Valuing biodiversity and forest habitat restoration in Kakum National Park in Ghana

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Abstract

Conflicts in nature protection in developing countries are often a result of a difficult choice between tourism development and environmental conservation in communities with difficult socio-economic conditions. The management of these conflicts is paramount for the sustainable management of ecotourism. The present study investigates the preferences of resident and non-resident tourists at Kakum National Park in Ghana using the choice experiment. Although the non-resident tourists are more aware of the uniqueness of the forest habitat at Kakum National Park than resident tourists, the non-resident tourists support the conversion of portions of the park to support livelihoods in surrounding communities as compared with stricter nature protection among resident tourists. The marginal WTPs for 1% increase in biodiversity are GHS1.61 and GHS82.88 for resident tourists and international tourists respectively. Furthermore, the marginal WTPs for restoring one hectare of forest habitat is approximately GHS 0.30 for resident tourists but GHS3.55 for international tourists. Furthermore, whereas the marginal WTP for information using QR codes is (GHS4.80) and (GHS51.08) for resident tourists and international tourists respectively, the marginal WTPs for information provision using printed text are GHS1.30 and GHS21.79 for resident and international tourists. Based on these estimates, we make a number of recommendations for promotion of ecotourism and management of conflicts in nature tourism strategy development within the context of developing countries.

Keywords: *Biodiversity, forest habitat, Choice Experiment, encroachment*

JEL Classification: *Q51, Q56, Q57, Q58, Z32*

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Introduction

Economies all over the world depend on natural resources and the environment for human well-being, raw materials for production and hence it contributes to their economic growth (Ritchie & Roser, 2020; Common & Stagl, 2005). Among the various sectors that benefit directly from the availability and abundance of natural resources includes the agricultural, industrial, travel and tourism sectors with the latter contributing 10.4% to global GDP in 2019 (WTTC, 2020). This share decreased to 5.5% in 2020 due to the travel restrictions following the outbreak of the novel COVID-19 and associated with this macroeconomic loss was an additional loss of 62 million jobs within the period, representing a fall of 18.5% in employment of individuals in the global travel and tourism industry (WTTC, 2020). The spending of both local and foreign tourists boosts national income and leads to job creation and higher demand of goods (Manzoor et al., 2019).

According to Deutsch et al. (2013), all tourism, even in city centers, is dependent on natural resources for food, clean water, which are ultimately reliant on the abundance of biodiversity[1]. Biodiversity has immense contribution to the attractiveness and quality of destinations and most importantly to their appeal which draws the attention of tourists. In southern and eastern Africa, wildlife safari tourism is a major lure and source of money for the tourism industry whereas wildlife and scenic views are popular tourist attractions in mountainous locations (Buckley, 2011; Sintayehu, 2018). According to World Economic Forum (2019) Ghana has a significant opportunity to build competitiveness through her abundance of natural sites. Owing to this, considerable efforts have been channeled to the sector as it is a major source of direly needed foreign currency, tax revenue, employment opportunities and a driver of economic growth. The Ministry of Tourism, Arts and Culture estimated that the sector accounted for 4.9% of GDP in 2018 making it the fourth largest contributor to GDP after cocoa, gold, and oil (MoFEP, 2018). In 2019, the travel and tourism sector in Ghana contributed approximately $3.7 billion dollars to national GDP (Statista, 2020.). This paints a clear picture of the singular importance of the tourism sector to the overall growth of the economy.

Despite the importance of the environment and its resources, biodiversity is in decline around the world, with considerable losses occurring as more land is converted from its natural

[1] Biodiversity refers to the biological variety of species (flora and fauna) in an area.

state to intensive human use (Alkemade et al.,2009). Since 1970, the world's mammal, bird, fish, reptile, and amphibian populations have declined by 69% on average. According to SOURCE (YEAR), North America Latin America and The Caribbean, Europe and Central Pacific, Asia Pacific and Africa have recorded 20%, 94%, 18%, 55% and 66% biodiversity losses respectively between now and 1970 (Living Planet Report, 2022). Much of the loss is the result of habitat damage and the habitat destruction is attributed to overhunting, unsustainable agriculture or deforestation. Climate change, which has not been the primary cause of biodiversity loss thus far, is likely to take on that role in the coming decades (Living Planet Report, 2022). According to data from the Global Forest Watch, from 2002 to 2021, Ghana lost 112 kilo hectares (kha) of humid primary forest, making up a 10% reduction of total forest area and 8.2% of its total tree cover loss. Within this same time period, Ghana lost 1.41 mega hectares (Mha) of tree cover, equivalent to a 20% decrease in tree cover since 2000, and 740Mt of CO_2 emissions. The establishment of Protected Areas (PAs)[2] is one of the effective measures taken by governments to protect natural forests from human exploitation (Naughton-Treves, Holland & Brandon, 2005). Fiagbomeh (2013) states that at the time of the establishment of KNP, there was a growing wildlife population and locals had full access to the forest for their hunting and agricultural needs. But with the establishment of the PA, locals had to deal with restrictive conservation laws as well as find alternative sources of livelihoods. Ongoing conflicts between park officials and owners of admitted farms over wildlife raid as well as activities of illicit logging, poaching and increased agricultural land usage are among the threats the KNP faces (Amoah & Wiafe, 2011). This evidence indicates that establishing a PA is not enough to achieve goals of conservation but rather it requires effective management and conservation measures which involves generating enough revenue to implement policies that focus on compensating surrounding communities to enhance peaceful coexistence (Dudley, 2008).

The PAs are underfunded and the situation at the KNP is no different from this finding. (Navrud & Vondolia, 2005; Sustainable Travel International, 2020). The major source of funding for protected areas are visitor fees and, in this regard, it is necessary to understand the trade-offs between the preferences of tourists with regards to biodiversity and habitat restoration *vis à vis*

[2] A Protected Area (PA) is defined by the International Union for Conservation of Nature (IUCN) as a geographical space that is recognized, devoted, and maintained for the long-term conservation of nature, with related ecological services and cultural values, by legal or other effective mechanisms (Chape et al., 2008; Gaston et al., 2008; ICUN, 2012).

investments in PA infrastructure. This may be useful in attracting tourists to generate more revenue in implementing activities like ecosystem monitoring, anti-poaching patrols, environmental educational and alternative livelihood programs (Whitelaw, King& Tolkoch, 2014). Since markets for these biodiversity characteristics cannot be inferred from the market transactions, it is important to find alternative approaches in estimating the economic value of biodiversity to tourists to know how much they are willing to pay to end the ongoing conflicts and threats posed to biodiversity at the park. Previous studies at the KNP have focused on determining entrance fees, visitor satisfaction and estimating use value of the KNP using the Contingent Valuation method (CVM) and Travel Cost Method (Agyeman, Aboagye & Ashie, 2019; Navrud &Vondolia, 2005; Twerefou, & Ababio, 2012). While the former method generates a total willingness to pay for partaking in tourist activity with no attention to the specific attributes that should attract investments, the latter focuses on just the use value of the KNP with no consideration for non-use value. The present study uses the Choice Experiment Method which is able to overcome the challenges of CVM and TCM by highlighting the biodiversity and forest habitat restoration attributes in addition to infrastructure that are of interest to most tourists and will help to evaluate the marginal WTP of the identified attributes. It also provides information regarding the potential tradeoffs that affect management decisions such as ecotourism promotion, biodiversity conservation and habitat restoration. The understanding and management of these trade-offs between ecotourism promotion and nature conservation will greatly contribute to addressing conflicts between park management and local communities and the promotion of ecotourism especially in the developing world. Based on this backdrop, the study sought to investigate the differences in conservation attitudes between local and foreign tourists as well as to value biodiversity across both tourists' groups in an effort to promote conservation and ecotourism.

The paper is structured as follows: Sections 1 and 2 covers reviewed literature and the study area, Section 3 outlines the Methodology adopted for the study, while Section 4 gives the analyses of the data collected including the econometric results and discussions, whereas Section 5 contains the findings and ramifications for management.

2. Valuing biodiversity and terrestrial habitat protection

The loss of biodiversity is unprecedented (see IPBES, 2019). The main causes of the loss in biodiversity are habitat destruction, direct exploitation, and climate change. For terrestrial ecosystems, the causes of forest encroachment and degradation are many and complex. Iftekhar and Hoque (2005) identify some of the causes of forest encroachment and degradation to include poverty, unplanned development activities, population growth, corruption and malpractice, less industrialization, low resilience of households. These causes go on to create larger problems that begin with forest degradation. According to Nghikembua et al., (2021) the impacts of bush encroachment and degradation include poor soil water infiltration, loss of suitable habitat, reduced visibility for ecotourists, decreased hunting efficiency for predators leading to a reduction in biodiversity as well as declines in farm production and profitability which directly affects the livelihoods of the locals. Meanwhile, nature-based tourism has focused on environmental protection with few studies focusing on understanding tourists' attitudes and knowledge towards nature conservation and the value they place on restoring encroached habitats.

