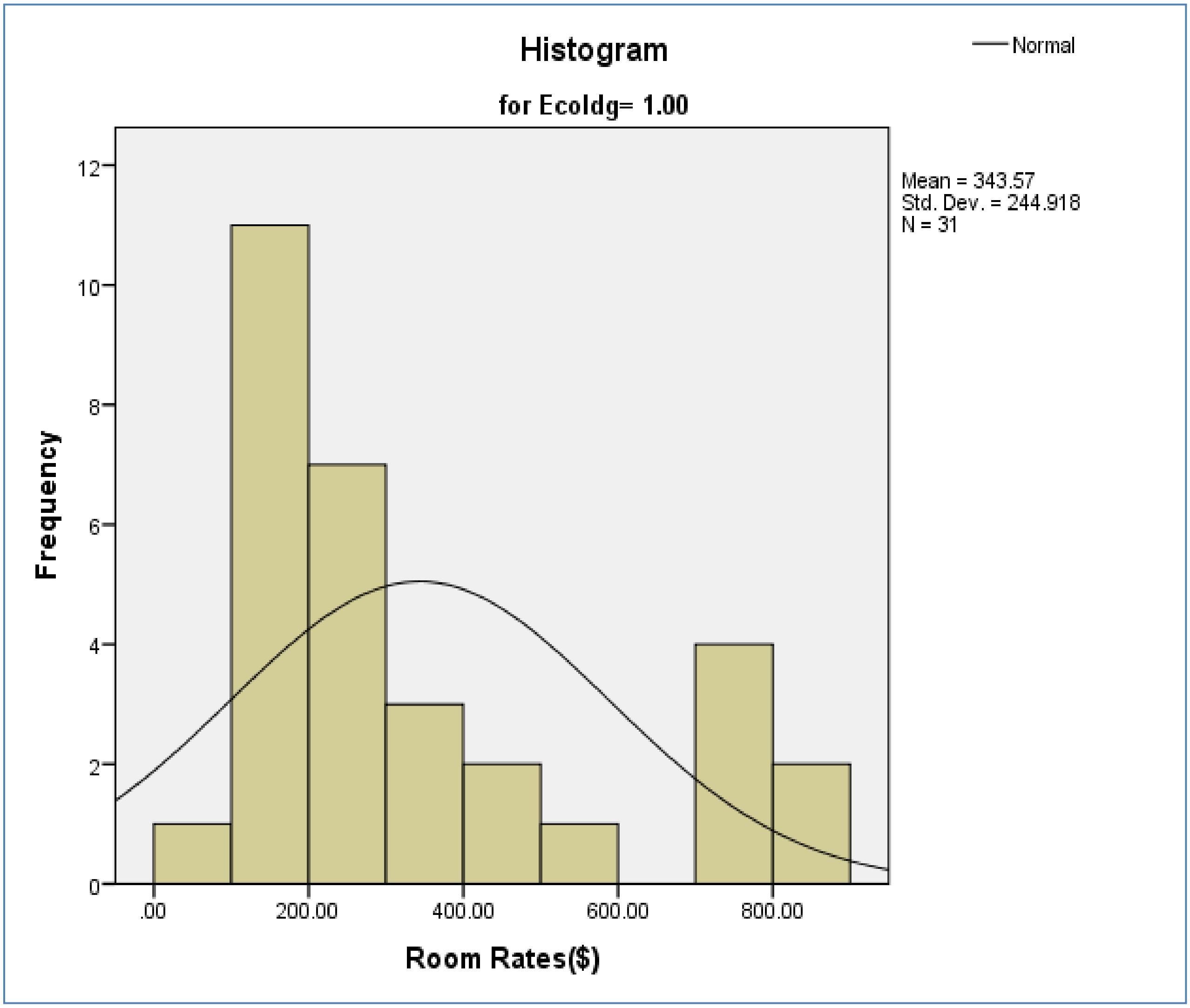

Figure 4.11 Frequency Distribution of Room Rates for Ecolodges

Source: Research data (2023)

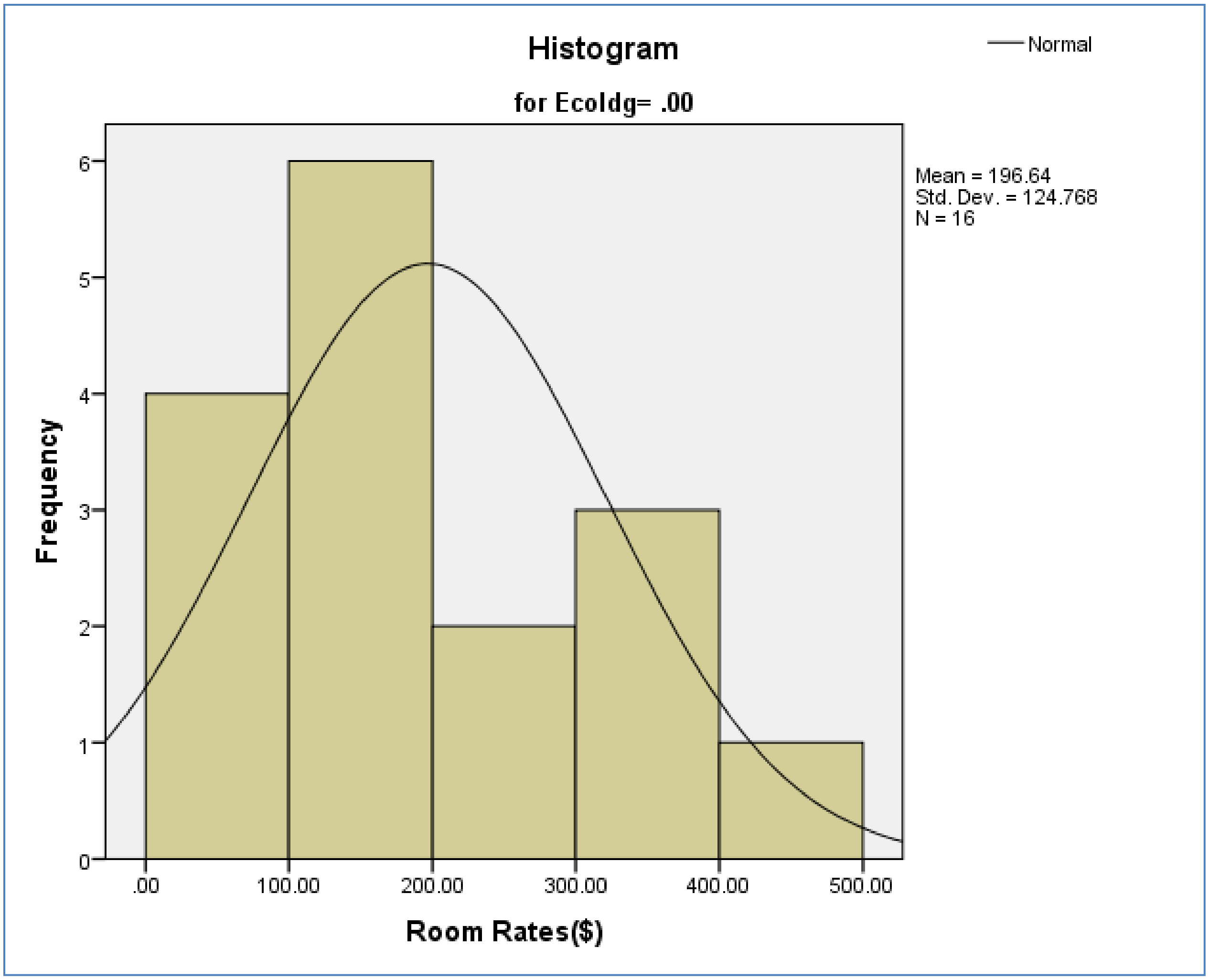

Figure 4.12 Frequency Distribution of Room Rates for Lodges.

Source: Research data (2023)

The dependent variable (room rate) was tested for normality using the Shapiro-Wilk test (Shapiro & Wilk, 1965). Results of the test confirm that room rates for lodges were approximately normally distributed $(W(16) = 0.92; p = .18)$ with a skewness of 0.81(SE = 0.56) and a Kurtosis of -0.06(SE = 1.09). On the other hand, the test affirms that rates for ecolodges significantly departed from normality $(W(31) = 0.82; p < .01)$ and reveal a positive skew 1.06 (SE = 0.42) and a Kurtosis of -0.29(SE = 0.82). However, on transformation, the log of room rates data became approximately normally distributed for both lodges $(W(16) = 0.96; p = .64ns)$ and ecolodges

$(W(31) = 0.95; p = .14ns)$ and was usable in subsequent regression analysis (MacKinnon & Magee, 1990).

Subsequently, the study assessed the estimated G-HPM for conformance to the assumptions of linearity between the dependent and independent variables, the nonexistence of multicollinearity, absence of outliers, and homogeneity of variance in the residuals before interpreting its results (Agmapisarn, 2014; Cohen et al., 2007; Kefela, 2014).

To begin with, the results of Pearson's correlation analysis between log room rates and the independent variables confirm linearity between the eight independent variables selected by the stepwise regression model and the log of room rate $(.50 \leq |r| \geq .29)$ (Table 4.14). The literature recommends $|r| \geq .30$ as the threshold for linearity (Grande, 2015).

Table 4. 14 Correlation between Dependent and Independent Variables

Facility Attributes	1	2	3	4	5	6	7	8	9
1. Log Room rate	1.00								
2. Chain affiliation	.499	1.00							
3. Ecolodge	.353	.121	1.00						
4. Plunge pool	.293	.079	-.079	1.00					
5. Buffet breakfast	.408	.343	-.044	-.042	1.00				
6. Concierge	.397	.442	-.049	.046	.216	1.00			
7. Private balcony	.350	.284	-.074	.107	.258	.259	1.00		
8. Bathrobe	.328	-.020	.004	.144	.136	-.038	.197	1.00	
9. Log Dist. aesthetic hotspots	-.326	-.076	.188	-.296	-.163	-.135	-.006	-.226	1.00

Source: Research data (2023)

The results in table 4.14 show low to moderate associations between independent variables ($|r| \leq .44$) suggesting a low risk of multicollinearity in the regression model. Multicollinearity inflates variances of estimated coefficients ($\boldsymbol{B_i}$) and diminishes the statistical significance of the explanatory variables (Joshi, Kulkarni, & Deshpande, 2012). The risk of multicollinearity occurring in OLS regression increases if there are exact or near-perfect relationships between the independent variables. Hedonic pricing literature suggests that large coefficients ($|r| \leq .70$)in the independent variables' correlation matrix signal risk of multicollinearity (Grande, 2015).

Still, the VIFs from the regression results confirmed no multicollinearity in the model (*VIF* = 1.09 – 1.45). The VIF measures the increase of the variance of an estimated regression coefficient (B) due to multicollinearity. Conventionally, a VIF value higher than 10 signifies that the model's regression coefficients are biased due to multicollinearity (Agmapisarn, 2014; Grande, 2015; Joshi et al., 2012).

The model diagnostics examined Cook's distance (D_i) to check for outliers in the data. Outliers are observations that are far from the least-squares line and potentially affect the slope of the regression line (Agmapisarn, 2014). Cook's distance identifies outliers by estimating the variations in regression coefficients on removing each observation, one at a time (Cook, 1977). As a general rule, the maximum $D_i > 1$is the cut-off to identify outliers in a dataset (Cook & Weisberg, 1982). The results show the maximum $D_i = 0.31$indicating no outliers in the dataset.

A visual examination of the scatter diagram of regression standardized residuals vis-à-vis the standardized predicted values (Figure 4.13) reveals a rectangular scatter with observations randomly distributed within -2 and +2 on both *y* and *x-axis*. The practice in HPM literature suggests that the absence of Heteroskedasticity is shown by the lack of pattern in the plot of residuals against predicted values (Astivia & Zumbo, 2019). Therefore, the distribution of the residual was adjudged random from inspection of the scatter plot.

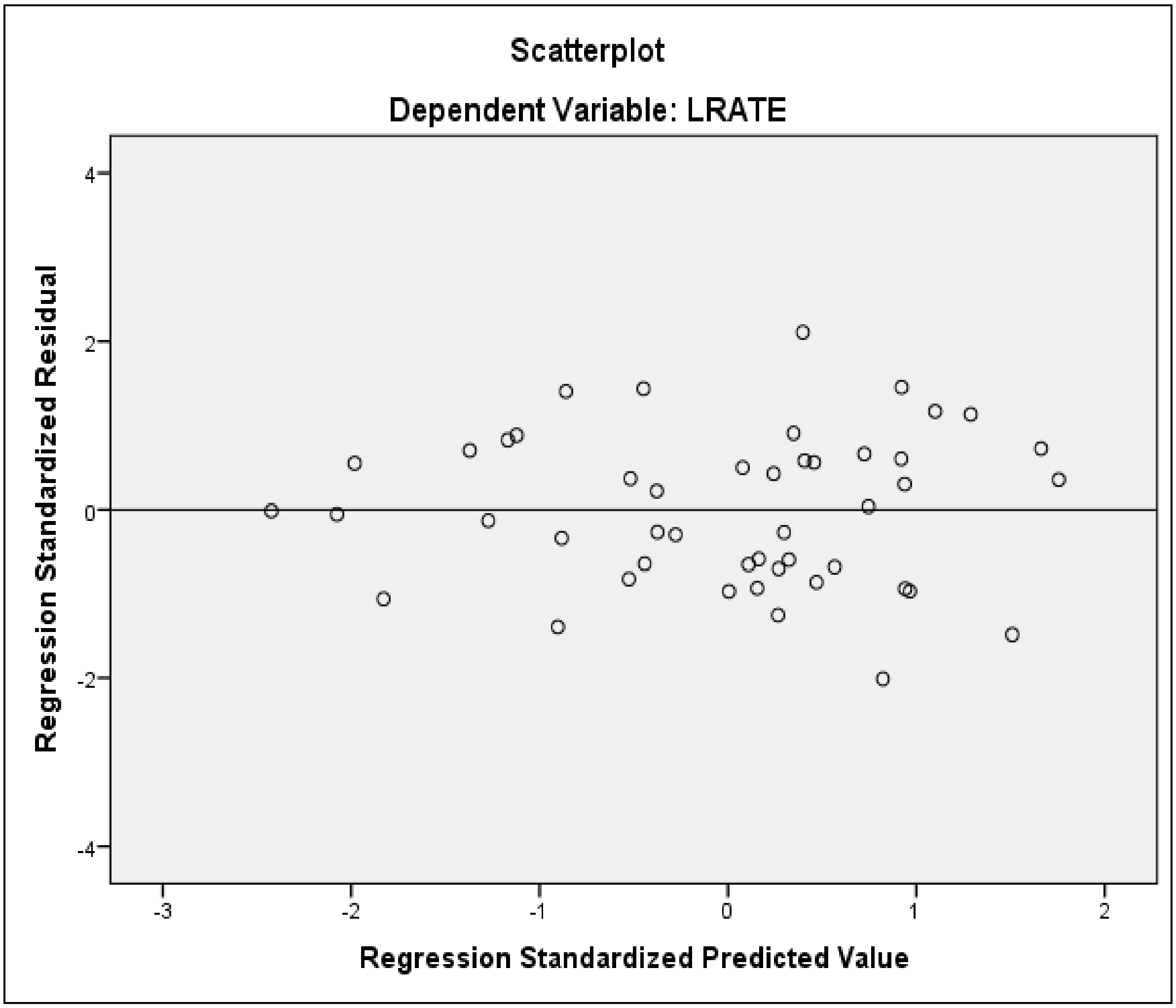

Figure 4. 13 Regression Standardized Residual vs. Standardized Predicted Values.