Valasiuk et al. (2017) in assessing the desirability of the restoration of functional networks of natural forests within the Fulufjället National Park Area which is managed for sustained-yield wood production discovered that both Norwegians and Swedish were in agreement with alternatives that contemplated bigger extensions of the protected area on domestic segment of the transboundary. Moreover, citizens were willing to pay less for forest restoration outside their country’s boundary. Like most public goods, their results showed that after a threshold, there was a decreasing value per unit when increasing the scale of protection for protected areas. This was associated with concerns of effective management as the scale of land increases and the ability of enhancing restoration of functional networks of naturally dynamic boreal forest habitats.

In addition, Aseres and Sira (2020) conducted a study in which they used a CV method to estimate the tourists' WTP for the proposed conservation fund in the context of the Bale Mountains National Park. The study revealed that 75% of tourists would be ready to pay a conservation charge. For visitors from abroad and domestic visitors, the mean WTP was calculated to be $7.40 USD and $1.00 USD, respectively. This result paints a picture that foreign tourists are willing to pay more than domestic tourists for conservation. According to the findings, adding a conservation fee to the current entry fee enhances the long-term sustainability of financing for protected areas.

Moreover, Mukanjari et al. (2021) used a CV Method to determine the tourist consumer surplus in order to determine the feasibility of creating a typical large African park, such as the Kruger National Park, to generate additional revenue through an increase in entrance fees in order to finance park operations. According to their research, the park officials might potentially raise total revenue by 57 to 61 percent ($38 million and $40 million) each year by assessing the willingness to pay (WTP) of international tourists for probable future trips. However, both research works did not give a clue on the specific attributes that can be used to develop strategies to increase protected areas' capacity for self-financing, which will help them achieve their environmental and livelihood objectives because of the methodology used.

On the other hand, Suresh et al. (2021) employing the CE examined the willingness of foreign visitors to pay levies for wildlife protection at the Yala National Park in Sri Lanka. To enhance wildlife habitat, the study examined the use of tourist levies to safeguard national park resources and make up for crop damage caused by wildlife. They discovered that travelers are willing to pay extra in embarkation taxes in order to support local farmers and safeguard wildlife species. Tourists were more likely to contribute money to protect wildlife, more so, when there were more water bodies present in national parks, which is correlated with improved habitat quality. The study of Hjerpea, Hussanib & Phillips (2022) in assessing ecological function of rubber plantations in rural China brought to light interesting results with a negative estimated coefficient of ecological restoration area indicating that respondents do not want ecological restoration project to be implemented on a large scale. The implications such a programme will have on the livelihood of farmers as well as residents' low ecological awareness were among the identified reasons for their results.

Austen et al., (2022) found that shared public perspectives on biodiversity attributes are multifaceted, influenced by personal experience and vary across taxa. The necessity for a deeper knowledge of the interactions between humans and nature is highlighted by this heterogeneity, since restoration and creation activities must produce biodiverse forests to satisfy the variety of preferences that are being applied to them. According to Marshall et al. (2022) multiple uncertainties remain for achieving successful long-term forest landscape restoration since in their restoration only the benefits derived are considered without any considerations for the costs. This necessitates research into the mechanisms by which ecosystem services and disservices may

accrue to different stakeholders following successful forest restoration and increasing engagement with local communities through participatory approaches. These considerations will allow the estimation of more realistic opportunity costs and better understanding of motivations, knowledge, challenges and benefits across different disciplinary stakeholders, especially tourists.

In Ghana, the literature on restoration of encroached ecotourism lands in Ghana is limited and hardly focuses on the restoration of biological diversity and ecological functions. Existing studies have predominantly focused on valuing entrance fees associated with ecotourism sites. By employing a CVM to determine the optimal pricing of the KNP, Navrud and Vondolia (2004) found that the existing fee for canopy walking at the Park is generally ineffective in terms of maximizing financial revenue. According to their findings, the price of canopy walking for tourists would need to be raised to $37 per year in order for the activity to make the most money. Their findings also suggest price discrimination between residents and international visitors is more likely to result in higher revenue generation. It is worthy to not that their research focused on only the canopy walkway attributes as a means of income generation and ecotourism promotion whereas in reality the KNP provides other biodiversity related services aside the canopy walkway and hence the findings of this study cannot be applicable to the current situation at the park. Additionally, Nanag and Owusu (2010) used the Travel Cost Method to estimate the economic value of recreation in the KNP. The estimated annual revenue of $2.1 billion dollars was computed using a sample of 200 tourists with their results suggesting an increment of entrance fee from $3 to $7 for local tourists and a raise from $10 to $37 for non-resident tourists. The prime location of the KNP among other tourist attractions like the Stingless Bee Centre, the Ostrich Farm and the Hans Cottage Botel does not make the Travel Cost Method an ideal valuation estimation tool. Moreover, the travel cost method tends to undervalue the non-use value components of a commodity, hence it is not applicable to this study.

Furthermore, Twerefour and Ababio (2012) sought to estimate the monetary use value of the Kakum National Park by using the Travel Cost method. They explored the factors that influence visits to the park using a survey of 246 visitors and estimated that the annual per person value of the park is about 67.28 (US$ 46.40) which translates into an annual aggregate value of 8,481,653.20 (US$ 5,849,416) in 2009. The estimation technique used is only acceptable when the site is primarily valuable to people as a recreational site and there are no endangered species or

other highly unique qualities that would make non-use values for the site significant. The current status of the KNP, with endangered species and possible bequest values calls for the need for a different estimation technique.

The gaps with these previous studies are that they did not offer any conclusive data and results on the biodiversity preference among domestic and international tourists and how they may influence the value they ascribe to the attributes. Also, literature on the preferences for biodiversity and habitat protection in protected areas in Ghana is scanty and nascent at best. By incorporating goals of ecotourism and forest restoration, this paper will focus on understanding tourists' attitudes and their awareness of conservation and biodiversity characteristics at the KNP. Also, the study employed a discrete choice experiment to estimate the WTP for all identified attributes for both local and foreign tourists at the park. The choice of the experiment is to assist in analyzing the trade-off between attributes relating to ecotourism infrastructure development versus attributes relating to traditional nature conservation (i.e., biodiversity conservation and habitat restoration).

3. Methodology

3.1 Study Area

The study sought to determine visitor preferences for biodiversity and habitat protection at the KNP. The KNP spans a region of 375 square kilometers (145 sq mi) in the Central Region of Ghana. Established in 1931 as a reserve, KNP became a national park in 1992 after an initial avifauna assessment was carried out in the tropical vegetation at the reserve. The Park was created on the initiative of residents as a deliberate national policy of Department of Wildlife of the Government of Ghana, which is in charge of protecting the country's wildlife. It has a 350-meter (1,150-foot) long canopy walkway that connects seven tree-platforms and is noted as a habitat for certain endangered fauna species. The Kakum National Park (KNP) was proposed as a World Heritage Site by the Government of Ghana and approved by UNESCO, and it is the most visited tourist site in Ghana with a yearly average visitor turnout of 130,000 tourists. (Kakum Management Plan, 1996; Mensah, 2017; Statista, 2020). As of 2012, the densest population of forest elephants in Ghana is located in Kakum (Fiagbomeh, 2013). The Ghanaian Wildlife Department is in charge of managing the park. It is known as the most popular tourist destination according to Statista (2021). However, for the past two decades, the canopy walkway has been the

park's main attraction, with some Ghanaians claiming that the lack of other attractions served as a deterrent to future visitors hence the declining patronage of the facility (Ghana News Agency, 2016). The declining patronage costs the country some revenue and also deprives the KNP of needed funds to enforce and implement environmental conservation policies. There are enforcement officers as well as tour guides in the park who have received specialized training in the cultural and medical value of the native flora available in the tropical forest (Agyeman, Aboagye & Ashie, 2019).

Even after its establishment, human activities like poaching and deforestation have caused adverse effects on the habitats as well as conservation of the Kakum forest with notable species being endangered thereby reducing the variety of species (ICUN, 2010). This is largely because before the area was designated a conservation site, locals from surrounding communities relied on the forests for wood, game as well as land for farming but since it was conferred a protection status, dwellers of surrounding communities do not receive same use benefits from the existence of the park as before with some resulting to such illegal invasion (Wiafe, 2016). The conversion of landscapes surrounding the KNP to agriculture is stated to be rising in the forest belt because forests provide the necessary temperatures and biological conditions for the development of cocoa (Theobroma cacao), the country's main cash crop. This situation encourages human encroachment in PAs located in the country's forest zones, limiting the effective extent of habitats around them. Further, rising growth rates of populations in the surrounding districts have intensified threats of encroachment as residents continue to hunt and gather forest resources to support their livelihood. Disturbed sites and other illegal operations have been a going concern for park officials. (Wittemyer et al., 2008; Binlinla, Voinov & Oduro, 2014).