Source: Research data (2023)

However, the residuals were formally tested for homoscedasticity using the Breusch – Pagan Langrage Multiplier test that checks for direct correlation between the model's residuals and the independent variables (Breusch & Pagan, 1979). The results of the test confirm homoscedasticity in the residuals$(LM = 3.54, p = .90ns)$. Astrivia and Zumbo (2019) warn that Heteroskedasticity biases the standard errors or lowers the t-statistics thereby inflating the probability of type I errors. At the same time, it increases the uncertainty associated with the HPM model fit (Astrivia & Zumbo, 2019).

The results of all routine diagnostics confirm that the model conforms to the basic assumptions of OLS regressions. Assuming stationarity in the relationship between the independent and dependent variables, the estimated regression coefficients (Table 4.13) were interpreted as global or mean effects of the accommodation facilities' respective structural amenities, visitor services, and distance to hotspot for landscape aesthetics on room rates (Crompton & Nicholls, 2019).

2.7 JOINT EFFECTS OF ACCOMMODATION FACILITIES' ATTRIBUTES ON ROOM RATES

In the fourth objective, the study examined the estimated hedonic pricing model to test whether facilities structural amenities, visitor amenities, and environmental attributes jointly explained variability in room rates in the study area. The null hypothesis for the test was that tourist accommodation facilities' structural amenities, visitor services, and environmental attributes do not significantly influence room rates in the study area. Formally:

$$H_0 1 = B_S = B_Q = B_N = 0$$

Results in Table 4.13 indicate that 60% of the variance in room rates was jointly accounted for by the eight independent variables in the global model ($\bar{R}^2 = .60$). The results confirm that the eight-variable model was significant in accounting for the variability of room rate variations in the study area($F(8{,}38) = 9.66; p < .001$). Based on the test statistic (equation 15), the study found sufficient evidence to reject the null hypothesis and conclude that the specific structural attributes, services, and proximity to the hotspot for landscape aesthetics in table 4.13 jointly influenced the room rates in the Tsavo-Amboseli wildlife tourism destination area.

Extant HPM studies in other markets show comparable adjusted coefficient of determination. For instance, Agmapisarn (2014) obtained $\bar{R}^2 = .52 - .57$ from city hotels in Bangkok, Espinet et al., (2012) computed $\bar{R}^2 = .58$ in sun and beach hotels, Napierala and Lesniewska (2014) found $\bar{R}^2 = .49 - .57$ in metropolitan hotels while Tung et al. (2012) reported $\bar{R}^2 = .63$ from a G-HPM using a sample of town hotels. Thus, based on the results, the explanatory power for the G-HPM was adjudged as reasonable. However, there are no analogous HPM studies in terrestrial parks for direct comparison.

2.8 IMPLICIT EFFECTS OF ACCOMMODATION FACILITIES' STRUCTURAL AMENITIES ON ROOM RATES

In the fourth objective, the study also examined the estimated hedonic pricing model to test the marginal effects of structural amenities on room rates in the study area while holding other variables constant (*ceteris paribus*). The null hypothesis for the test was that tourist accommodation facilities' structural amenities do not significantly influence room rates in the study area. Formally:

$$H_0 2: B_S = 0$$

By examining the marginal influence of the independent variables on room rates (table 4.13) against the test statistic (equation 16), the study found sufficient evidence to reject the null hypothesis concerning the effect of availability of a plunge pool, availability of bathrobe in the rooms, and ecolodge status on room rates. The results indicate that facilities with a plunge pool charge higher room rates than those that do not have$(B_3 = .15, t = 2.00, p = .05)$. Similarly, facilities that provide a bathrobe in the bathrooms could also charge higher rates$(B_7 = .26, t = 2.03, p = .05)$. Further, the results reveal that facilities categorized as ecolodge charge higher rates than conventional lodges$(B_2 = .27, t = 4.26, p < .001)$.On the other hand, there was no sufficient evidence suggesting that the availability of rooms with a private balcony influenced room rates in the study area. However, the variable had the expected sign $(B_6 = .10, t = 1.44, p = .16ns)$. .

The study's findings are consistent with Lancaster's characteristics theory which predicts a positive relationship between utility-yielding facility attributes and prices (Lancaster, 1971). The effect of ecolodge on room rates is comparable with findings by Zhang et al. (2011) that uncovered a positive association between the class of hotel and room rates in New York business hotels. Similarly, the results compare with Napierala and Lesniewska (2014), who found an analogous association between hotel typology and room rates in Polish metropolitan hotels.

The results obtained from the Tsavo-Amboseli wildlife tourism destination area lend credence to Napierala and Lesniewska's (2014) assertion that guests perceive and expect differences in accommodation experiences across facility types. For instance, park visitors expect higher standards of personalized non-intrusive service, environmentally friendly operations, and enhanced interpretation services at ecolodges. Because of these expectations, guests are willing to pay a premium for a room in an ecolodge compared to a conventional lodge.

On the other hand, the study noted differences in the importance and direction of effects between its findings and others from different markets like the business tourism market. A plunge pool is vital for tourists in a tropical national park where temperatures reach 30^0C. The amenity is of little utility to a business executive in a city hotel in Bangkok (Agmapisarn, 2014). Similarly, a pool is of peripheral importance to a tourist in a beach resort who has the option to swim in the ocean (Rigall-I-Torrent et al., 2011). While a private balcony significantly influences room rates for facilities in the beach tourism markets (Espinet et al., 2012; Rigall-I-Torrent et al., 2011), this feature was not critical in the parks because park visitors have multiple opportunities to enjoy views of the park from public areas and during the game drives.

2.9 IMPLICIT EFFECTS OF ACCOMMODATION FACILITIES' VISITOR SERVICES ON ROOM RATES

As part of objective four, the study tested the marginal effects of facilities' visitor services on room rates in the study area *ceteris paribus*. The null hypothesis for the test was that tourist accommodation facilities' visitor amenities do not significantly influence room rates in the study area. Formally:

$$H_0 3: B_Q = 0$$

Through examining the marginal influence of visitor services on room rates (Table 4.13) in relation to the test statistic (Equation 16), the study found sufficient evidence to confirm that lodges offering a buffet breakfast could charge visitors a premium for this service $(B_4 = .17, t = 2.08, p = .05)$. On the other hand, the model suggests that chain affiliation and a concierge did not generally influence the difference in room rates in the wildlife tourism destination area.

The study's results are consistent with findings from holiday markets studies on the significance and direction of the effect of guests' services on room rates. Analogous to the study's results, Kefela (2014) reports that hotels offering breakfast buffets in Stockholm charge higher rates on weekdays and weekends. Tung et al. (2012) confirm the positive influence of service on room rates from their research in 58 Taiwanese hotels. However, conflicting results are found in business tourism markets. For instance, the availability of complimentary breakfast in Bangkok city hotels (Agmapisarn, 2014) and a buffet breakfast in Taipei hotels (Chen & Rothschild, 2010) were insignificant predictors of room rates.

The study revealed that chain affiliation had no significant effect on park accommodation room rates. This finding was inconsistent with observations from other markets. For instance, there is evidence that chain-affiliated hotels in the business tourism accommodation markets charge higher rates than independent units (Agmapisarn, 2014; Chen & Rothschild, 2010; Kefela, 2014; Thrane, 2007). Agmapisarn (2014) explains that the profound influence of chain affiliation on room rates is attributable to the competitive advantages of brand equity that allows the city hotels to charge a premium. Tung et al. (2012) assert that brand recognition and chain affiliation are essential to a hotels' sales strategy. Results from the wildlife tourism suggest that visitor motivation for novelty, adventure, and an authentic ecotourism experience overrides the benefits of brand familiarity in this market; chain affiliation is thus an insignificant price determinant in this market.

2.10 IMPLICIT EFFECTS OF ACCOMMODATION FACILITIES' PROXIMITY TO LANDSCAPE AESTHETICS HOTSPOT ON ROOM RATES

As part of the fourth objective, the study examined the estimated hedonic pricing model to test the marginal effects of proximity to CES hotspots on room rates in the study area while holding other variables constant (*ceteris paribus*). The null hypothesis for this test was that the distance of tourist accommodation facilities to the landscape aesthetic appreciation hotspot does not significantly influence room rates in the study area, as represented formally by:

$$H_0 4: B_N = 0$$

Table 4.13 results confirm that a facility's proximity to a hotspot for landscape aesthetic appreciation significantly predicted room rates in the study area ($B = -.20, t = -2.11, p = .04$). The negative sign of the influence of distance to a hotspot for landscape aesthetics conforms to the distance decay principle that posits that a facility close to attractive environmental amenities can include a locational premium in the room rate (Kim et al., 2020).

The results echo Mandic and Petric's (2020) proposition that the distance decay effect builds on guests' expectations regarding opportunities to take advantage of CES in the Park. Studies in the city hotels provide corroboratory evidence of an inverse relationship between proximity to the city center as the major attraction and room rates (Agmapisarn, 2014; Chen & Rothschild, 2010; Kefela, 2014; Pawlicz & Napierala, 2017).

2.11 RELATIVE EFFECT OF ACCOMMODATION FACILITIES STRUCTURAL, VISITOR SERVICES AND ENVIRONMENTAL ATTRIBUTES ON ROOM RATES

To answer the question about the impact of different facilities attributes (facilities' structural amenities, visitor services, and proximity to a landscape aesthetic hotspot) on room rates in the fourth objective, the study analyzed the standardized regression coefficients (β_i) of the significant room rate determinants presented in table 4.13 to compare the magnitudes of their effects.

Results from the comparison indicated that facilities status as an ecolodge had the strongest significant effect on room rates ($\beta_2 = .41$), followed by the facility's proximity to hotspots for landscape aesthesis ($\beta_4 = -.22$) and whether the facility provided a buffet breakfast ($\beta_4 = .22$). The availability of a bathrobe in the room and a plunge pool on site had the weakest influence on rates ($\beta_7 = \beta_3 = .20$).

From the results of the relative effects, it is noteworthy that the strategic decision on location near hotspots for CES, status as an ecolodge, or a lodge had a profound influence on room rates. The results suggest that the long-term strategic choice of location and status as an ecolodge is the initial building block upon which the facility's other attributes that affect room rates like service design are set up. Soler and Gemar (2018) report comparable results revealing that hotel category is a critical factor in the configuration of room rates in 57 Malaga hotels.

2.12 THE SPATIAL EFFECTS OF ACCOMMODATION FACILITIES' ATTRIBUTES ON ROOM RATES

To explore spatial dependency and non-stationarity in the relationship between the independent variables and room rates in TAWTDA parks, the study developed a spatial hedonic pricing model under its fourth objective. This section presents the estimated spatial hedonic pricing model used in the research to examine the effects of facilities' structural amenities, visitor services, and CES on room rates in the study area:

2.12.1 Preliminary Analysis of the G-HPM Variables and Residuals for Spatial Dependencies.

Explanatory variables in the G-HPM (table 4.13) could not account for 40% of the variance in the room rates. Therefore, the study computed the Moran's I statistic to examine whether the spatial effects in the residuals contributed to the unexplained variance in room rates (equation 17). The statistic measures spatial autocorrelation of the residuals based on their magnitudes and locations simultaneously. The statistic indicates clustering (+1), dispersion (-1), or random (0) distribution of errors. Figure 4.14 plots the global Moran I statistics for the residuals.