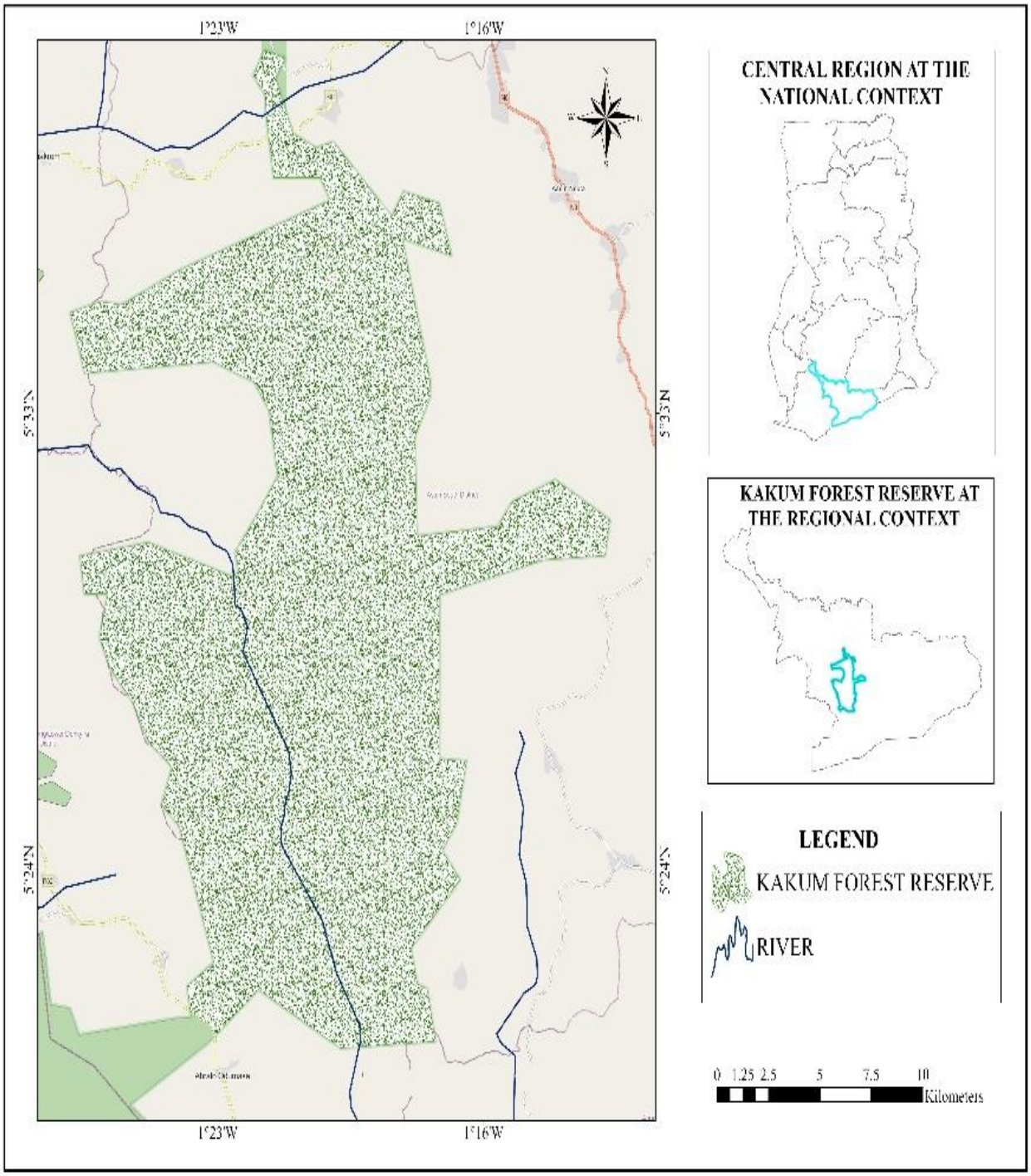

Figure 1: Map of the Kakum National Park

Source: KNP Management Plan (1996).

3.2 Survey Design and Choice Experiment

A discrete choice experiment uses survey methods to obtain respondents' estimation of the relative value of different attributes of a service which might include environmental, health, non-health, and marketing attributes. The methodology assumes that a service can be described by its constituent characteristics and that the total utility, satisfaction, or preference that a respondent derives from a service is determined by the utility they gain from each of the constituent parts. The following steps make up a choice experiment: identifying the good to value, choosing the attributes and levels to be assigned to each attribute and alternative, designing the experiment, creating the choice cards, gathering the data, and analyzing the results (Owuora et al., 2019). The knowledge obtained from preliminary interviews with park management and literature review helped develop a 10 attributes list which was further reduced to 5 after interactions with tourists on their biodiversity preferences. The attributes included both quantitative (such as human traffic per bridge, level of biodiversity, number of canopy bridges, size of encroached forest) and qualitative variables (such as mode of information) (Coast & Horrocks, 2007). The general design process' second phase is to choose the right levels for each attribute to capture and assure trade-offs between traits and have a scope or range that is meaningful, simple to understand, and acceptable to the respondent (Ryan, 1999; Lancsar & Louviere, 2008; Green & Srinivasan, 1978). The attributes and their respective levels are presented in Table 1. By varying the attribute levels, some alternatives were formulated, ranked and presented on a choice card.

The questionnaire designed and administered consisted of five sections. Section one captured respondents' view about their demographic characteristics with the section two covering information on tourist's knowledge of endangered species and habitat protection. Section three also looked at measuring attitudes towards nature conservation, while section four focused on the Choice Experiment and estimating willingness to pay for biodiversity and habitat protection. The last section comprised of follow-up questions to the choices made in the choice experiment and the ranking of tourist preferences. The human traffic attribute considered the number of adults allowed per canopy bridge, whereas the canopy walkway attribute covers the number of over hanged bridges at the park. The biodiversity attribute was measured by the mean specie abundance of protected areas in the Western region of Ghana and the reduction of encroached forest captured

the size of admitted farms and disturbed habitat within the conservation area (Hackman & Gong, 2017).

Based on responses from two pretests conducted, two different choice sets were designed for the two groups under the study (thus the foreign and local tourists). This was because of the wide differences in expected levels for the cost attribute among the tourist groups. This was done to also prevent possible heteroscedasticity as the income levels between these two groups vary vastly. The choice cards were designed using the NGENE software and the Bayesian efficient design was employed to generate the choice cards in the survey. This design has been proved to perform better than the D-optimal design and orthogonal design (Ferrini & Scarpa, 2007; Klojgaard et al., 2012). Data was collected through personal interviews with the help of the tour guides at the Park.

Table 1: Attributes of the KNP with respective levels

Attributes	**Number of levels**	**Levels**
Biodiversity	3	• 90% of mean species abundance • 75% of mean species abundance • 60% of mean species abundance (SQ)
Number of bridges of the canopy walkway	3	• 15 bridges of canopy walkway • 10 bridges of canopy walkway • 7 bridges of canopy walkway (SQ)
Restoration of encroached forest	3	• 0 hectare of admitted farms zone. • 2000 hectares of admitted farms zone. • 4000 hectares of admitted farms zone (SQ)
Provision of information on Biodiversity and Cultural Heritage	3	• Only tour guides provide information on biodiversity and cultural heritage to tourists (SQ) • Only printed materials present information on biodiversity and cultural heritage to tourists • Only QR codes provide information on biodiversity and cultural heritage to tourists

Human traffic per bridge on the Canopy Walkway	4	• about 5 adults are allowed per bridge • about 8 adults are allowed per bridge • about 12 adults are allowed per bridge • about 35 adults are allowed per bridge (SQ)
Changes in Entrance Fees	7	• 300 Ghana cedis/ 30 Ghana cedis • 250 Ghana cedis/ 25 Ghana cedis • 200 Ghana cedis/ 20 Ghana cedis • 150 Ghana cedis/ 15 Ghana cedis • 100 Ghana cedis/ 10 Ghana cedis • 50 Ghana cedis/ 5 Ghana cedis • 0 Ghana cedi (SQ)

Note: SQ (Status quo) denotes the current condition at the KNP at the time of the survey for each attribute.

3.3 Sampling

The study adopted a simple random sampling technique to select the respondents since there existed no clusters or strata in the population. To ensure all tourists had enough information on the various activities offered at KNP, the questionnaire was administered after tourists had participated in the choice activities at the park and were seated in the visitor section. Tourists were briefed in groups about the research before they set off with the guides for the various activities. By sitting at the first visitor centre, tourists assented to partaking in the research and this was also confirmed by the research assistant before delving into answering the questions. The average annual visitor count at the national park is 130,000 according to Agyeman, Aboagye and Ashie (2019). A sample size of 472 tourists was used for this study based on the sample size table formulated by Krejcie and Morgan (1970). However, because each tourist answered nine different choice cards 4248 observations were realized for the choice experiment section.

3.4 Random Utility Maximization Theory and Mixed Logit

One of the most significant criticisms of the multinomial logit model was that a choice alternative's utility was unrelated to the existence and characteristics of other alternatives. In the case of a high degree of similarity between specific alternatives, it predicts that a new, similar

choice option will decrease market shares in proportion to their utility. Hence, the mixed logit method will be used in the quest to find answers to the research questions of the study. By allowing for unconstrained replacement patterns, random taste fluctuation, and correlation in unobserved components over time, Mixed Logit avoids the restrictions of Multinomial Logit (Train, 2009). Within the context of the Mixed Logit, a restriction of independently and identically distributed extreme value type 1 is placed on the error term from equation 1.

The random utility model presents a theoretical framework in which the dependent variable of interest is the option selection(choice). The utility obtained from consuming any set of good or service is specified as a function of the attributes of the good or service.

$$U = f\ (Attributes)$$

For any individual$_q$ (q= 1,2, 3, ……Q) with choice$_i$ and choice task$_t$ is thus specified as follows:

$$U_{qit} = \alpha + \beta_i X_{qit} + \varepsilon_{qit} \text{ ..... (1)}$$

where α is the alternative specific constant (intercept parameter), $\beta_i$represents a matrix of slope coefficients of the various attributes, X_{qit} is a vector of observed attributes of the KNP including entrance fees (price) and ε_{qit} represents the stochastic error term.

The random utility theory is the foundation of the majority of discrete choice models and makes the same assumption as the general economic consumer theory: that the decision-maker has complete discriminatory power (the ability to assign various costs to each unit/segment of the road). It is also assumed that the decision-maker lacks all the necessary information, therefore some degree of uncertainty must also be considered. The utility is therefore treated as a random variable to reflect this uncertainty, where the value that the decision-maker n identifies with the alternative$_i$ in the choice set is determined by the addition of an error term. The distinctions among a group of alternatives represent the choice of any option in this framework. Kamolthip and Seenprachawong (2016) explained that in the random utility model, each alternative is represented by an indirect utility function with two components: a deterministic component (Vi) and a stochastic term (εi), which indicates unobservable influences on individual decision. Alternative i's overall utility is estimated as:

$$U_{i=}V_i + \varepsilon_i \text{ ..... (2)}$$

An individual is likely to choose alternative$_i$ if $U_i > U_j$ for all $j \neq i$. Because the utilities include a random portion, the probability that an individual chooses alternative i is described as follows:

$$\text{Prob}\{\text{i is selected}\} = \text{Probn}\{V_i + \varepsilon_i > V_j + \varepsilon_j; \forall \text{j} \in \text{C}\}$$

where C is the choice set of all possible alternatives, in this case nine choice set. The introduction of probability shows the model is a choice model with a likelihood of a choice selected over the other.

To allow attribute parameters to differ according to a pre-specified distribution to allow for heterogeneous preferences, resulting in a mixed logit (MXL) model. The vector of attribute coefficients, β_q, which is now individual-specific, where β is a common mean, and ד is the lower Cholesky matrix with standard deviations on the diagonal and η_q represents draws from a specified distribution such as normal, log-normal, triangular, or uniform, and q represents draws from a specified distribution such as normal, log-normal, triangular, or uniform. Setting the off-diagonal elements to non-zero allows for correlation between utility coefficients. (Hensher et al., 2005).

$$\beta_q = \beta_i = \text{ד}\eta_q \text{..... (3)}$$

$$\text{P(i|C)} = \frac{\exp(\gamma\beta_q X_{qit})}{\sum\exp(\gamma\beta_n X_{qit})}, \text{ for i = 1, . . ., J, q=1, …. Q, t = 1, … , T, ... (4)}$$

where γ is a scale parameter, which is inversely related to the variance of the error term. As γ and β are confounded and cannot be estimated separately, within one and the same dataset, it is usual to normalize γ to 1(Train, 2009).

Because the possibility in the MXL model is conditional on the heterogeneous preferences, the probability in eqn(4) is

$$\text{P(iq|X}_\text{q}) = \int \prod_{t=1}^{T} \frac{\exp(\gamma\beta_q X_{qit})}{\sum\exp(\gamma\beta_n X_{qit})} f(\beta) d\beta, \text{ ..... (5)}$$

where f(β) is the density function. Because equation 5 does not have a closed form solution, it must be approximated using simulated averaging across D draws from the expected distribution (Hensher et al., 2005; Revelt & Train, 1998). For this draw, 1000 draws were used for both non-cost and the cost parameter The simulated log-likelihood function can be represented by

$$\text{Log L} = \sum_{q=1}^{Q} log \frac{1}{D} \sum_{d=1}^{D} \prod_{t=1}^{T} \frac{exp(\gamma \boldsymbol{\beta_q X_{qit}})}{\sum exp(\gamma \boldsymbol{\beta_q X_{qit}})}$$

The marginal willingness to pay (MWTP) will then be computed by taking the marginal utility of the attribute divided by the marginal disutility of price. The MWTPs can be readily compared between models due to the cancellation of scale parameters.

$$MWTP = \frac{\beta_A}{\beta_P} \text{ ..... (6)}$$

4. Results and discussion

Ghanaian tourists constituted the majority of tourists (57%) whereas other nationals accounted for the remaining 43%. The average age of tourists was 30 years with a significant number being single. Tourists had some form of education with a mean household expenditure of GHS11,983. Table 2 presents an overview of the socio-demographic features of the sample.

Table 2: Overview of demographic factors

Characteristics	Ghanaian (Percent)	International (Percent)	Total
Nationality	270 (57.2)	202 (42.8)	472
Age			
18-35	205 (58.9)	143 (30.3)	348
36-60	61 (12.9)	55 (11.7)	116
>60	4 (0.008)	4 (0.008)	8
Gender			
Male	155 (32.8)	131 (27.8)	286
Female	115 (24.4)	71 (15.0)	186
Educational level			
Primary	3 (0.6)	0	3
JHS/ Middle school	8 (1.7)	1 (0.2)	9
SHS/O and A level	36 (7.6)	4 (0.8)	40
Tertiary	200 (42.4)	132 (28.0)	332
Postgraduate	23 (4.7)	65 (13.8)	88
Marital level			
Co-habiting	2 (0.4)	2 (0.4)	4
Single	190 (40.3)	117 (24.8)	307
Married	73 (15.5)	78 ()16.5	151
Divorced	2 (0.4)	1 (0.2)	3
Separated	1 (0.2)	3 (0.6)	4
Widowed	2 (0.4)	1 (0.2)	3
M.Expenditure GHS[3]			
3,000 or less	262 (55.5)	18 (3.8)	280
3001-6000	6 (1.3)	17 (3.6)	23

[3] 1 USD= 10 GHS

>6,001	2 (0.4)	167 (35.4)	169
Environmental Member			
Yes	243 (51.5)	180 (38.1)	423
No	27 (5.7)	22 (4.7)	49

To measure their knowledge on biodiversity levels at the KNP, the following questions were asked: Are there are a lot of large mammals and water bodies in the KNP? Is the KNP internationally known for different species of butterflies and are all trees the same in the KNP? Foreign tourists obtained a mean score of 78 percent which was 4 percentage points higher than Ghanaian tourists. These results are in sharp contrast to the report of the UNESCO Courier (2021) where their findings show that inhabitants of biodiversity enriched areas were likely to be custodians of knowledge and protection. However, the result from this study is possibly due to the scanty amount of research on biodiversity in Ghana. Most of the limited studies on biodiversity are usually pioneered and funded by foreign institutions as published by Kondra (2019). Therefore, Ghanaians do not have enough literature and information related to biodiversity. Relatively, international tourists had a higher knowledge in all biodiversity areas except in their knowledge of tree species as shown in Figure 2. This can largely be attributed to the fact that most Ghanaians rely on these tree species for medicinal purposes and hence know the various species available in a tropical forest (Amoah et al., 2014). According to Oyelewo et al. (2008) African communities have successfully conserved natural resources that are of interest to their belief system through laws and taboo even though they may not fully understand and appreciate the science behind their importance. This shows Ghanaians have adequate knowledge on biodiversity even though it may not be at the level of international tourists.