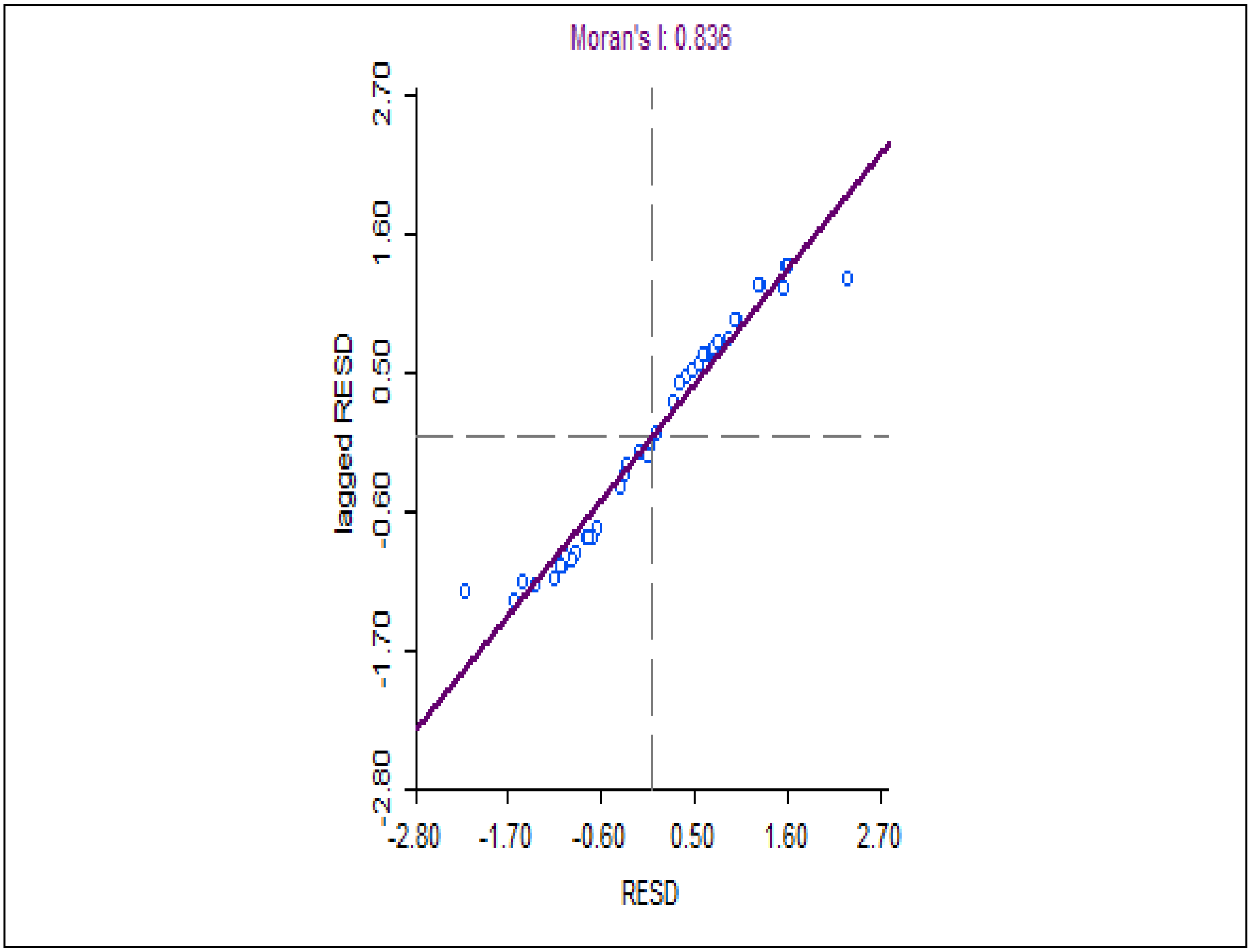

Figure 4.14 Moran's I Statistics of the Residuals of the G-HPM Model.

Source: Research data (2023)

The Moran's I statistics in figure 4.14 confirm spatial autocorrelation in the error terms $(I = .84, Z = 13.55, p < .01)$. The results suggest that the distribution of high and low values in the residuals from the G-HPM was more spatially clustered than would be expected if the residuals were randomly distributed. The presence of a statistically significant pattern in the error terms suggests the omission of a spatial variable(s) in the global HPM that contributes to the 40% unexplained variability in room rates.

Subsequently, the study also examined spatial autocorrelations in the G-HPM variables (Table 4.13) using global Moran's I statistics. Table 4.15 shows Moran's statistics for the variables.

Table 4. 15 Global Moran's I Statistics - Dependent and Independent Variables

Variable	Global Moran's I Statistics		
	I	**z-score**	**Pseudo-p**
Log Room rates	0.82	13.64	< 0.001
Chain affiliation	1.00	22.10	< 0.001
Ecolodge	1.00	23.93	< 0.001
Plunge pool	1.00	26.40	< 0.001
Breakfast buffet	1.00	26.34	< 0.001
Concierge	1.00	22.66	< 0.001
Private balcony	1.00	24.67	< 0.001
Bathrobe	0.25	9.85	< 0.001
Log Dist. to aesthetics hotspot	0.92	10.25	< 0.001

Source: Research data (2023)

The results in table 4.15 confirm spatial dependence in all the variables ($I = 0.25 - 1.0$; $pseudo - p < 0.001$). The positive Z statistic for the independent variables indicates that facilities with similar structural amenities and visitor services are clustered together in conformance to Tobler's first law of Geography (Tobler, 1970). Furthermore, the results on the logarithm of room rates suggest that facilities located near each other charge comparable room rates. Intuitively, the Moran's I on the logarithm of distance to aesthetic hotspots was close to +1, implying that neighboring facilities are the same distance from the same CES hotspot (c.f. Table 4.11).

Upon confirming spatial autocorrelation in the G-HPM's variables and residuals, the study estimated a spatial hedonic pricing model on the counsel that failure to account for spatial effects in G-HPM leads to biased coefficients, large residuals, and spurious significance statistics (Kim et al., 2020).

2.12.2 Geographical Weighted Regression Hedonic Pricing Model Estimation

The analysis protocol georeferenced the eight independent variables in the G-HPM (Table 4.13) and fitted a Gaussian GWR with the log of room rates as the dependent variable (equation 7). Due to the facilities dispersion, the analysis constructed a spatial weighting matrix (w_i) (equation 9) for the GWR using the bi-square adaptive kernel function (equation 10) with k = *30nn* as the bandwidth (h). The study preferred a user-defined bandwidth due to the sample size (n = 47). Table 4.16 presents the summary statistics of local coefficients estimated by the GWR-HPM at conventional level of significance ($p \leq .05$).

Table 4. 16 Descriptive Statistics-Local Regression Coefficients of the GWR-HPM.

	Significant GWR Local Coefficients $(B_{ik,}\ p < .05)$					
Variables	**Mean**	**SD**	**Min**	**Median**	**Max**	**Sign. Ratio**
Chain affiliation	0.246	0.063	0.201	0.230	0.371	13%
Ecolodge	0.284	0.075	0.208	0.286	0.492	98%
Plunge pool	0.291	0.077	0.215	0.285	0.418	19%
Breakfast buffet	0.327	0.016	0.297	0.328	0.355	30%
Concierge	0.405	0.014	0.395	0.405	0.415	4%
Private balcony	0.179	0.004	0.170	0.180	0.182	17%
Bathrobe	0.402	0.094	0.313	0.373	0.589	21%
Log Dist. to aesthetics hotspot	0.507	0.000	0.507	0.507	0.507	2%
$\bar{R}^2 = 0.69$						

Source: Research data (2023)

The results of the GWR-HPM in table 4.16 show that on average, the eight independent variables accounted for 69% of variation in the room rates across all facilities.

2.13 SPATIAL EFFECTS ON THE JOINT INFLUENCE OF ACCOMMODATION FACILITIES ATTRIBUTES ON ROOM RATES

The study examined the spatial heterogeneity in the joint influence of accommodation facilities' structural amenities, visitor services, and proximity to a hotspot for landscape aesthetics on room rates in the study area. An evaluation of the GWR-HPM's (table 4.16) locally adjusted coefficients of determination ($\bar{R}^2_{(u_i v_i)}; p < .05$) across the study area indicates that the attributes together accounted for between 69% and 90% of the variability in room rates at specific locations. Figure

4.15 shows a raster heat map of the locally adjusted coefficients of determination ($\bar{R}^2_{(u_i v_i)}; p < .05$) in the study area.

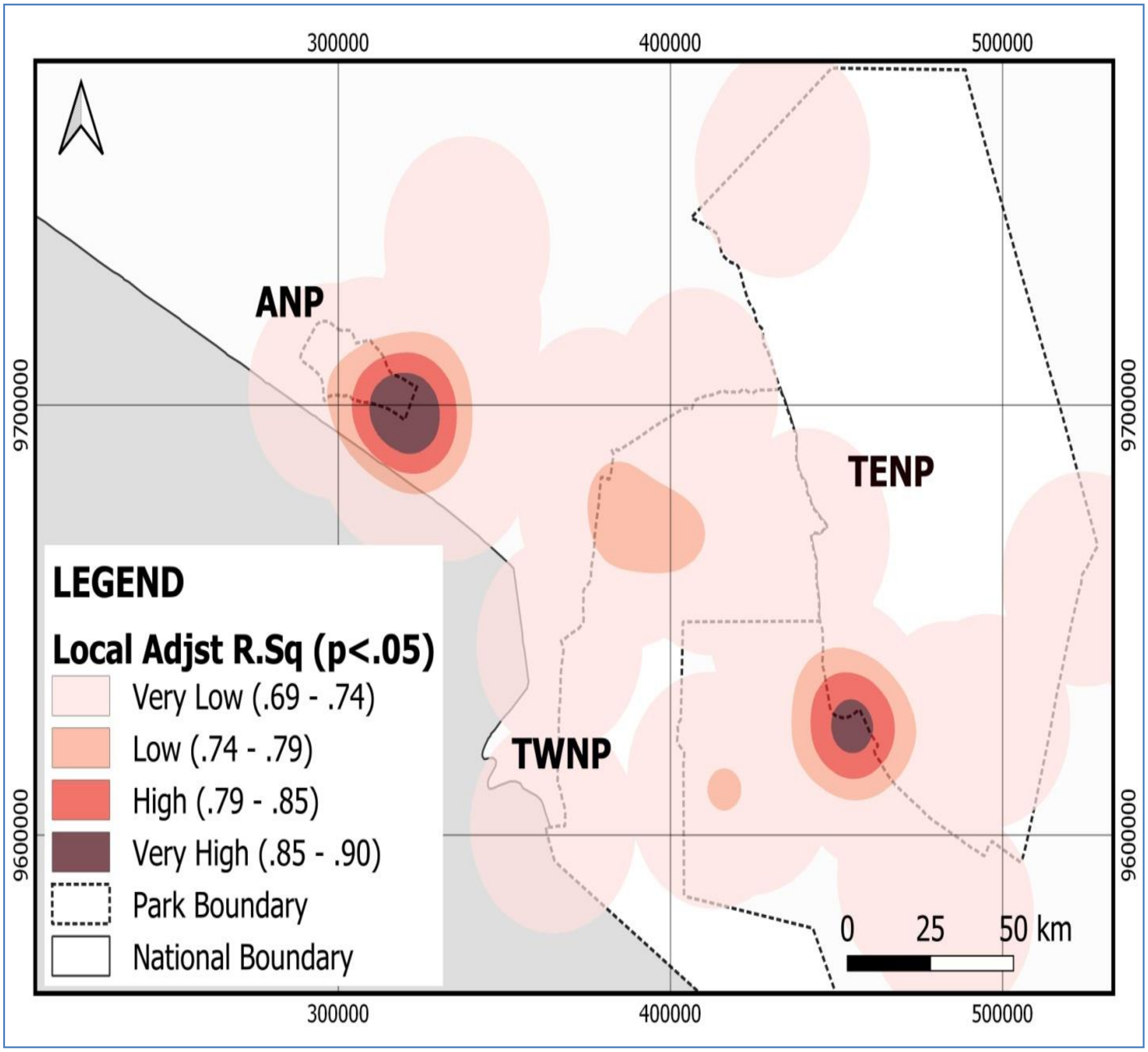

Figure 4. 15 Local Adjusted Coefficients of Determination - GWR HPM Model.

Source: Research data (2023)

The results show that the model had lower explanatory power in most of the TWNP, where it was able to predict between 69% and 79% of changes in room rates compared to the TENP and ANP, where the model accounted for between 79% and 90% of the difference in room rates.

Previous GWR-HPM studies observe a similar spatial variation in the GWR model fit and conclude that the model works better at predicting room prices in particular locations than in others (Zhang et al., 2017; Suarez-Vega & Hernandez, 2020). The results depicted in figure 4.15 suggest that the GWR model had insufficient information to explain room rate variations in most of TWNP and most of TENP compared to its performance in other parts of the study area. Borrowing from Suarez-Vega & Hernandez (2020), the result supports the inference that there may be facilities characteristics specific to TWNP and TENP not included in the model specification. This assertion implies the existence of a different market subsystem in these areas distinct from the rest of the study areas.

2.14 SPATIAL EFFECTS IN THE INFLUENCE OF ACCOMMODATION FACILITIES' STRUCTURAL AMENITIES ON ROOM RATES

The study explored the spatial effects on the implicit influence of accommodation facilities' structural amenities on room rates by examining the proportion of effects. Results in table 4.16 show that together, availability of a plunge pool, and rooms with a private balcony significantly influenced room rates in 57% of the study area.

The study examined non-stationarity in the implicit influence of structural amenities across the study area by rendering transformed regression coefficients for the effect of the presence or absence of the amenities on a proportional symbol map. The transformation followed Chen and Rothschild's (2010) formula to convert regressions coefficients for dummy variables into percentages ($[100 \times (\exp(B_{i(u_i v_i)}) - 1)]$). Figure 4.16 maps significant coefficients of the facilities structural amenities and proximity to landscape aesthetics hotspot in the GWR-HPM (Table 4.16) ($p \leq .05$).