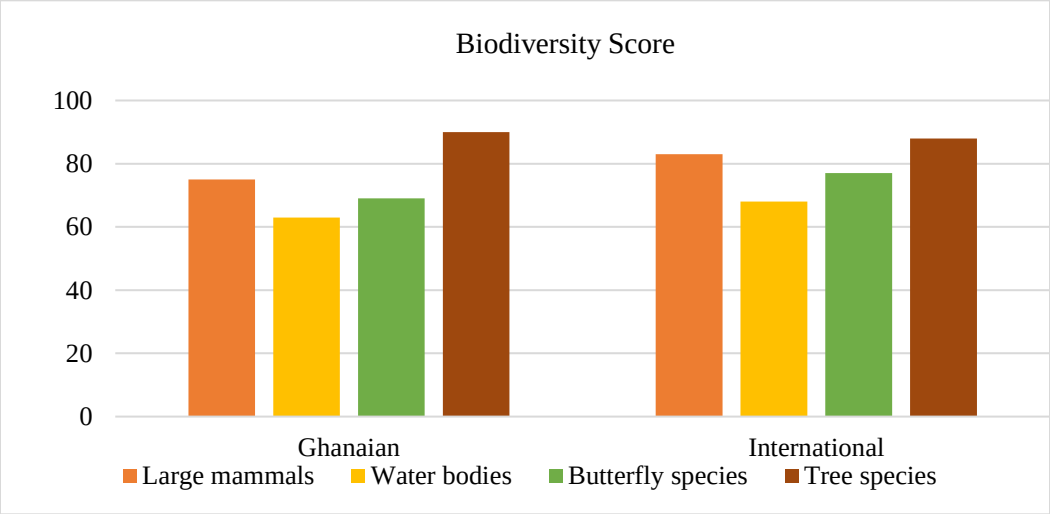

Figure 2: Biodiversity knowledge among tourists

Comparing attitudes between Ghanaian tourists and international tourists' groups

It is evident that foreign tourists at the KNP want more strict environmental laws to be enforced than Ghanaians. This can be broadly linked to foreign tourists having more knowledge on biodiversity and its importance. Also, Western countries have benefitted greatly from the implementation of strict laws according to the Nature Conservation Organization (2022) and hence it is expected that foreign tourists recommend stricter laws for improved conservation strategies. In addition to this, international tourists were much more willing to learn park rules in order not to

go against them, indicating a high level of commitment to not disrupting habitat in the KNP. More Ghanaians than foreigner tourists want a conservation fund to be created by the government. Ghanaians are heavily reliant on the central government for the provision of many public goods like education and health care (Ofori-Mensah, 2017), therefore it is not surprising the majority would prefer government to take the lead in establishing a fund to protect the KNP. These results reflect the attitude towards Ghanaians on goods perceived to be public and they are mostly funded by the state with communities and individuals being a little reluctant to contribute as found by Odonkor, Dei and Sallar (2019).

Compared to other nationals, Ghanaians were of the view that it was necessary that the KNP was designated a protected area reflecting how important the KNP is for the Ghanaian people. An extension of this pattern is realized as more non-resident tourists advocated for conversion of the park into other uses like farming. This is highly correlated to the views of foreign tourists on their inability to spot much wildlife and hence believe the KNP may not be meeting its set purpose. On the contrary, Ghanaian tourists were of the notion that the park had other major benefits aside tourism including but not limited to environmental resources corroborating the conclusion of studies by Twerefour and Ababio (2017), Dewu and Røskaft (2014) as well as Dillon (2021).

On the issue of poachers, foreign nationals took a stronger stance in both spectrums than the Ghanaian tourists. More foreign tourists than local tourists strongly advocated for prosecution. Also, more foreign tourists than local tourists strongly agree that poachers should be prosecuted. According to Obour, et al. (2016) higher rates of poaching were recorded after 2012 in Ghana, this was due to Ghanaians having an increased demand for bushmeat which legal hunting may not have been able to match and hence having a less reaction to poaching. This possibly explains their relatively mild attitudes of Ghanaians towards poaching. There were no considerable differences in payment attitudes as both groups were willing to pay more towards nature conservation at the KNP. More so, more Ghanaians were of the view that compensating neighboring communities will be very effective in preserving the KNP. This is consistent with the findings of Cobbinah et al. (2015), in which the local communities expressed their dissatisfaction with the government's and park officials' lack of dedication to offering substitute forms of social support and services.

Table 3: Measuring attitudes of Ghanaians towards nature conservation among tourists.

Measuring attitudes of Ghanaians towards nature conservation among tourists (%)	SD	D	N	A	SA
I would want the government to enforce more strict environmental laws	3.3	0.74	0.37	63.7	31.85
I would want the government to establish a conservation fund for protected parks	1.1	1.1	1.1	62.2	34.4
I do not think it was necessary to make the KNP a protected area	66.3	24.4	2.2	5.93	1.1
I am willing to learn the rules of KNP in order not to flout them	3	1.9	10.7	68.9	15.6
The KNP should be converted into other uses. (e.g. Farming, mining)	67	23	1.5	6.7	1.9
I see no other benefit from KNP apart from Tourism	33	39	13	11.5	4.1
I think poachers should not be prosecuted.	31.9	35.9	17	13	2.0
I think that the Wildlife Division is doing its best in conserving KNP.	7.4	3.3	24.4	49.3	15.6
I am willing to pay extra towards the conservation of KNP	7	1.5	18.9	56.7	15.9
Nature conservation is the responsibility of the staff of KNP.	10	3	20.7	57	9.3
Compensating households of surrounding communities will motivate them to preserve the park	4.1	3.7	11.1	61.1	20
Even if I will not visit KNP again, the quality of the ecosystem should be protected.	4.1	0.7	7.0	50.7	37.4

Table 4: Measuring attitudes of Non-residents towards nature conservation among tourists.

Measuring attitudes of foreigners towards nature conservation among tourists (%)	SD	D	N	A	SA
I would want the government to enforce more strict environmental laws	4.46	1.49	0.50	51.98	41.58
I would want the government to establish a conservation fund for protected parks	5.9	1.5	3	45.1	44.6
I do not think it was necessary to make the KNP a protected area	59.9	21.8	4	10.4	4
I am willing to learn the rules of KNP in order not to flout them	7.4	4.5	5.5	57.9	24.8
The KNP should be converted into other uses. (e.g., Farming, mining)	64.4	20.8	1	7.9	5.9
I see no other benefit from KNP apart from Tourism	35.6	30.7	8.9	18.8	5.9
I think poachers should not be prosecuted.	41.1	22.8	16.8	12.9	6.4
I think that the Wildlife Division is doing its best in conserving KNP.	7.4	2.5	21.8	50	18.3
I am willing to pay extra towards the conservation of KNP	9.9	6.4	14.4	48.5	20.8

Nature conservation is the responsibility of the staff of KNP.	9.9	8.4	28.2	42.1	11.4
Compensating households of surrounding communities will motivate them to preserve the park	5	4.5	13.4	55.9	21.3
Even if I will not visit KNP again, the quality of the ecosystem should be protected.	4	3.5	6.4	40.1	46

The table below provides the results of the Freidman test statistic of the rankings of the selected attributes at the KNP. There is an overall statistically significant difference between the mean ranks of the attributes with Biodiversity ranked as the most important attribute by all tourists, followed by the human traffic per canopy bridge, the reduction of the size of encroached forest, Provision of information and finally the number of canopy walkway bridges. On the other hand, the Kendall's Coefficient of concordance reports a low value of 0.135 signifying low agreement and implying tourists have different standards of measurement they look out for when ranking attributes and hence no predictable pattern exists among the choice selection of attributes for the entire tourist group. Breaking down the analysis to group level, it was observed that both international and Ghanaian tourists agreed in their order of ranking with biodiversity having the lowest mean rank (most preferred attribute) and Number of canopy walkway bridges (least preferred attribute) having the highest mean rank.