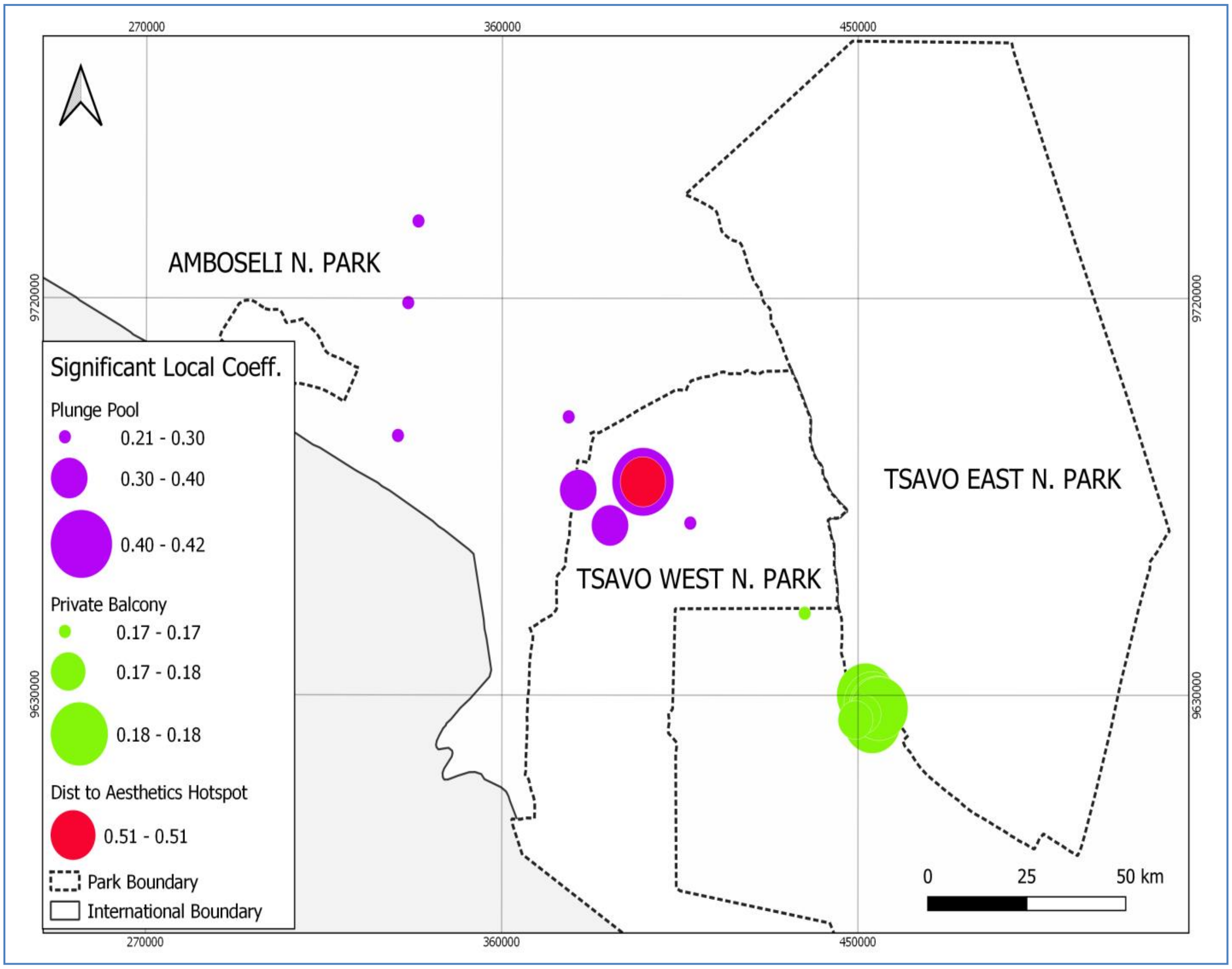

Figure 4.16 GWR- Regression Coefficients for Structural Amenities and Landscape Aesthetics Hotspot.

Source: Research data (2023)

Results in figure 4.16 highlight the effect of rooms with a private balcony for facilities located on the park boundary and suggest that facilities at Voi gate with rooms with a private balcony overlooking the national park charge 20% higher rates than facilities without ($B_{6(u_i v_i)} = .18, p < .05$). The results imply that the room balcony is particularly significant for enhancing wildlife viewing exposure for facilities outside the park boundary and insignificant for facilities inside the park that provide unfettered wildlife viewing opportunities. This finding confirm that facilities on the park boundary can place a price premium on rooms with a private balcony overlooking the park.

Results in figure 4.16 suggest that facilities in ANP and TWNP with a plunge pool charge 35% ($B_{3(u_i v_i)} = .21 - .30, p < .05$) and 52% ($B_{3(u_i v_i)} = .40 - .42, p < .05$) higher rates than those without the amenity. This observation is consistent with results from other HPM studies that observe spatial non-stationarity in structural attributes' influence on room rates (Kim et al., 2020; Suarez-Vega & Hernandez, 2017; Yalcin & Mert, 2018). It is noteworthy that the presence of a plunge pool did not significantly influence room rates for facilities in TENP. This result is attributable to the difference in visitor profile in the parks; while facilities in TENP rely on transit visitors, TWNP and ANP facilities are focused on longer staying mid-level visitors who use the plunge pools to cool off on hot afternoons.

2.15 SPATIAL EFFECTS IN THE INFLUENCE OF ACCOMMODATION FACILITIES' VISITOR SERVICES ON ROOM RATES

The study examined the spatial effects on the influence of accommodation facilities' visitor services like the availability of buffet breakfast and a concierge/naturalist at the facility on room rates. Results in Table 4.16 show that the availability of buffet breakfast was a significant room rate determinant in 30% of the locations and the presence of concierge service in 4% of the study area.

Figure 4.17 shows a proportional symbol map of the transformed significant regression coefficients for the effect of visitor services on room rates in the study area.

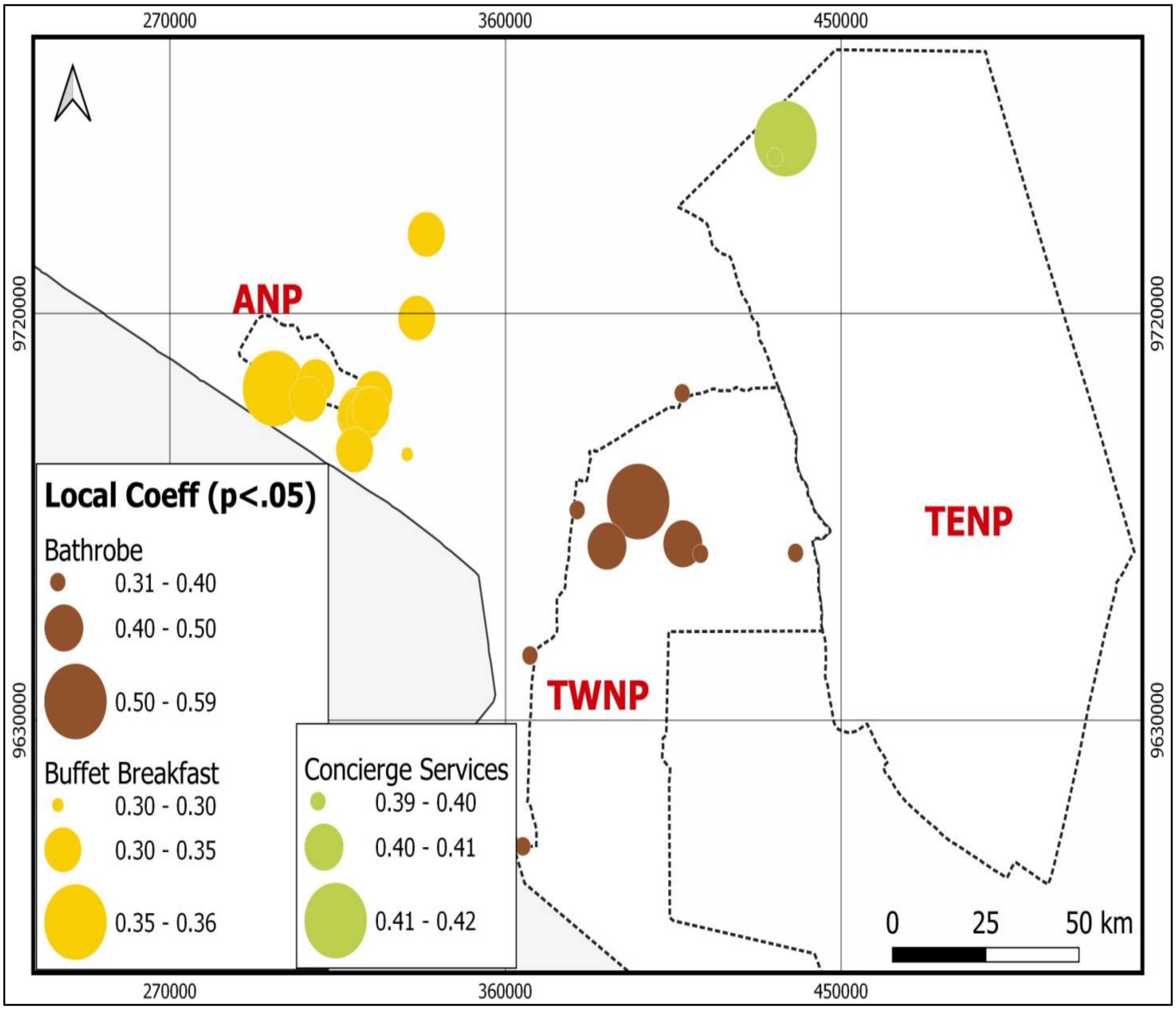

Figure 4. 17 GWR-HPM Regression Coefficients for Visitor Services.

Source: Research data (2023)

The results in figure 4.17 point to the importance of additional services like buffet breakfast for accommodation facilities in ANP and suggest that offering the meal experience allows facilities in the park to charge between 35% and 43% higher rates. The effect was not significant in TENP and TWNP. Amboseli is a terminal destination; the visitors stay in the park for at least two days.

Besides, the park offers a morning game drive (3hr 30min) and a lucrative afternoon game drive (2hr 30min) that makes the buffet breakfast important.

The influence of the availability of buffet breakfast and a bathrobe on room rates for facilities in ANP and TWNP suggests that for the middle to high-end wildlife holiday markets, additional guest services are significant (Kim et al., 2020; Suarez-Vega & Hernandez, 2020; Yalcin & Mert, 2018). It is instructive that the extra visitor services were not significant room rates determinants in TENP because facilities in this park are focused on lower-end conventional safari tourists.

The results show that in the Emusaya WZ- TENP, facilities providing concierge services charged higher rates ($B_{5(u_iv_i)} = .39 - .42, p < .05$) (Figure 4.17). The wilderness zone attracts special interest tourists and interpretation is a critical selling point for facilities in this location. The result support Adler and Gordon's (2013) proposition that the naturalist, the equivalent of a concierge in urban hotels adds to the guest experience in wilderness accommodation creating a competitive advantage.

2.16 SPATIAL EFFECTS IN THE INFLUENCE OF ACCOMMODATION FACILITIES' PROXIMITY TO LANDSCAPE AESTHETICS HOTSPOT ON ROOM RATES

The study explored the spatial effects of the influence of accommodation facilities' proximity to a hotspot for landscape aesthetics appreciation on room rates. Results in Table 4.16 show that proximity to the CES benefit was a significant room rate determinant in only 2% of the study area. The non-rivalrous and non-excludable nature of the CES benefit explained the insignificant local influence on room rates. On average, the facilities were within 37.5km (*SD* = 28.40) from the CES hotspots; it stands to reason that an operator could not appropriate the benefits to differentiate their accommodation experience from the neighboring facility based on this aspect.

Figure 4.16 reveals that a kilometer increase in the distance to a landscape aesthetics hotspot was associated with a 66.5% ($B_{8(u_i v_i)} = .51 p < .05$) increase in room rates in Mzima HUZ-TWNP. This counter-intuitive result is explainable by visitor preference for exclusive accommodation away from highly visited tourist attraction sites in the park (e.g., Mzima springs, Shetani lave, and Kichwa Tembo).

2.17 SPATIAL EFFECTS IN THE INFLUENCE OF CHAIN AFFLIATION AND ECOLODGE STATUS ON ROOM RATES

The study considered whether a facility's status as an ecolodge or a conventional lodge and whether it is a single unit or part of a chain had intervening influences on room rates in the Tsavo-Amboseli wildlife tourism destination area. The G-HPM supported the view that whereas ecolodge status had a significant effect, a facility's chain affiliation did not significantly influence room rates in the study area. The study then evaluated the spatial influence on the room rates in the GWR-HPM:

The GWR-HPM (Table 4.16) corroborates the finding from the G-HPM that ecolodge status was the most critical room rate determinant with influence in 98% of the locations. On the other hand, the spatial model differs from the G-HPM and identifies places where chain affiliation significantly influenced room rates in some 13% of the study area.

Figure 4.18 is a proportionate symbol map of the GWR-HPM local significant regression coefficients for chain affiliation and ecolodge.

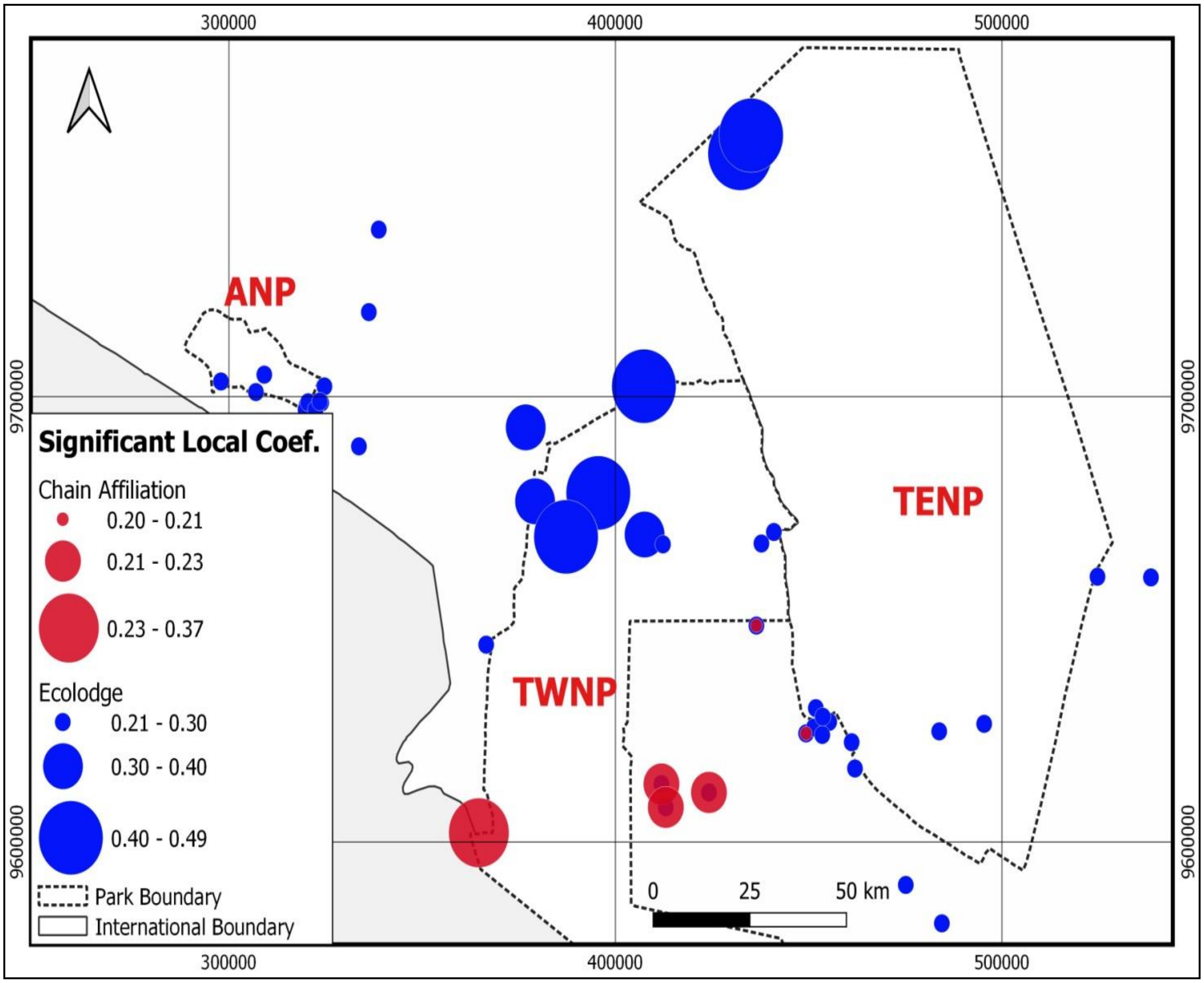

Figure 4.18 GWR-HPM Regression Coefficients for Chain Affiliation and Ecolodge.