Table 5: Friedman's and Kendall's Test

Attributes (Mean rank)	**All tourists**	**Ghanaians**	**International**
Biodiversity	2.04	2.05	2.02
Size of encroached forest	3.14	3.12	3.16
Number of bridges	3.46	3.42	3.50
Provision of information on Biodiversity	3.43	3.39	3.48
Human Traffic	2.94	3.02	2.83

Test Statistic (Friedman Test)	All tourists	Ghanaian	Mean Rank (International)
N	472	270	202

Chi-Square	254.074	135.335	121.133
Df	4	4	4
Asymp Sign	0.000	0.000	0.000
Kendall's W[4]	0.135	0.125	0.150

The responses from the choice experiment were estimated using the mixed logit model. The results were estimated for Ghana tourists and international tourists. The results are presented in Table 6 below:

[4] Kendall's Coefficient of Concordance

Table 6: Mixed and Multinomial Logit Estimation Results for Tourists

	Mixed Logit			Multinomial Logit			
Variables	Ghanaians Estimates	Robust t-ratio	Foreigners Estimates (robust std errors)	Robust t-ratio	Ghanaians Estimates	Robust T-ratio	Foreigners Estimates	Robust T-ratio
Alternative specific constant	-2. 5044*** (0.2930)	-9.48	-2.7724*** (0.2652)	-10.45	-1.7674*** (0.1513)	-11.68	-1.6807*** (0.1490)	-11.28
Humantraffic	-0.0027 (0.120)	-0.23	0.0190** (0.0094)	-2.01	-0.0208*** (0.0081)	-2.56	-0.0178*** (0.0071)	-2.51
Humantraffic_sig	-0.0961*** (0.117)	8.18	0.0410** (0.0105)	3.91				
Bridges	0.0394* (0.279)	1.41	-0.0735** (0.0254)	-2.90	0.0116 (0.0215)	0.54	-0.0555*** (0.0220)	-2.53
Bridges_sig	-0.1139** (0.0311)	-3.67	-0.1052** (0.0298)	-3.52				
Encroached forest	0.0537 (0.0722)	0.74	-0.0494 (0.0594)	-0.83	0.1471*** (0.0538)	2.73	-0.0528 (0.0498)	-1.06
Encroachedforest_sig	-0.0729 (0.0906)	-0.80	-0.0196 (0.1887)	-0.10				
Biodiversity	0.3043 (0.5954)	0.51	1.1620** (0.5954)	1.95	0.5089 (0.4952)	1.03	0.9838** (0.4781)	2.06
Biodiversity_sig	0.3371 (2.7560)	0.12	-0.7846 (1.2881)	-0.61				
Tour with print	0.2445** (0.1192)	2.05	0.3168** (0.1253)	2.53	0.0678 (0.0917)	0.74	0.0513 (0.0951)	0.54
Tour with print_sig	-0.0868	-1.07	-0.0260	-0.33				

	(0.0811)		(0.0797)					
Tour with QR	-0.9057**	-3.35	-0.7100**	-3.24	-0.1522	-1.08	-0.2231	-1.74
	(0.2707)		(0.2192)		(0.1412)		(0.1513)	
Tour with QR_sig	0.9006**	2.25	0.5544	1.25				
	(0.3995)		(0.4418)					
Fee	-0.1892***	-12.08	-	-9.65	-0.1443***	-16.75	-0.2231***	-13.66
	(0.0157)		0.0139***		(0.0086)		(0.0007)	
			(0.0014)					
Number of decision makers	214		Number of decisions maker	173	Number of decision makers	214	Number of decision makers	173
Number of observations	1926		Number of Observations	1557	Number of observations	1926	Number of observations	1557
Estimated parameters	29		Estimated parameters	29	Estimated parameters	8	Estimated parameters	8
Number of Halton Draws	1000		Number of Halton draws	1000	Number of Halton Draws	1000	Number of Halton Draws	1000
LL (0)	-2115.927		LL (0)	-1710.5	LL (0)	-2115.93	LL (0)	-1710.5
LL (final)	-1502.266		LL (final)	-1250.3	LL (final)	1663.773	LL (final)	1411.17
Estimated parameters	29		Estimated parameters	30	Estimated parameters		Estimated parameters	8
Rho-sq	0.29		Rho-sq	0.27	Rho-sq	0.21	Rho-sq	0.18
Adj. rho-sq	0.28		Adj. rho-sq	0.25	Adj. rho-sq	0.21	Adj. rho-sq	0.17
AIC	3062.53		AIC	2560.6	AIC	3343.55	AIC	2838.33
BIC	3223.86		BIC	2721.12	BIC	3388.05	BIC	2881.14

*** *p<.01, ** p<.05, * p<.1*

Out of the total sample of 470 tourists, only 387 tourist responses were included in the choice experiment because some of the responses were inconsistent. These respondents were dropped as they are classified as protest responses i.e., they choose the status quo option for all nine cards not out of real preference but because they are unwilling to pay for improvements they want to see and believe it should be financed by others especially the government (Martinez & Louriero, 2013; Samuelson, 1995). A total of 29 predictors were estimated to control and solve for possible unobservable correlations among attributes for both the Ghanaian and non- Ghanaian model. Only the estimates of individual attributes were presented. After estimating the Mixed logit (MXL) and Multinomial logit (MNL) results, the signs and significance for all parameters were the same (see Table 6 for multinomial results). The MXL models are superior to the MNL model as they account for heterogeneity in parameters and also usually give lower LL-value, AIC, and BIC values as evidenced in Table 6. Based on this information the study will concentrate on the MXL results. The model fit is given by pseudo- R^2 and equaled 0.29 and 0.25 for the resident and non-resident models respectively. This is a good fit for choice models, as pseudo-R^2 is often between 0.2 and 0.4 (Louviere et al., 2000).

The coefficient of parameters provides no information in terms of magnitude but rather in relation to the direction of effect. The alternative-specific constant (ASC) of the status quo is negative and statically significant implying a preference for moving away from the status quo. The status quo of the KNP is explained by Alternative 3 in each choice card. Statistically significant standard deviations of most random coefficients in the MXL model indicate heterogeneous preferences among tourists for all attributes. While the negative human traffic attribute for domestic tourists indicates Ghanaian tourists' preference for smaller groups of people admitted per canopy walkway, the statistically positive sign in the foreign tourists' model shows a penchant for larger groups per canopy walkway. Whereas local tourists prefer more canopy bridges and an increase in the size of encroached forests, international tourists were inclined towards choices with lesser canopy bridges and wanted a reduction in the size of encroached forest and admitted farms. Interestingly, both models recorded a positive biodiversity coefficient showing their preference of favoring alternatives with higher biodiversity levels. Further, compared to the option of tour guides being the only source of information, all tourists support the inclusion of printed materials as a source of information on biodiversity and cultural heritage with a lower preference for QR codes as a source of information.

Table 7: MWTP for Resident and Non-Resident Tourists

Attributes	MWTP	MWTP std dev	C.I
Ghanaian Tourists			
Human traffic	-0.142706	0.507928	{-0.208, -0.072}
Number of bridges	0.20825	0.602008	{0.129, 0.291}
Size of encroachment	0.28383	0.385307	{0.23, 0.33}
Biodiversity	1.60835	-1.78171	{1.56, 1.63}
Printed materials	1.29228***	0.458774	{1.23, 1.35}
QR codes	-4.786998	-4.76004	{-5.43, -4.15}
Foreign Tourists			
HumanTraffic	1.37***	-0.22	{1.34,1.40}
NumberofBridges	-5.29***	0.56	{-5.37, -5.21}
Encroachement	-3.55***	0.10	{-3.57, -3.53}
Biodiversity	82.88***	4.15	{82.26, 83.50}
Printmaterial	22.79***	0.14	{22.77, 22.81}
QR Codes	-51.08***	-2.93	{-51.52, -50.64}

**** p<.01, ** p<.05, * p<.1*

For this basic model, the mean willingness to pay (MWTP) per trip for the attributes were as follows for human traffic; Ghanaian tourists are willing to pay 0.14 GHS for a reduction of 1 person on the canopy walkway and are also disposed to pay 0.21 GHS for an increase in the number of canopy walkway bridges. Resident tourists are prepared to pay an estimated amount of 0.28 GHS for a hectare increase in encroached forest and admitted farms whereas for a 1% improvement in biodiversity, local tourists are inclined to pay 1.60GHS more. Compared to having a tour guide only, Ghanaian tourists are willing to pay 1.29 GHS for accessing information via printed material and are willing to pay 4.76 GHS for less access to information via QR codes. However, the MWTPs of the attributes were not significant except for the information access attribute, specifically the printed material option. Indicating that Ghanaian tourists are much more likely to respond positively if more information on biodiversity is made available via printed materials.
The low values could be attributed to large heterogenous preferences as well as because the fee increment was estimated per trip.

The outcome of the Ghanaian MXL model shows significant values for almost all the standard deviation of attributes indicating a heterogenous preferences for various features. The

biodiversity attribute had the highest MWTP for improvement and this indicates Ghanaians placing a high value for biodiversity. Interestingly, on resident tourists prefer less encroachment which corresponds with the guidelines of protected areas according to Dudley (2008) whereas local tourists prefer more encroachment which intuitively goes against the guidelines of protected areas. This presents a mixed result which can be reconciled by understanding that majority of local people strongly perceive the KNP to have many reasons aside tourism and may be open to having more use than non-use value of the park. Also, the lower biodiversity score recorded of local tourists indicates an information gap on their overall knowledge of the importance of protected areas. This finding partially contradicts the report of the ICUN (2000) which found out that protected areas free from encroachment and capable of providing habitat for endangered species are important to tourists and improve their financing options. The low MWTP of the canopy walkway is in line with the report of the Ghana News Agency (2016) and could be attributed to tourists wanting novel attractions at the park. The significant MWTP of the information attribute confirms the findings of Saayman and Saayman (2014) and Mariyam, Vijayakrishnan and Karanth (2022) where they found that tourists want more of biodiversity information at nature parks before, during and after their trips.

The mean willingness to pay for biodiversity improvements at the park recorded the highest value of MWTP per trip in the non-resident model from table 7. Foreign tourists are willing to pay an average of 82.88 GHS in order to enjoy options of a 1% higher biodiversity level. This is followed by information on biodiversity and cultural heritage which recorded a MWTP value of 51.08 GHS. This value indicates that tourists were willing to pay this in order to stick to the status quo of having tour guides provide information. This is followed by MWTP for printed materials as opposed to having tour guides only provide them with information. Non-Ghanaians are willing to commit 22.79 GHS to benefit from having printed materials available at the park. An amount of 1.37 GHS is the estimated value that tourists are willing to pay for an increase of more individuals admitted on the canopy walkway whereas the tourists are willing to pay 3.55 GHS for a reduction in the size of encroached forest by one hectare. Finally, an estimated sum of 5.29 GHS is how much extra international tourists are willing to pay for moving to options that contain lower canopy walkway options. Each attribute of the foreign mean WTP estimates was statistically significant.

The results are in line with the results of Meja and Brandt (2015) and they demonstrate that foreign tourists are more concerned with the levels of biodiversity which hold more appeal to them. The outcome of the study gives a clear indication on the importance of biodiversity on tourism and follows the conclusions of Deutsch, Dyball and Steffen (2013), that ascribes tourism as being heavily reliant on natural resources. Furthermore, the findings of the study move in the same direction as Aseres and Sira (2020) where they found out that foreign tourists were willing to pay more for biodiversity conservation than local tourists. Even though at the park the status quo number of people per canopy walkway is 35 adults, most foreign tourists attested to the fact they are usually given some preferential treatment and are mostly isolated from the local tourists who come in huge numbers. This could explain their interest in wanting more traffic as perhaps they may want to interact more with other tourists while enjoying their tour. Furthermore, habitat protection measured by size of encroached forest is complementary to the biodiversity attribute, it was found to be significant in the model as foreign tourists opted for options that did restrict the use benefits (agriculture) local people enjoy from the park. Lower MWTP for additional canopy bridges could be attributed to the fact that the bridges have lost their novelty and uniqueness.

According to Fiagbomeh (2013) as at the time of its establishment, the canopy walkway present in the park was one of very few in the whole continent of Africa. Fast forward to years after its establishment, even in Ghana there exists at least two sites which have canopy walkway. International tourists have a wide range of other destination to choose from that possess similar characteristics as the park hence it is prudent for park managers to focus on improving the biodiversity aspect of the park by reintroducing endangered species and rebranding their wildlife viewing service. The poor internet connectivity at the park may be the foremost reason why foreign tourists were not willing to pay for QR codes as well as possible externalities associated with having private information (paid information) accessible on the internet according to the findings of Bass, et al. (2021). On the other hand, printed materials seem to be a better option than having only tour guides provide them with information, and this intuitively makes sense as language barriers could easily be overcome by having such information available in various languages to meet the vast demand of tourists.

5. Recommendations

Based on the evidence that tourists especially resident tourists have low biodiversity

score and are willingly to pay for quality and lasting information, park officials must ensure adequate information access, so guests are privy to knowledge on biodiversity as well as certain endangeredspecies limited to the park. Staff of the KNP can make available books and other printed materials solely focused on available biodiversity stock and information on cultural heritage that tourists can easily access. The information provided should be educational and incorporate various benefits the KNP provides as there is evidence that some tourists may not be fully informed hence supporting claims that lead to conversion.

The Ghana Forestry Commission (GFCC) should consider reintroducing certain charismatic species to increase biodiversity stock, so tourists have the opportunity to see more wildlife at the facility. Further to this, they must be willing to offer admitted farms some protection against wildlife and have regular meetings with owners of encroached areas to settle regular disputes and offer available compensation so they can be relocated to provide synergy within the ecospace. This will also minimize threats and the ongoing conflicts between farm owners and wildlife at the KNP.

References

Agyeman, Y., Aboagye, K. & Ashie, E. (2019). Visitor satisfaction at Kakum National Park in Ghana, *Tourism Recreation Research*, 44(2). https://doi.org/10.1080/02508281.2019.1566048

Alkemade, R., Van-Oorschot, M., Miles. L., Nellemann, C., Bakkenes, M. & Ten-Brik, B. (2009). GLOBIO3: A Framework to Investigate Options for Reducing Global Terrestrial Biodiversity Loss. *Ecosystems*.12,374-390. https://doi.org/10.1007/s10021-009-9229-5

Amoah, M. & Wiafe, E. (2011). Livelihoods of fringe communities and the impacts on the management of conservation area: the case of Kakum National Park in Ghana. *The International Forestry Review*, 14, (2), 131-144. https://doi.org/10.1505/146554812800923381

Amoah, S., Sandjo, L., Bazzo, M., Leite, S. &Biavatti, M. (2014). *Herbalists, traditional healers and pharmacists: a view of the tuberculosis in Ghana: Science Direct*, 1(2), 89-95. https://doi.org/10.1590/0102-695x2014241405

Aseres, S, & Sira, R. (2020). Estimating visitors' willingness to pay for a conservation fund: sustainable financing approach in protected areas in Ethiopia, *PubMed,* 6(8)

Austen, G., Dallimer, M., Irvine, K., Fisher, J., Fish, R. & Davies, Z. (2022). The diversity of people's relationships with biodiversity should inform forest restoration and creation: *Conservation Letters*

Bass, D. McFadden,B. & Messer, K (2021). A case for measuring negative willingness to pay. *Food Policy, Elsevier.*104.

Binlinla, K., Voinov, A., & Oduro, W. (2014). Analysis of human activities in and around protected areas (PAs): Case of Kakum conservation area in Ghana. *International Journal of Biodiversity and Conservation. 6*(7), 541-554. https://doi.org/10.5897/ijbc2014.0691

Buckley, R. (2011). Tourism and Environment. *The Annual Review of Environment and Resources.*36:397-416.

Coast, J. & S., Horrocks, (2007). Developing attributes and levels for discrete choice experiments using qualitative methods. *Journal of Health Services Research and Policy, 12*(1), 25-30. https://doi.org/10.1258/135581907779497602

Cobbinah, P., Black, R. & Thwaites, R. (2015). Ecotourism implementation in the Kakum Conservation Area, Ghana: administrative framework and local community experiences, *Journal of Ecotourism 14(2-3).*

Common, M.& Stagl, S. (2005) Ecological Economics. An Introduction. Cambridge University Press.

Deutsch, L., Dyball, R. & Steffen, W. (2013). *Feeding Cities: Food Security and Ecosystem Support in an Urbanizing World.* Netherlands: Springer. 505- 537

Dewu, S. & Røskaft, E. (2017). *Community attitudes towards protected areas*: insights from Ghana. Cambridge University Press https://doi.org/10.1017/s0030605316001101

Dillon, A. (2021). The Illegally Traded Elephant in the Room: Species Terrorism & Combating Illegal Wildlife Trade Pace International Law Review 1(34)

Ferrini, S. & Scarpa, R. (2007). Designs with a priori information for nonmarket valuation with choice experiments: a Monte Carlo study. *Journal of Environmental Economics and Management, 53*, 342-363. https://doi.org/10.1016/j.jeem.2006.10.007

Fiagbomeh, R. (2013). *Perceptions of the impacts of nature conservation and ecotourism management*: a case study in the Kakum Conservation Area of Ghana. https://doi.org/10.53846/goediss-4109

Ghana News Agency. (2016). Kakum National Park records a reduction in visits. Retrieved from https://www.ghanabusinessnews.com/2016/04/12/155628/

Global Forest Watch (2021). Accessed on 28 November 2022 from https://www.globalforestwatch.org/

Green, P. & Srinivasan, V. (1978). Conjoint Analysis in Consumer Research, *Journal of Consumer Research*, 5(2), pp 103–123, https://doi.org/10.1086/208721