Source: Research data (2023)

Figure 4.18 shows that the magnitude of influence of ecolodge status and chain affiliation on room rates varied locally; $(B_{2(u_i v_i)} = .20 - .49, p < .05)$ and $(B_{1(u_i v_i)} = .20 - .37, p < .05)$. The figure confirms the pervasive impacts of ecolodge status on room rates throughout the study area. For instance, facilities claiming the ecolodge status in the Voi-HUZ charged 35% higher rates than the conventional lodges, and in the Mzima HUZ, the ecolodge status allowed facilities to levy as much as 63% higher rates. It stands to reason that up to 66% of the facilities in the study area claimed ecolodge status on their OTA listing. The ecolodge status could be a gimmick to attract tourists (Chan et al., 2007). On the other hand, Mzima HUZ is a scenic wilderness area likely to attract price-insensitive tourists. In this part of the destination area, ecolodge status had more influence on room rates than the Voi-HUZ, popular with conventional mass tourists.

The results in figure 4.18 uncover spatial non-stationarity in the effect of chain affiliation on room rates and highlight locations where chain affiliation was relevant to pricing. The map shows that chain-affiliated facilities in Lake Jipe LUZ in TWNP charged as much as 45% higher rates. The chain-affiliated facilities in Taita-Hills wildlife Conservancy charge 23% to 25% higher rates than independent units. These results affirm that facilities located in the poorly visited parts of the protected area and those outside the park boundary can leverage chain affiliation to attract guests. Methodologically, the results demonstrate the risk in conclusions drawn from non-spatial HPM and buttress the assertion by Soler and Germar (2018) that G- HPM can be misleading for some locations.

2.18 COMPARISON OF THE GWR-HPM AND G-HPM PERFOMAMNCE

The study compared the G- HPM and the GWR HPM in terms of model goodness of fit statistics and model residuals. Table 4.17 presents the results of the model comparison. The study specified both models with eight independent variables viz, chain affiliation, ecolodge, plunge pool, breakfast buffet, concierge, rooms with private balcony, bathrobe, and log of distance to a hotspot for landscape aesthetics) regressed against the log of room rates.

Table 4.17 Comparison of G-HPM and GWR-HPM.

Criteria	**Model**	
	G – HPM	**GWR –HPM**
Coefficient of Determination(R^2)	0.67	0.86
Adjusted Coefficient of Determination($\bar{R}^2$)	0.60	0.69
Residual sum of squares(SS)	1.52	0.67
Residuals Moran's I Statistics (*I*) ($p < 0.01$)	0.84	0.56

Source: Research data (2023)

The results in table 4.17 support the conclusion that by accounting for spatial effects in the data, the GWR-HPM model outperformed the G-HPM in terms of goodness of fit, minimizing residuals, and reduction in spatial dependency in the errors. These findings are consistent with results from comparable studies in other accommodation markets (e.g., Hong & Yoo, 2020; Suarez-Vega & Hernandez, 2020; Zhang et al., 2017).

CHAPTER FIVE

2. SUMMARY, CONCLUSION AND RECOMMENDATIONS

2.1 INTRODUCTION

This chapter presents a summary of the main findings of the study and the research conclusions. The chapter highlights the study's contribution to the body of academic knowledge and describes the study's implications by way of recommendations for future research and practical applications of the knowledge developed.

2.2 SUMMARY OF KEY FINDINGS

The study aimed to develop a quantitative model of CES benefits tourists enjoy on their visit to national parks based on the benefits' effects on accommodation facilities' room rates. The research used data from a census of tourist accommodation facilities in the TAWTDA and a GIS database of CES benefits constructed from benefits mapped by park staff to estimate global and spatial hedonic pricing models that explain room rate variations. Explanatory variables included accommodation facilities' structural amenities, visitor services, ecolodge status, chain affiliation, and proximity to hotspots for landscape aesthetic appreciation. The following is a summary of the study findings.

2.2.1 Distribution of Cultural Ecosystem Services in the TAWTDA

The study employed a novel deliberative GIS mapping technique to capture park staffs' perceptions of CES benefits; locate their provision in the parks and assess the benefits' spatial distribution. Respondents' rating of parks' suitability for various CES benefit categories attest to their ability to distinguish CES types by their benefits indicators and demonstrate the usability of social ecosystems services assessment procedure in the context of national parks.

The study affirmed previous research findings that ecotourism & recreation and landscape aesthetic were the most frequently cited CES benefits due to the relative ease in measurement. On the other hand, introspective benefits like heritage/historical appreciation and religious reverence were more difficult to operationalize and map. The results support the view that, park managers have difficulties considering the latter CES benefits and are likely to underplay their values to park users.

The spatial distribution of CES benefits in the study area provided evidence that ES distribution follows patterns that coincide with geological features, hydrological features, socially significant sites, and ecological habitats. The results confirmed that low CES endowment corresponded to locations that were not accessible for tourism activities in line with the proposition that CES benefits result from people's interaction with the ecosystem's structure and functions.

Examination of the CES benefits intensity and diversity indices revealed clusters and joint-provision of combinations of benefits. The pattern of co-occurrence suggested the joint provision of abstract or subjective CES benefits like heritage and religious/spiritual reverence. The study confirmed that relatively tangible CES such as ecotourism & recreation, personal knowledge development & scientific research, scenic appreciation are bundled together in the terrestrial national parks.

The study uncovered CES benefits hotspots in the TAWTDA identified as locations of high intensity of particular CES benefits surrounded by other areas of high concentration of the same CES benefits. The hotspots analysis quantified the spatial variation in the distribution of the CES benefits and provided measurable inputs for assessment of the non-material values using a stated preference technique.

2.2.2 Accommodation Facilities Attributes and Room Rates in the TWTDA

The study observed that over two-thirds of tourist accommodation facilities in the TAWTDA claimed "ecolodge" status; seven in ten were chain affiliated. The facilities' daily room rates averaged USD 293.55 per person. On average, the facilities were priced for the budget to middle-level spenders. However, significant differences existed in room rates for facilities in the study area; TENP and TWNP facilities were priced for the budget market while ANP facilities were priced for the middle segment.

According to the findings, typical accommodation facilities amenities included restaurants, a bar/lounge, and a snack bar. The facilities provided mosquito nets, public WIFI, a floodlit water hole, and a desk in the rooms. On the other hand, differentiating amenities included a gift shop available in 60% of the facilities, room with private balcony (64%), and a plunge pool in 77%. Guest services included laundry service in 70% of the units, buffet breakfast (79%), and concierge services in 40%. The study observed that the facilities were within equal proximity to hotspots for CES benefits. This finding is accounted for by co-occurrences of CES at geological, hydrological, and landscape features and by the notion that developers locate facilities to provide ideal opportunities for guests to enjoy the CES benefits.

2.2.3 Global Influence of Accommodation Facilities' Attributes on Room Rates

The study's demonstrated that eight facilities attributes jointly influenced room rates in TAWTDA. The significant determinants included structural attributes operationalized as availability of a plunge pool, availability of room with private balcony; services including availability of a bathrobe in rooms, buffet breakfast, availability of a concierge, and environmental attributes operationalized as the distance to a hotspot for landscape aesthetic. The study also included facilities type - lodge or ecolodge and management - independent or chain affiliated.

Examined individually, five variables viz, ecolodge, availability of a plunge pool, buffet breakfast, bathrobe, and distance to aesthetic hotspot significantly influenced room rates. This finding was consistent with results from research in other leisure tourism markets. Taken independently, chain affiliation, availability of a concierge, and a room with a private balcony had no significant influence on room rates. In relative terms, establishment attributes like a facility's proximity to CES hotspots and its operational orientation as an ecolodge or a conventional lodge were the most critical room rate determinants. This observation supports the conclusion that providing a bathrobe in the rooms and offering a buffet breakfast were imitable tactics that could not sustain room rate differences between facilities. However, the results suggest that visitors are willing to pay a premium for accommodation in a facility located within proximity to opportunities to enjoy the parks' intangible benefits and preferred facilities that are sensitive to the environment.

The study's findings contribute to the existing theory of microeconomic consumer preference by confirming that tourists are willing to pay for additional attributes of facilities that enhance their overall satisfaction. This aligns with the Lancaster Characteristics theory that such attributes provide increased utility to consumers. Consequently, the availability of these added amenities and services was found to have a positive relationship with room rates.

However, it is important to note that the specific attributes influencing the wildlife holiday accommodation market differed from observations in other markets. This disparity can be attributed to the unique preferences of visitors, their expectations of the experience they seek, and the local conditions surrounding the wildlife accommodations.

Additionally, the study's findings regarding the global impact of proximity to a hotspot for landscape aesthetics on room rates support the concept of the distance decay effect. This effect predicts a decrease in the suitability of a facility as a tourism base as the distance from the park increases. The study's confirmation of this effect highlights the importance of considering the distance factor when assessing the desirability and market value of accommodations in relation to their proximity to natural landscapes.

Based on the goodness of fit statistics and analysis of residuals, the G-HPM performed satisfactorily in predicting room rates in the study area. The G-HPM performance compared well with results from other accommodation markets. Furthermore, despite the limited population, the G-HPM satisfied the basic assumptions of OLS regression. However, due to the inherent weakness of the OLS regression technique, the model did not account for spatial effects in the facilities' data. The study confirmed spatial autocorrelation in the G-HPM model residuals and variables and motivated estimation of a GWR HPM.

2.2.4 Spatial Effects in the Influence of Accommodation Facilities' Attributes on Room Rates

The GWR - HPM confirmed the influence of facility attributes identified in the G-HPM and highlighted additional attributes that positively impacted on room rates in specific locations *viz.,* presence of a concierge (naturalist), rooms with a private balcony, and chain affiliation. This finding ascertained that G-HPM did not identify attributes that were significant in particular locations. The GWR-HPM significant local regression coefficients confirmed that the ecolodge status was the most influential facility characteristic affecting room rates, significant in 98% of the observations. The availability of the breakfast buffet was significantly influential in 30% of the observations.

Interestingly, distance to hotspots for aesthetic appreciation had no significant influence on room rates in 98% of the locations. The study finds evidence of significant positive association between the distance to hotspot and room rates in 2% of the locations. This is new evidence regarding the influence of the public good characteristic of CES benefits on this relationship. While previous studies have generally suggested an inverse correlation between distance to attractions and accommodation rates, this study reveals an interesting finding. It identifies an insignificant or weak positive association between distance to popular attractions within national parks and room rates. This positive association can be attributed to the non-excludable and non-rival nature of park CES benefits. Unlike other goods or services, accommodation facilities within national parks cannot fully incorporate the non-excludable CES benefits into their room rates. This implies that the availability of these benefits, which are shared by all visitors, does not significantly affect the pricing of accommodations within the national park. This finding contributes to our understanding of the unique dynamics and economic considerations associated with national park accommodations and their relationship to CES benefits. By shedding light on the non-excludable nature of CES benefits within national parks, this study offers insights that can inform pricing strategies and management decisions related to accommodations in similar contexts.

The GWR-HPM uncovered spatial heterogeneity in relationships between facilities attributes and room rates. This finding is consistent with results from other tourism markets. The GWR–HPM was able to discriminate significant variables basing on peculiarities in the property's location. The research observed spatial non-stationarity in the room rate-determinants relationships attributable to local visitation levels, availability of tourism infrastructure, and access to wildlife viewing opportunities, guests' expectations, and length of stay together with guest expenditure that preconditioned guests' preferences.

A comparison of the reference G-HPM and the GWR-HPM confirmed the superior performance of the latter to the extent that the model accounted for spatial dependency and spatial non-stationarity in the data. However, the study demonstrated that the GWR-HPM performed better in predicting room rates in some locations than in others. This finding suggested that due to local subsystems in the wildlife holiday accommodation market, the model had sufficient information to account for variations in room rates in the locations where it performed better. All in all, the superior performance of the GWR–HPM supports the conclusion that the model is better at identifying locally relevant factors that explain variations in room rates.

2.3 CONCLUSION AND KNOWLEDGE CONTRIBUTIONS

The study's findings support the conclusion that national park managers perceive a range of CES benefits supplied by their respective parks. However, the managers readily recognize the more tangible benefits than the introspective benefits. The results permit the conclusion that the ecosystem services concept broadens the appreciation of terrestrial protected areas values by demonstrating socially constructed benefits of the ecosystems. The study contributes to mainstreaming the ecosystem services paradigm in conservation management decisions by providing a protocol for identifying and articulating a range of intangible park CES benefits.