Hackman, K. & Gong, P. (2017). Biodiversity estimation of the western region of Ghana using arthropod mean morphospecies abundance. *Biodiversity Conservation*, 26,2083–2097

Hensher, D., Rose, J. & Green, W. (2005). Applied Choice Analysis: A primer. RePec. Cambridge University Press

Hjerpea, E., Hussainb, A. & Phillips, S. (2015). Valuing type and scope of ecosystem conservation: A meta-analysis: *Journal of Forest Economics*. (21),32-50. http://dx.doi.org/10.1016/j.jfe.2014.12.001

Holland, M. & Brandon, K. (2005). The role of protected areas in conserving biodiversity and sustaining local livelihoods. Annual Review of Environmental Resources. 2005. 30:219–52 https://doi.org/10.1146/annurev.energy.30.050504.164507

Iftekhar, M.S & Hoque, A.K. (2005). Causes of forest encroachment: An analysis of Bangladesh 2005 *GeoJournal* 62: 95-106. DOI 10.1007/

Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) (2019). Global Assessment Report of The Intergovernmental Science-Policy Platform On Biodiversity And Ecosystem Services. Accessed on 3rd September, 2023 from www.ipbes.com

International Union for Conservation of Nature (2010). Parks and reserves of Ghana: Management Effectiveness and Assessment of Protected Areas, IUCN, Gland, Switzerland

Kakum Management Plan, (1996).

Kamolthip, S. & Seenprachawong, U. (2016). Validity of Internet-based Stated Preference Data in Modeling Waterfall Recreation Site Choice, *Applied Economics Journa*l, 23 (2), pp 48-74.

Klojgaard, E., Bech, M. & Sogaard, R. (2012). Designing a Stated Choice Experiment: The Value of a Qualitative Process. Journal of Choice Modelling, 5(2), pp 1-18 https://doi.org/10.1016/s1755-5345(13)70050-2

Kondra, M. (2019). Current State of Biodiversity in Ghana. A literature Review. Working Paper (19).

Krejcie, R. and Morgan, D. (1970). Determining sample size for research activities. Educational and psychological measurement.607-610 https://doi.org/10.1177/001316447003000308

Living Planet Report (2022). https://wwflpr.awsassets.panda.org/downloads/lpr 2022 full report.pdf

Louviere, J., Hensher, D., & Swait, J. (2000). Stated Choice Method Analysis and Application. Cambridge University Press: Cambridge. https://doi.org/10.1002/jae.701

Manzoor, F. Wei, L., Asif, M., Haq, M.& Rehman, H. (2019). The contribution ofsustainable tourism to economic growth and employment in Pakistan. *International Journal of Environmental Research and Public Health, 16 (3875), 1-14.*

Mariyam, D., Vijayakrishnan, S. & Karanth, K. (2022). Influence of charismatic species and conservation engagement on the nature-viewing preferences of wildlife tourists, Tourism Recreation Research, https://doi.org/10.1080/02508281.2022.2114746

Marshall, A., Waite, C., Pfeifer,M., Banin, L., Rakotonarivo, S., Chomba, S., Herbohn, J., Gilmour, D., Brown, M. & Chazdon, R. (2022). Fifteen essential science advances needed for effective restoration of the world's forest landscapes. *Philosophical Transactions Royal Soceity B* 378: 20210065. https://doi.org/10.1098/rstb.2021.0065

Martinez, M. & Louriero, M. (2013). The impact of protest responses in choice experiments: An application to a Biosphere Reserve Management Program, *Forest Systems*, 22(1).

Ministry of Environment, Science, Technology, and Innovation. (MESTI). (2016). National Biodiversity Strategy and Action Plan.

MoFEP. (2018). The Annual Ghana Budget Statement and Economic PolicyRetrieved from https://mofep.gov.gh/sites/default/files/budget-statements/2018 -Budget-Statement-and-Economic-Policy

Naidoo, R. (2008). The Role of Economic Valuation in the Conservation of Tropical Nature. Economics and Conservation in the Tropics: A Strategic Dialogue. Conference Paper.

Nanag, D. & Owusu, E. (2010). Estimating The Economic Value of Recreation at the Kakum National Park, Ghana. *Novea Science Publishers*

Navrud, S. &Vondolia, G. (2005) Using contingent valuation to price ecotourism sites in developing countries. Journal of Tourism. 53(2), 115-125

Nature Conservation Organization, (2022). Retrieved from https://www.nature.org/en-us/ on 28th November, 2022.

Nghikembua, M., Marker, L., Brewer, B., Leinonen, A., Mehtätalo, L., Appiah, M. & Pappinen, A. (2021). Restoration thinning reduces bush encroachment on freehold farmlands in north-central Namibia. *Forestry*; 94, 551–564, https://doi.org/10.1093/forestry/cpab009

Odonkor, S., Dei, E. & Sallar, A. Knowledge, Attitude, and Adaptation to Climate Change in Ghana, Scientific World Journal. https://doi.org/10.1155/2020/3167317

Ofori-Mensah, M. (2017). Access to basic public services: Challenges Ghana must overcome: Institute of Economic Affairs.

Owuora, M. A., Mulwae, R., Otienoe, P., Icelyd, J., & Newton, A. (2019). Valuing mangrove biodiversity and ecosystem services: A deliberative choice experiment in Mida Creek, Kenya. Ecosystem Services, 40, 1-12 https://doi.org/10.1016/j.ecoser.2019.101040

Oyelowo, O., Adebagbo, C., Akinyemi, O. & Osinubi, Y. (2008). Traditional African Knowledge In Biodiversity Conservation. African Journal Online, 1(2). https://doi.org/10.4314/joafss.v6i1.48616

Qiao D, Li W, Zhang D, Yan Y and Xu T (2022) How do You Want to restore? Assessing the Public Preferences and Social Benefits of Ecological Restoration for Natural Rubber Plantation in China. *Frontiers in Environmental Science*, 10:823778. doi: 10.3389/fenvs.2022.823778

Ritchie, H. & Roser, M. (2020). Environmental Impacts of Food Production: Retrieved from https://ourworldindata.org/environmental-impacts-of-food

Ryan, M., Gerard, K., Watson, V., Street, D.J., Burgess, L. (2008). Practical Issues in Conducting a Discrete Choice Experiment. The Economics of Non-Market Goods and Resources, 11,73-97. https://doi.org/10.1007/978-1-4020-5753-3_3

Saayman, M. & Saayman, A. 2014. Who is willing to pay to see the Big 7. Tourism Economics, 20(6): 1181-1198.

Samuelson, P. (1955). *The Pure Theory of Public Expenditure: Review of Economics and Statistics*.36: 387-89.

Sintayehu, D. (2018). Impact of climate change on biodiversity and associated keyecosystem services in Africa: a systematic review. *Ecosytem Health and Sustainability*., *9*, 225-239.

Statista. (2020). Total Contribution of Travel and Tourism Industry to Ghana Employment. Retrieved from https://www.statista.com/ on 17th May, 2022.

Sustainable Travel International's report (2020). Retrieved from https://sustainabletravel.org/ on 17th May, 2022

Train, K. E. (2009). Discrete choice methods with simulation. London: Cambridge university press.

Twerefour, D. K. & Ababio, D. (2012). An economic valuation of the Kakum National Park: An individual travel cost approach. *African Journal of Environmental Science and Technology*. 6(4), 199-207

United Nations Educational Scientific and Cultural Organization (2021). Restoring Biodiversity, Reviving Life.

Valasiuk, S., Czajkowski1, M., Giergiczny, M., Zylicz, T., Veisten, K., Mata, I., Halse, A., Marine Elbakidze, M.& Angelstam,P. (2018). Is forest landscape restoration socially desirable? A discrete choice experiment applied to the Scandinavian transboundary Fulufjället National Park Area: *Forest Ecology*, 26(2), 370-380

Whitelaw, P., King, B. & Tolkoch, D. (2014). Protected areas, conservation and tourism – financing the sustainable dream. *Journal of Sustainable Tourism*. 22(4)584-603. https://doi.org/10.1080/09669582.2013.873445

Wiafe, E. (2016). *Tree Species Composition of Kakum Conservation Area in Ghana*. Result score too low

Wittemyer, G., Paul, E.T.W., Bean, A.. & Coleman, O. (2008). Accelerated Human Population Growth at Protected Area Edges; Vol. 321. no. 5885, pp. 123 – 126

World Economic Forum. (2019). The Travel and Tourism Competitiveness 2019: Travel and Tourism at a Tipping point.

World Travel &Tourism Council. (2020). Impact Assessment of the COVID-19 outbreak on international tourism. Retrieved from nwto.org/impact- assessment-of-the-covid-19-outbreak-on-international-tourism