The study concludes that the terrestrial national parks' CES benefits occur in patterns that reveal varying concentrations, intensities, and diversity predetermined by the ecosystem's structure. The study further concludes that conservationists can rely on GIS to demonstrate and quantify the spatial distribution of the subjective CES in terrestrial national parks. The study contributes to improving techniques for describing, assessing, and depicting non-material CES benefits in a manner that accounts for spatial variation in their provision in national parks. A precise quantitative description of the CES benefits should improve articulation of the otherwise incommensurate values for inclusion in economic trade-off decision scenarios.

The research supports the conclusion the influence of the lodges/ecolodges' structural amenities, visitor service, and environmental characteristics on room rates reveals park visitor preferences and expectations of the park accommodation experience as suggested by Lancaster's goods characteristics theory. The study concludes that globally the nature of the influence is consistent with the consumer preference theory that suggests that tourists are willing to pay for facilities characteristics for their additive impact on satisfaction. The uncovered spatial non-stationarity in the relationship between room rates and its determinants and the superior performance of the spatial regression model in predicting room rates permits the conclusion that there exist localized relationships between room rates and its determinants.

The research contributes evidence of the utility of the revealed preference technique in assessing non-market intangible use values of national parks. However, the study confirmed that the revealed preference method was not suitable for evaluating co-occurring and inseparable CES benefits in national park ecosystems. Still, the study advances the knowledge on the theoretical determinants of room rates by explaining the peculiarities in the global and local relationships between accommodation facilities room rates and its determinants in the context of terrestrial national parks. Specifically, the study demonstrated the relative performance of the G-HPM and GWR-HPM with evidence from a wildlife holiday accommodation market.

2.4 RECOMMENDATIONS

Arising from its findings, empirical and theoretical implications as well as its limitations, the research makes the following recommendations for practical application and future academic research.

2.4.1 Practical Implications

The research recommends the use of the deliberative GIS CES assessment technique demonstrated by the study in park planning to capture the range of park values while promoting stakeholder engagement in protected area management. Such a participatory approach enables the park managers acquire accurate information on public values to aid in management decision making. Additionally, it will benefit the national parks from the social capital borne in the participatory process of identifying ecosystem values and legitimize conservation programs by creating broad-based acceptability.

The study suggests that park managers consider implementing a park zonation framework based on CES values, in addition to the inorganic zonation schemes that rely on biophysical parameters, administrative regions, and tourism traffic. This alternative zonation approach would provide a foundation for management strategies that are more informed by the explicit social values associated with different zones. By integrating the concept of ecosystems into park management, this framework would enable a more comprehensive and holistic approach to park management practices.

The study highlights a need for park managers to identify and exploit synergies that exist in the joint provision of park CES benefits in developing and packaging diverse tourism experiences that appeal to different market segments. On the other hand, exclusion and uniqueness in the provision of CES benefits provide an opportunity for tourism managers to develop and market unique park visitor experiences.

The research affirms a principle in Lancaster's characteristics theory that goods possess characteristics demanded by consumers rather than the commodities themselves (Lancaster, 1971). The study provides evidence that in the destination (TENP, TWNP & ANP); availability of a plunge pool, a bathrobe in the room, a buffet breakfast, and distance to a hotspot for landscape appreciation together with whether the facility is an ecolodge or a lodge significantly explains variations in room rates. It follows that park accommodation providers can rely on this evidence to predict how demand for their service will be affected by the presence or absence of any of the five attributes and use the prediction to design a visitor experience with the most desirable amenities.

The direction of influence of the five attributes on room rates implies that the accommodation service providers can stake on these characteristics to differentiate their product to differentiate their facility within a destination. At the same time, the relative importance of facilities' status as an ecolodge lends credence to an emerging trend in which holiday tourists increasingly consider the environment in their accommodation choices. By adopting eco-friendly ethos espoused in the ecolodge status, hoteliers can stay ahead of their competitors by highlighting environmental responsiveness in their marketing communication to leverage visitor preference for eco-accommodation.

The GWR-HPM results highlight the effect of particular facilities' structural amenities, guest services, and CES benefits in specific locations. The results confirmed spatial heterogeneity in the relationship between facilities attributes and room rates in the study area preconditioned on locational differences in guest preferences, local tourist use levels, guest's expectations, length of stay, and visitor expenditures. By implication, park accommodation facilities managers can rely on information about location-specific visitor preferences to attain particular marketing and product development objectives, for example, leveraging chain affiliation to promote visitation to units in poorly visited parks areas and relying on structural elements like a private balcony or a plunge pool to enhance the visitor experience.

5.4.2 Future Academic and Research Implications

The study is subject to some limitations that non-the-less offer future research opportunities: Firstly, the study initially used input from park staff members to identify CES values and map them. The study proposes that future researchers should explore different perceptions of CES values, which can arise from interactions between various stakeholders and their local knowledge of the natural environment. By involving a wider range of stakeholders, including indigenous communities and other park users, a more comprehensive understanding of the non-material benefits can be achieved, enriching the assessment process and capturing diverse perspectives. To broaden the range of participants involved in participatory and voluntary GIS CES mapping processes, future research can utilize modern approaches such as online survey platforms and crowdsourcing techniques. These innovative methods can enhance the number and diversity of respondents.

Furthermore, the study employed the HPM, a revealed preference technique in assessing the implicit values of CES benefits based on visitors' willingness to pay for park accommodations. However, the study acknowledged that certain CES benefits co-occur in specific locations, potentially confounding the relationship between CES categories and room rates. The effect could underestimate the CES values. It is noteworthy that scholars have criticized HPMs for their inability to handle the collinearity issues arising from co-occurring independent variables. The study recommends that future research explore stated preference techniques such as Contingent Valuation and Choice Modeling that have the potential to capture a range of CES use and non-use benefits that simultaneously occur and allow nuanced and accurate estimates of park users' willingness to pay for the ecosystem values and bring them into focus in conservation decision making.

Secondly, the study relied on a census of private accommodation within a contiguous wildlife tourism destination area, yielding a restricted number of observations (N = 47). Thirdly, the research included proximity to hotspots for aesthetic appreciation as an independent variable. Previous studies have shown joint-provision of CES benefits within ecosystems (Ament et al., 2016; Ribeiro & Ribeiro, 2016). It is unclear if other CES co-produced at the aesthetic appreciation hotspots had confounding effects on room rates. Future researchers can consider GWR-HPM models for a larger geographical scale, e.g., a national scope that will increase the number of observations and model CES effects on room rates across different ecosystems.

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APPENDICES

APPENDIX 1: A SELECTION OF TOURISM G-HPM STUDIES (2013 -2017)

			Independent Variable (*Direction of influence, significance*)			
Author (Year)	**Location**	**Dependent Variable**	**Structural Amenities**	**Visitor Services**	**Environmental Attributes**	**Model performance $\bar{R}^2$**
Liu & Li (2013)	Hong Kong	Hotel room price	Room size; **Dummy variables** Bar (+); Gym (+) Restaurant (+)	Star rating; Brand	Location Views (+)	$\bar{R}^2$= 0.64
Agmapisarn (2014)	141 Bangkok Thailand hotels	High & low season room rates	Age (-); No. of rooms (ns); Room size(+), No. of bars (ns), No. rests (+) **Dummy Variables** TV (+), WIFI (ns),	**Dummy Variables** Comp B/fast (ns); business center (ns); spa (+); Fitness center (ns); Chain (+)	Distance to city center (-); Distance to transport (-)	$\bar{R}^2$= .52 - .57

Author (Year)	Location	Dependent Variable	**Independent Variable** (*Direction of influence, significance*) Structural Amenities	Visitor Services	Environmental Attributes	Model performance $\bar{R}^2$
			Pool (ns);			
Kefela (2014)	49 Hotels Stockholm, Sweden	Room rate per night	Room Size (+); No of Rooms (-); **Dummy Variable** Bath & Shower (Not Significant); min-bar (+); Free parking (+)	**Dummy Variables** 24hr room service; Refundable rates (+); chain affiliation (+ week), (ns-weekend) Breakfast (+) Star rating (+) (0)	Distance from CBD (-);	$\bar{R}^2$= .66 - .80
Napierala & Lesniewska (2014)	115 accommodation facilities, Lodz Metropolitan Area, Poland	Best available room rates	**Dummy Variables** Type of establishment – Luxury (+) Budget (+) Other hotels (+) Others (-);		Distance from city (ns); Distance to competitor(+) Distance to nearest Accommodation facility (ns) Distance to transport(-); **Dummy Variables** Location in urban (ns); Location in city (+)	$\bar{R}^2$= .49 – .57

Author (Year)	Location	Dependent Variable	**Independent Variable** (*Direction of influence, significance*) Structural Amenities	Visitor Services	Environmental Attributes	Model performance $\bar{R}^2$
Kim & Jogaratnam (2014)	Singapore	Hotel room rate	Room size (+);	Star rating (+); Events/festivals (+) Hotel occupancy(-)	Location (+)	$\bar{R}^2 = 0.65$
Geng, Ma & Chen (2015)	Beijing, China	Vocational rental price	House structure (+); Decoration (+)	Hosting behavior (+)	Location accessibility (-)	$\bar{R}^2 = 0.81$
Bilgihan, Kandampully, and Zhang (2016)	Florida, USA	Airbnb rental rates	Property size (+); No. of bathrooms (+); No. of bedrooms (+)	Host experience (+) Host response time (-)	Location in a tourist destination (+); Local crime rate (-)	$\bar{R}^2 = 0.69$
Choi and Heo (2016)	Jeju, Korea	Hotel room rate	Spa and fitness center (+); Amenities (+); Hotel size (-); Free Wi-Fi (-)' Hotel type Room type	Star rating	Location	$\bar{R}^2 = 0.69$

Author (Year)	Location	Dependent Variable	**Independent Variable** (*Direction of influence, significance*) Structural Amenities	Visitor Services	Environmental Attributes	Model performance $\bar{R}^2$
Pawlicz & Napierala (2017)	79, Business hotels Warsaw Poland	Room rate	No. of rooms(+);	Star rate online (+); Star rate official(+); **Dummy Variables** Chain affiliation(ns);	Distance from city center (-); Proximity to next competitor (ns); Proximity to transport hub(ns) **Dummy Variable** Location in CBD (ns)	$\bar{R}^2 = .78 - .89$

(+) = positive influence, (-) negative influence; (NS) not significant.

Source: Research data (2023)

APPENDIX II: SUMMARY OF REVIEWED LITERATURE AND KNOWLEDGE GAPS

	Thematic area	Source	Key Contributions	Knowledge Gaps & Research opportunities
(1)	Ecosystem Services	MAE (2005)	• Highlighted the link between ecosystems and society through welfare enhancing goods/services and stimulated the "ecosystem approach" in global conservation and academic research agenda.	• Normative description of ES resulting in challenges in their operationalization in metrics suitable for inclusion in economic valuation studies.
		Boyd and Banzhaf (2007); Fisher et al. (2007)	• Distinguished between ecosystem services and ecosystem benefits enhancing measurement of the services,	• Scope to include ES in socio-economic decision and policy design by using quantitative measurements.
(2)	Cultural Ecosystem Services	MAE (2005); De Groot et al. (2005).	• Description and classification of the range on non-material welfare enhancing services from ecosystems;	• Lack of clarity on the distinctions between Cultural ecosystem and non-material benefits resulting from the services.
		Daniel et al. (2012); De Groot et al. (2005); Milcu et al. (2013); Plieninger et al. (2013)	• Described intangible, subjectivity attributes of CESs and related these to challenges in measurement of CES;	• Limited studies on some CES categories resulting in underestimation of their economic importance.

	Thematic area	Source	Key Contributions	Knowledge Gaps & Research opportunities
(3)	Ecosystem services in wildlife protected areas	Pullin et al. (2013)	• Highlighted the importance of protected area as a viable conservation strategy and their global role in provision of ES;	• Scope to show the balance of ES benefits flows from protected areas at the local level
(4)	Cultural Ecosystem Services in Wildlife Protected Areas	Abraham et al. (2010); Willis (2015),	• Explained the nexus between natural ecosystems, tourism and well-being through CES	• Scope to demonstrate the link between PAs and visitor benefits through the less studies non-material benefits
(5)	Wildlife protected areas as Tourism Destinations	Grihault (2008); UNWTO (2014)	• Highlights the global importance of wildlife tourism as a distinct leisure tourism market segment	• Limited research on attributes and preferences of wildlife tourist.
(6)	Total Economic Value	Randall and Stoll, (1983), Mburu et al (2005),	• Ascribed value to Non-market CESs whose benefits exhibit attributes of public and quasi-public goods in a metric amenable to economic & policy decisions	• Limited evidence of application of the TEV framework in assessment of CES in the context of IUCN category II PAs (National Parks)
(7)	HPMs	Bilbao-Torel, et al. (2017); Latinopoulos (2018); Portolan (2013);	• Advanced the theory of hedonic pricing of non-market goods and its applicability in a tourism scenario like the wildlife holiday accommodation market.	• Scope to extend knowledge on the application of the HPM in examining tourist preferences in the wildlife holiday accommodation markets.

	Thematic area	Source	Key Contributions	Knowledge Gaps & Research opportunities
		Rosen (1974)		
		Fang et al. (2019); Fotheringham et al. (2002); Kim & Nicholls, (2016). Kim et al. (2020); Xiao, (2017).	• Pointed out the weaknesses of traditional HPM arguing that the global regression technique does not account for spatial effects in data with spatial characteristics	• Opportunity to elaborate baseline global HPMs to demonstrate spatial dependency and heterogeneity in wildlife tourism accommodation data;
(8)	GWR-HPMs	Fang et al. (2019) Fotheringham et al. (2002); Soler and Germar (2018);	• Elaborate the spatial GWR-HPM and proposed its adoption as standard practice in hedonic pricing studies with spatial data.	• Scope to test the ability of GWR-HPM to account for spatial effects in wildlife tourism accommodation data; • Scope to compare performance of GWR – HPM against baseline HPM in the context of wildlife tourism accommodation
(9)	Quantification of CES	Ambrose-Oji and Pagella, (2012); Neugarten et al. (2018);	• Highlight the significance of quantification of CES as a prerequisite to their valuation. However, they note challenges associated with the non-market nature of CES.	• Limited research progress in quantification of CES at the site level in IUCN category II PAs.

	Thematic area	Source	Key Contributions	Knowledge Gaps & Research opportunities
		La Rosa et al. (2015) Stagarescue and Partidario, (2014).		
		Hernandez-Morcillo et al. (2013)	• Describes a typology of CES indicators and lays out a process for development of effective benefit indicators	• Need to develop and test the adequacy of benefit indicators in capturing user perceptions for protected areas CESs.
(10)	Mapping of CES	Angarita-Baéz et al. (2017); Bieling and Plieninger (2013); Brown and Fagerholm (2015); Canedoli et al. (2017);Plieninger, et al. (2013); Ribeiro and Ribeiro (2016)	• Empirical application of social-assessment methods, development and refining of participatory CES mapping techniques using GIS	• Scope to explore participatory mapping process to qualitative data on CES preference at an ecosystem scale and leverage GIS to quantify and demonstrate the spatial nature of CES provision in PAs
(11)	Hedonic Pricing Model	Liu & Li (2013); Agmapisarn (2014); Kefela(2014);	• Provide empirical evidence on operationalization of accommodation structural and services attributed in HPM and evidence of the direction of effects and relative influences of the characteristics on room rates.	• Lack of knowledge on the direction and relative influence of accommodation attributes specific to park holiday accommodation.

Thematic area	Source	Key Contributions	Knowledge Gaps & Research opportunities
	Napierala & Lesniewska (2014); Kim & Jogaratnam (2014); Geng et al., (2015); Bilgihan et al., (2016); Choi and Hea (2016); Pawlicz & Napierala (2017); Lee et al., (2018); Zhao et al., (2019		
	Fleischer (2013); Awoyemi et al., (2014) Bilbao-Terol et al., (2017);	• Demonstrate the effect of environmental/neighborhood facility attributes on room rates. Environmental attributes in beach and city accommodation markets were measured in terms of accessibility to attractions or availability of environmental amenities	• Scope to investigate the effect of quantitatively operationalized environmental attributes on room rates in a hither to under researched market.

	Thematic area	Source	Key Contributions	Knowledge Gaps & Research opportunities
		Cirer-Costa (2018); Cai-Miao (2019)		
(12)	Geographical Weighted Regression HPM	Zhang et al., (2017); Hong & Yoo (2020); Kim et al., (2020); Suarez-Vega and Hernandez (2020); Guedes and Rebelo (2020)	• Demonstrate spatial effects in hedonic pricing data in the city, P2P and beach holiday accommodation and affirm superior performance of GWR in accounting for spatial heterogeneity and dependency resulting in improved model goodness of fit statistics and predictive power	• Scope to investigate the spatial effects in determinants of accommodation prices in the wildlife holiday market and assess the relative performance of global and spatial HPMs in this market.

APPENDIX III: LIST OF TOURIST ACCOMMODATION FACILITIES

		UTM COORDINATES	
S/No.	Facility	X	Y
1	Maasai Simba Camp.	338778	9737516
2	Kibo Safari.Camp.	319125	9697800
3	Oltukai Lodge	309162	9704965
4	Amboseli Serena Lodge	308739	9705226
5	Sentrim Lodge- Amboseli.	319309	9696661
6	WE4Kenya Guest/House.	322993	9702054
7	Kilima SafariCamp.	318351	9697505
8	Tawi Lodge.	323646	9698687
9	Elerai Satao Camp.	319541	9689792
10	Amboseli EcoCamp	326234	9687111
11	Ol Donyo Lodge.	320554	9721442
12	Campi ya Kanzi(CW)	376584	9693332
13	Tortilis Camp	297551	9703266
14	Amboseli Sopa Lodge	333615	9688993
15	AA Lodge Amboseli	318754	9692995
16	Porini A.Camp.	311342	9741290
17	Zebra Plains Camp.	323135	9699885
18	Man Eaters Camp.	440821	9669615
19	Finch H. Tented Camp	387252	9668516
20	Kilaguni Serena Lodge	395342	9678622
21	Kipalo Hills Lodge	436503	9648621
22	Voyeger Ziwani Camp	366577	9644331
23	Sarova Salt Lick Game Lodge	413055	9607826
24	Sarova Taita Hills Game Lodge	424218	9611155
25	L.Jipe Safari Camp	364682	9602098
26	RhinoValley Camp	407563	9669055
27	Africa Lodge	449349	9624418

		UTM COORDINATES	
S/No.	**Facility**	**X**	**Y**
28	Voi Safari Lodge	451872	9630075
29	Impala Safari Lodge	451372	9625711
30	Voi Wildlife Lodge	454872	9627182
31	Manyatta Camp	455331	9627006
32	Sentrim Tsavo East Camp	483801	9624868
33	Sagala Lodge	462002	9616533
34	Ngulia Safari Lodge	412316	9666854
35	Severin Safari Camp	387259	9668496
36	Lions Bluff Lodge.	404145	9613024
37	Ashnil Aruba Lodge	453547	9624068
38	Kivuli Camp	475148	9590389
39	Hunters' Lodge	356807	9755272
40	Tsavo River Hippo Safari Lodge	437793	9667042
41	Kivuko Eco-Camp.	484485	9581769
42	Satao Luxury Tented Camp	495437	9626558
43	Ithumba Camp	432283	9754630
44	Ngutuni Lodge	461142	9622426
45	Osteria Safari Camp	524759	9659586
46	AHG Kuwinda Tented Camp	538591	9659426
47	Loyk Tented Camp	435134	9758690
48	Lion Hill Lodge	453679	9628143
49	Severin Kitani Bandas	387234	9668539
50	Tsavo Inn Lodge	407386	9702358

Source: Research data (2023)

APPENDIX IV: TOURIST ACCOMMODATION FACILITIES ONLINE SURVEY CHECKLIST

S/No.	----------------	Date-------------------			Time	---------------------	
1	**Name of facility**	------------------------------------			UTM	-----------, -----------	
	Website	--					
2.	**Park**	T/West N. Park	□	T/Easy N. Park	□	Amboseli N. Park	□
3.	**Facility Type**	Lodge	□	Ecolodge	□		
4.	**Facility Structural Amenities**						
	Plunge Pool	□	Bar/Lounge	□	Meeting room	□	
	Mosq. Net	□	Restaurant	□	Gift Shop	□	
	Public WIFI	□	Snack bar	□	Bath & Shower	□	
	Water hole	□	Conference	□	Room Priv.Balcony	□	
	Outdoor fire	□	Room Safe	□	Room Desk	□	
	Pool bar	□	Bath & Shower	□	Bath robe	□	
5.	**Facility Guest Services**						
	Laundry Service	□	Breakfast Buffet	□	Currency Exchange	□	
	Baby sitting	□	Kids Buffet	□	Concierge	□	
	Hiking	□	Free breakfast	□			
6.	**Management**		Chain Affiliated	□	Independent unit	□	

APPENDIX V: PARK STAFF SURVEY QUESTIONNAIRE

Introduction and Informed Consent Form

Dear Sir/Madam

I am Mr. Mark Nelson YOBESIA, a PhD candidate at the Technical University of Kenya, School of Hospitality and Tourism Studies undertaking research for my doctoral thesis titled "*The Effects of Cultural Ecosystem Services on Lodge Room Prices in Kenyan Terrestrial Wildlife Protected Areas*". The purpose of this questionnaire is to collect your views on cultural ecosystem services enjoyed by visitors in your park. This questionnaire will take 30 minutes of your time, kindly answer the questions as accurately as you can. All information collected will be treated confidentially and used only for academic purposes.

THANK YOU.

2.0 Background

National Parks and Reserves provide intangible benefits to park visitors that are known as cultural ecosystems services (CES). These benefits come from opportunities to enjoy ecotourism and recreation, social interactions, spiritual and religious use, artistic inspiration, education and enjoyment of landscape aesthetics in wildlife protected areas. This study aims to identify the range of CES specifically provided by your park and use the information to evaluate whether they affect prices of lodge accommodation in the park.

Kindly complete the annexed form on informed consent before participating in the survey. Feel free to contact the study's lead researcher on yobesia.mark19@gmail.com for any clarification.

3.0 Informed Consent

(Instructions: Kindly tick as appropriate)

		YES	NO
3.1	I agree to participate in the study as a respondent and for my data, views and opinions as willfully recorded in this questionnaire to be used in this study.	□	□

RESPONDENTS' QUESTIONNAIRE

Name of the Park/Reserve: ....

Date: ....**Time**...

PART A: Respondent's Knowledge of the Park

(Instructions: Kindly tick as appropriate)

A1. Are you currently employed at the park? Yes ☐ No ☐

A.2 If employed by KWS, which of these best describes your roles?

- Park management and administration ☐
- Scientific research ☐
- Security and law enforcement ☐
- Community wildlife service ☐
- Tourism management ☐
- Conservation education ☐
- Veterinary and wildlife care services ☐
- Others (specify)...

A3. On a scale of 1 to 5, please indicate the extent of your knowledge of the park's unique values

1	2	3	4	5
Not at all knowledgeable	Slightly knowledgeable	Somewhat knowledgeable	Moderately knowledgeable	Extremely knowledgeable
☐	☐	☐	☐	☐

A4. Which of these categories best describes your years of experience in parks in the country?

Less than 1 year	☐	11 – 15 years	☐
1 - 5years	☐	More than 15 years	☐
6 - 10 years	☐		

PART B: Perceptions on Cultural Ecosystem Services Benefits of the Parks to Visitors

(Instructions: Kindly tick as appropriate)

B1. By ticking the appropriate box, indicate how you rate this park's suitability for providing visitors opportunities to experience the following:

	Not at all suitable	Slightly suitable	Moderately suitable	Very suitable	Extremely suitable
Ecotourism activities	☐	☐	☐	☐	☐
Outdoor recreational activities	☐	☐	☐	☐	☐
Scenic landscape appreciation	☐	☐	☐	☐	☐
Scientific study or research	☐	☐	☐	☐	☐
Personal knowledge development	☐	☐	☐	☐	☐
Spiritual / religious reverences	☐	☐	☐	☐	☐
Closeness with nature	☐	☐	☐	☐	☐
Appreciation of human history	☐	☐	☐	☐	☐
Views of culturally significant species	☐	☐	☐	☐	☐
Appreciation of culturally important natural features	☐	☐	☐	☐	☐

PART C: Respondents' Demographics

C1. What is your gender? Male ☐ Female ☐

C2. Which of these categories best describes your age?

18- 20 years	☐	31 – 40 years	☐	Over 45 years	☐
21 – 30 year	☐	41 - 45 years	☐		

C3. What is your highest level of educational qualification?

Post graduate degree ☐

University Degree ☐

College Diploma	☐
College Certificate	☐
High school Certificate	☐
Primary Education Certificate	☐

D2. Are there locations in this park where visitors are most likely able to see the big five

Points	**Yes**	**No**	**Areas**	**Yes**	**No**
i. Salt/mineral licks (SL)	☐	☐	ii. Migratory routes (MR)	☐	☐
iii. Watering holes (WH)	☐	☐	iv. Breeding grounds (BG)	☐	☐
v. Viewing hides (WH)	☐	☐	vi. Known habitats (KH)	☐	☐
			vii. Grazing areas (GA)	☐	☐
			viii. Sanctuary (S)	☐	☐

If YES, indicate such locations on the topographic map by marking the corresponding initial using a **BROWN** colored points/polygons, you may point out more than one location for each attraction.

D3. Are there features in this park recognizable for their natural beauty?

Yes ☐ No ☐

If YES, indicate each feature on the topographic map using a **PINK** colored pencil mark, you may point out more than one feature.

D4. Are there areas in this park considered as being of notable aesthetic appeal?

Yes ☐ No ☐

If YES, indicate such locations on the topographic map using **BLUE** colored areas, you may point out more than one location.

D5. Indicate presence or absence of the following locations in this park used by researchers

Areas		**Present**	**Absent**
i.	Estuaries (ES)	☐	☐
ii.	Riverine forests (RF)	☐	☐
iii.	Iconic species ranges (SR)	☐	☐
iv.	Roosting grounds (RG)	☐	☐
v.	Species sanctuaries (SS)	☐	☐
vi.	Wilderness areas (WA)	☐	☐

If present, indicate such locations on the topographic map using a **GREEN** colored pencil to mark areas with corresponding initials, you may mark more than one location for each of the areas

D6. Are there any of the following educational places in the park?

Lines	**Yes**	**No**	**Points**	**Yes**	**No**
i. Nature walks (NW)	☐	☐	ii. Education centers (EC)	☐	☐
iii. Bird walks (BW)	☐	☐	iv. Visitor information centers (VI)	☐	☐

If YES, using a **YELLOW** colored pencil marks or line(s), indicate the corresponding initials on location of such resources on the topographic map, you may point out more than one location for each of the educational resource.

D7. Are the following natural elements with spiritual reverences found within this park?

	Yes	**No**		**Yes**	**No**
Caves (C)	☐	☐	Mountains (M)	☐	☐
Plants (P)	☐	☐	Grooves (G)	☐	☐

Others(List) ....

....

....

If represented in the Park, identify their locations on the topographic map using **PURPLE** colored pencil mark to indicate the corresponding initial where they are found, you may indicate more than one location for any of the elements.

D8. What landscape features in the park depict important human history?

i) ....

ii) ....

iii) ....

Indicate on the topographic map using **BLACK** colored pencil mark landscapes features found in this park that represent important human history.

D9. What landscape feature(s) in this park bear relevance to the local cultural norms/practices?

i) ....

ii) ....

iii) ....

Indicate location(s) of such features on the map using **LIGHT GREEN** colored pencil mark.

D10. What sacred plants/animals are found in the park

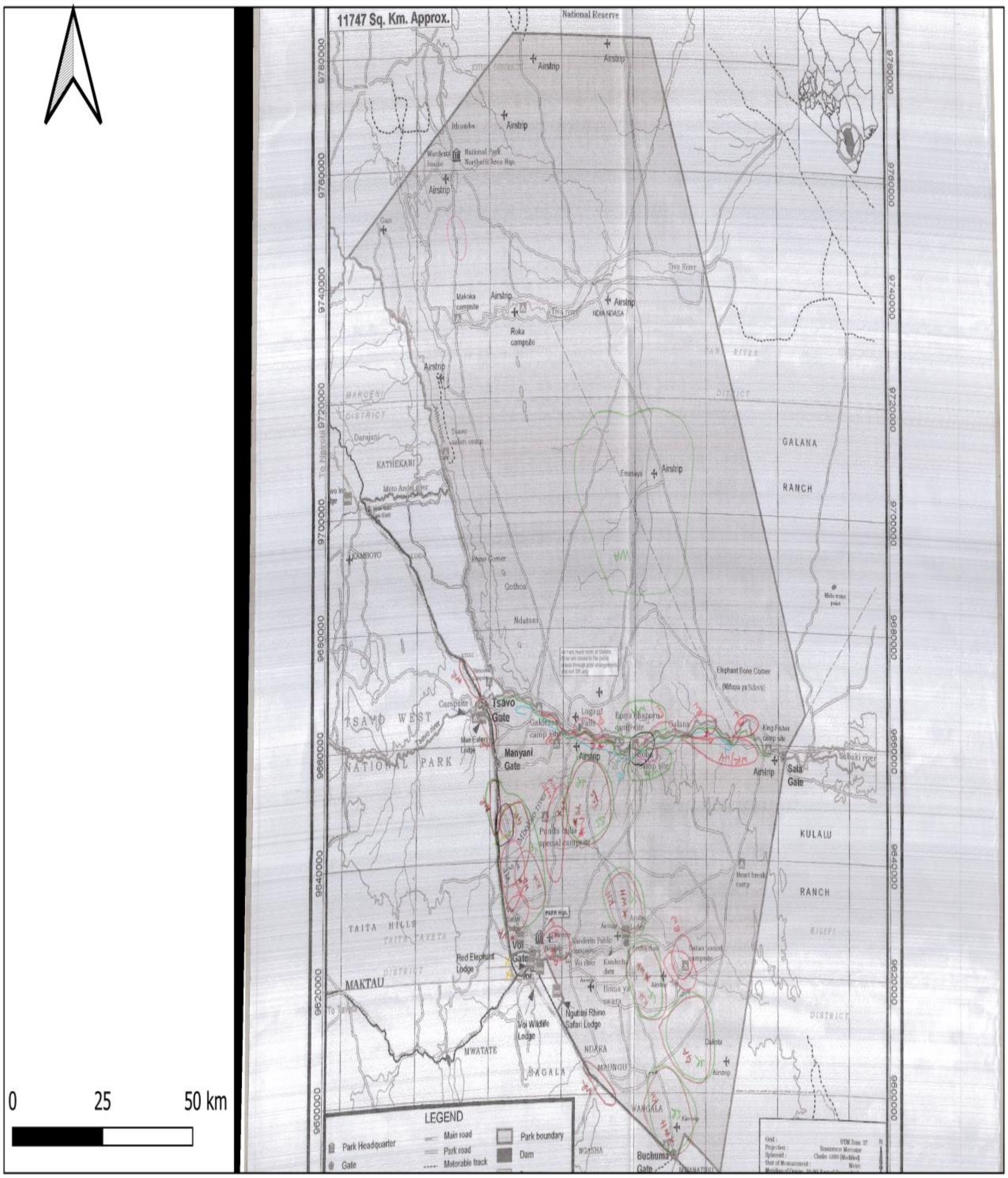
i) ....

ii) ....

Indicate on the map using **PEACH** colored polygons areas where visitors are likely to encounter large concentrations of these sacred species.

THANK YOU FOR YOUR COOPERATION.

APPENDIX VI: GEOREFERENCED MAP OF IDENTIFIED CES



Source: Research data (2020)

APPENDIX VII: SCHOOL OF GRADUATE AND ADVANCED STUDIES PHD RESEARCH APPROVAL

THE TECHNICAL UNIVERSITY OF KENYA

Haile Selassie Avenue, P. O. Box 52428, Nairobi, 00200, Tel: +254 (020) 343672, 2249974, 2251300, 341639,
Fax: 2219689, E-mail: vc@kenpoly.ac.ke, Website: www.tukenya.ac.ke

Office of the Director
School of Graduate and Advanced Studies

REF: ATHX/04840P/2017 April 15th, 2019

The Chief Executive Officer
National Commission for Science, Technology and Innovation
NACOSTI Building, Off Waiyaki Way
P.O. Box 30623 - 00100
Nairobi, KENYA
Tel: 020 400 7000/0713788787/0735404245

Dear Sir/Madam

REF: APPLICATION FOR RESEARCH PERMIT

This is to inform you that **Mr. Mark Nelson Yobesia Okunya,** is a registered PhD student in the Department of Tourism and Travel Management, School of Hospitality and Tourism Studies, The Technical University of Kenya. The course is offered by Research and Thesis. The title of his thesis is ***"The Effects of Cultural Ecosystem Services on Lodge Room Prices in Kenyan Terrestrial Wildlife Protected Areas."***

Mr. Okunya has defended his research proposal and is currently proceeding for field work which will involve data collection using approved surveys and research methods.

This is to kindly request you to issue him with a research permit.

SCHOOL OF GRADUATE & ADVANCED STUDIES
DIRECTOR
15 APR 2019
THE TECHNICAL UNIVERSITY OF KENYA

Prof. Joseph O. Lalah
Director- School of Graduate and Advanced Studies.
PROFESSOR OF CHEMISTRY
File copy: Student File
JOL/smm

Education and Training for the Real World
ISO 9001:2015 Certified

APPENDIX VIII: PERMISSION TO CONDUCT RESEARCH IN THE NATIONAL PARKS

KENYA WILDLIFE SERVICE

KWS/BRPM/5001

3 July 2019

Mark Nelson Yobesia Okunya
Technical University of Kenya
School of Hospitality and Tourism Studies
P.O.Box 52428-00200
NAIROBI
E-mail: yobesia.mark19@gmail.com

Dear Mark,

PERMISSION TO CONDUCT RESEARCH IN TSAVOS EAST&WEST, AMBOSELI AND LAKE NAKURU NATIONAL PARKS

We acknowledge receipt of your application requesting for permission to conduct research on a project titled: '**Effects of Cultural Ecosystems Services on lodge Room prices in Kenya Terrestrial Wildlife Protected Areas**'. The study will generate data and information that will assist in understanding the distribution of cultural ecosystem services supplied in terrestrial wildlife protected areas. This will contribute into knowledge of valuation of parks user benefits, which can be used in developing new tourism products and design of optimal park tariff regime structure.

You been granted permission to conduct the study from **July 2019 – July 2022** upon payment to KWS academic research fees of **Kshs.12,000** (PhD Study). However, you will abide by the set KWS regulations and guidelines regarding the carrying out of research in and outside protected areas. You will also be required to discuss your research proposal with our Senior Wardens in charge of (Tsavos East &West , Amboseli , Meru and Lake Nakuru National Parks) and Scientists in-charge of Tsavo , Central Rift , Southern and Eastern Conservation Areas before embarking on the field work .

You will submit a bound copy of your research findings to the KWS Director, Biodiversity Research and Planning and Director, Parks and Reserves on completion of the study

Yours Sincerely,

PATRICK OMONDI, PhD, OGW
DIRECTOR
BIODIVERSITY RESEARCH AND PLANNING

Copy to:

- AD-TCA, SCA,ECA,CRCA
- Senior Warden, Tsavo East N. Park
- Senior Warden Tsavo West N. Park
- Senior Scientists, TCA, SCA, ECA,CRCA

P.O Box 40241-00100, Nairobi, Kenya.
Tel: +254-020-2379407/8/9-15. Mobile: +254-735 663 421, +254-726 610 508/9.
Email: kws@kws.go.ke Website:www.kws.go.ke

APPENDIX IX: LICENSE TO CONDUCT RESEARCH IN KAJIADO, NAKURU AND TAITA TAVETA

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **536783**

Date of Issue: **19/August/2019**

RESEARCH LICENSE

This is to Certify that Mr.. Mark YOBESIA of Technical University of KENYA, has been licensed to conduct research in Kajiado, Nakuru, Taita-Taveta on the topic: THE EFFECTS OF CULTURAL ECOSYSTEM SERVICES ON LODGE ROOM PRICES IN KENYAN TERRESTRIAL WILDLIFE PROTECTED AREAS. for the period ending : 19/August/2020.

License No: **NACOSTI/P/19/873**

536783

Applicant Identification Number

Director General

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

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APPENDIX X: RESEARCH WORK SCHEDULE

TIME (YYYY/MM)

	YI 2018						Y2 2019												Y3 2020							2021
Activity	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
Proposal corrections	■																									
Pilot survey and testing of research instruments		■	■	■																						
Recruitment and training of research assistants					■	■																				
Data collection							■	■	■	■	■	■														
Data analysis													■	■	■	■	■	■								
Thesis drafting																			■	■	■	■	■			
Report presentation and correction																								■	■	
Corrections and submission of the final thesis																										■
Thesis defense and correction																										■
Thesis resubmission																										■

APPENDIX XI: RESEARCH BUDGET

Budget Items	Quantity	Cost/Unit (KES)	Year 1 (KES)	Year 2 (KES)	Year 3 (KES)	TOTAL
8.1. Expendable Supplies						
Ethics approval fee	Annual	12,000.00	12,000.00	-	-	12,000.00
Topographic Maps	5 maps	4,500.00	-	22,500.00	-	22,500.00
Postage and communication	Annual	5,500.00	5,500.00	5,500.00	5,500.00	16,500.00
Catering - Enumerator Training	2days X 6 pax	500/pax	-	6,000.00	-	6,000.00
Catering –field survey	3X1day (21 pax)	1,000/pax	-	63,000.00	-	63,000.00
		Sub-total	**17,500.00**	**97,000.00**	**5,500.00**	**120,000.00**
8.3. Local travel (*local traveling costs, accommodations, allowances*)						
Field Allowance & Substance -Field work and data collection	70 days	1,800.00	36,000.00	90,000.00	-	126,000.00
Hire of vehicle (Hardtop 4X4)	40 days	7,500.00	75,000.00	225,000.00	-	300,000.00
		Sub-total	**111,000.00**	**315,000.00**	**-**	**426,000.00**
8.4. Documentation, publication costs, conferences						
Hire of meeting venues	5 days	10,000.00	20,000.00	-	-	20,000.00
Printing, Stationary & Photocopying of documents	Annual	20,000.00	20,000.00	20,000.00	20,000.00	60,000.00
		Sub-total	**40,000.00**	**20,000.00**	**20,000.00**	**80,000.00**
		Yearly Budget	**168,500.00**	**432,000.00**	**25,500.00**	**626,000.00**

APPENDIX XII: RESEARCH PUBLICATION; DELIBERATIVE ASSESSMENT AND MAPPING OF CULTURAL ECOSYSTEM SERVICES PROVISION IN TERRESTRIAL NATIONAL PARKS, KENYA

ABSTRACT

The ecosystem services concept advocates for incorporation of Cultural Ecosystem Services (CES) into park management. However, challenges abound in articulation of CES in policy ready measurements. The study aimed to trial a social deliberative GIS method to identify, map, quantify, and analyze the distribution of CES in two Kenyan national parks. A sample of park staff was surveyed to identify non-material park benefits in five CES categories. Geospatial analysis was used to quantify and evaluate the benefits spatial distribution. Analysis of spatial associations between the CESs found strong to moderate correlation between mapped benefits suggesting co-occurrence of the CES. The analysis revealed CES concentration around hydrological, geological, and culturally significant features. These features had the highest benefits intensity and diversity indices while topographic and ecological park attributes diffused associated benefits. Except for two tourism use zones in Tsavo west, no significant difference between intensities of CES benefits was found between other zones in the parks. The study demonstrates applicability of the deliberative method in assessing protected area CES values. Park managers can rely on results of such a process to provide legitimate inputs into conservation decisions.

Key Words: Ecosystem Services, Cultural Ecosystem Services, Deliberative Geographic Information System, Terrestrial National Parks

Reference

Yobesia, M. N., Kihima, B. O., Makopondo, R. O., & Opondo, J. A. (2020). Deliberative Assessment and Mapping of Cultural Ecosystem Services Provision in Terrestrial National Parks, Kenya. *Parks - The International Journal of Protected Areas and Conservation*, *26*, 103. Available at https://parksjournal.com/wp-content/uploads/2020/11/10.2305-IUCN.CH_.2020PARKS-26-2en-Low-Res-1.pdf#page=103

APPENDIX XIII: RESEARCH PUBLICATION; EFFECTS OF ACCOMMODATION FACILITIES' ATTRIBUTES ON ROOM RATES IN A WILDLIFE DESTINATION AREA, KENYA

ABSTRACT

Park tourist facilities managers need to understand guests' preferences for elements of the accommodation experience to provide an ideal mix of attributes. Hedonic Pricing models have been used to estimate the implicit effect of facilities characteristics on room rates. However, the models do not account for possible spatial variations in the relationships. This study assessed the global and spatial influence of facilities' attributes on room rates in Amboseli, Tsavo East, and Tsavo West National Parks, three contiguous most visited parks in Kenya, an important international wildlife tourism destination. The study relied on online and geographical information system data. Results of the global model indicate that availability of buffet breakfast, bathrobe, plunge pool, and ecolodge design positively influence room rates while the distance to aesthetic appreciation hotpots inversely relates to rates. The spatial model uncovered non-stationarity in the effects of facilities' attributes on rates predicting the causal effects better in particular places. The model also revealed where particular facility attributes strongly influenced room rates than others. Park managers can rely on the results of the global model to design destination marketing programs while the facilities can use the spatial model to derive indices to inform product design and marketing decisions.

Key Words: Hedonic pricing model, geographically weighted regression, national park, cultural ecosystem services, tourist accommodation facilities.

Reference

Yobesia, M. N., Kihima, B. O., Makopondo, R. O., & Opondo, J. (2022). Effects of accommodation facilities' attributes on room rates in a wildlife tourism destination area, Kenya. *Tourism Recreation Research*, 1-16.