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GASHAKA GUMTI NATIONAL PARK TOURISM DEVELOPMENT AND BIODIVERSITY CONSERVATION

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Abstract

Tourist activities in host environments often create land use problems, such as infrastructure development, and damage to ecosystems and habitats. These disturbances can lead to the disruption of wildlife species, affecting their normal behavior, increasing mortality, and reducing reproductive success. Despite these challenges, the direct benefits of tourism development to the local community are substantial. The study found that 76.06% of locals engaged in merchandise sales, 77.66% gained employment through park development, and 52.6% participated in tourism-related activities. Additionally, the indirect benefits of tourism development to the local community include increased security, improved wildlife conservation, enhanced infrastructure development, employment opportunities, and increased wildlife knowledge, with an average significance ranging from 26% to 45%. In conclusion, tourism development and biodiversity conservation contribute significantly to development, knowledge, employment, and awareness within the local community and the country at large.

Keywords: Tourism Development, Local Community Benefits, Biodiversity Conservation, Ecosystem Impact, Employment, Wildlife Conservation

INTRODUCTION

The rapid development of tourism is both beneficial and detrimental to biodiversity (Small et al., 2004; Hochtl et al., 2005; UNEP & IOE, 2008). Most tourism development results in increase in local taxes, prices of goods and services and price of land (Crick, 1989; Butler, 1999) and rapid infrastructure development of the area thereby creating employment opportunities. The natives, however, have to choose between the traditional occupation and tourism job opportunities. Since, tourists travel is seasonal and often coincide with the farming seasons and other traditional occupation, such as hunting (Reimer & Dialla, 1992; Hitchcock, 1997: Pearce 1998).

Nonetheless the tourist activities at the hosting environment often creates problems of land use; "infrastructure development; damage to or destruction of ecosystems and habitats leading to disturbance of wild species, disrupting normal behaviour and potentially increasing mortality and reducing reproductive success" (Jeršič, 1989; Cater, 1995; Butler, 1999; Brancelj et al., 2000; Mwakima, 2013).

Based on these developments, it can be concluded that, the boom in tourism over the years occurred in protected areas because of the unique natural landscape and scenic beauty (Mwakima, 2013). Moreover, since, the protected areas are areas of special value, established to protect the integrity and diversity of nature against human destruction, traditional mass tourism (Beaver, 2002) development has been a major threat to biodiversity conservation due to lack of management controls and effective planning mechanisms.

Implication of Tourism Development and Conservation

Nigeria is blessed with abundant natural resources and amazing cultural diversity, which drives the country's tourism, sector (Orunye et al., 2017). Gashaka Gumti National Park is one of the largest National Park and tourist destinations in Nigeria. Biodiversity in the park is important resources for tourism and thus expected that conservation initiatives are beneficial to the growth of tourism in Nigeria and the rest of the world (Frey & George, 2009).

There is a strong symbiotic relationship between tourism and Biodiversity. This relationship can be harnessed for a common benefit. For instance, a location rich in biodiversity appeals to certain tourist destinations and also can bring visitors pressure contributing to the loss of biodiversity by transforming the scenic beauty of the protected

areas and Parks through degradation of tourist sites, pollution, and introduction of invasive species, and at the same time tourism can generate revenue to support biodiversity conservation, and thus protect unique features of biodiversity it impacts (Dudley, 2008; Fordham & Brook, 2010; Mwakima, 2013)

However, several studies have focused on the negative aspect of tourism development in the protected areas and National Parks (Marion & Reid, 2007; Holden, 2009) neglecting the economic viability of the industry which can be beneficial to biodiversity conservation if only the odds are well managed (van der Duim & Caalders, 2002; Jameson et al., 2004). The emergence of sustainable tourism as a better alternative to mass tourism developments which is less detrimental to the livelihood of local communities in protected areas making way for damaging activities, such as illegal logging, grazing, poaching wood collection, and others (Ross & Wall, 1999; Nicholus & Thapa, 2010). These activities thrive under the guise of mass tourism which in itself has been a threat to biodiversity conservation due to poor planning and control

In line with the concept of ecotourism, sustainable tourism can reduce the adverse effects of tourism development and likewise improve biodiversity conservation in communities being developed (Higham, 2007). Similarly, biodiversity can be threatened by the activity's tourists engage in such as game viewing, hiking, sports and the likes. So, it is imperative that tourism development applying the principles of ecotourism should go accordingly with biodiversity conservation. In most cases, tourism will be a useful conservation strategy in delivering scarce funds for conservation and providing local communities with an economic incentive to conserve biodiversity from other potentially more destructive forms of expansion such as logging, mining, or consumptive use of wildlife (Weaver & Lawton, 2007). Tourism can also provide education to visitors and promote awareness of biodiversity conservation biodiversity and provide support for cultural diversity of local communities and indigenous people and deepening conservation awareness.

Added to that, tourism can be of great importance of maintaining the scenic beauty or attractive resources base to continue in attracting more tourists in order to generate more funds needed to support its conservation. Therefore, a mutually supporting circle of success can be fashioned out. However, this positive relationship is not always the case, particularly where tourism occurs without management standards and guidelines that seek to promote biodiversity conservation (Buckley, 2004).

Tourism development, whatever the form, requires infrastructure development and other facilities such as large parcel of land and building materials etc. In addition, construction of the tourism facilities often involves clearing of the site and excavating of the ground for the layout of the building usually results in total alteration of the landscape, and thereby destroying habitats or forest causing loss of biodiversity. Furthermore, the loss of biodiversity is exacerbated due to direct pressure on individual species, for example from recreational activity, from use for food items, souvenirs or other trading, or competition from invasive alien species introduced through tourism activity; The problem is further compounded as many tourism facilities are cited in fragile regions or areas rich in biodiversity (Kruger, 2005) as well as its direct environmental impacts, resource depletion can also have socioe-conomic effects, as essential resources become scarce for the local community.

Hovardas & Stamou, (2006) indicated that infrastructure development can further the adverse impact on biodiversity by concentrating local resource use in smaller areas and /or by undermining local resource management systems. In addition to resources depletion, habitats destruction, environmental pollution are threats of traditional tourism that have dire consequence on conservation of wildlife and forest and scenic beauty of National Parks (Hunter & Sheringham, 2008). The problem of environmental pollution is exacerbated where there is mismanagement of solid waste and littering in remote areas is due to poor drainage system and waste collection.

In addition, construction of hotels, recreation, and other facilities often lead to increased sewage pollution, which pollutes seas and lakes surrounding tourist attractions thus damaging the flora and fauna. On accounts of these negative effects of tourism development on the corridors of local environment and cultures that ushered in ecotourism in the 1980s and 1990 (Richins, 2009). He argues that ecotourism is as an alternative form of tourism founded on the principle and practices that seek to harness tourism's economic potential for biodiversity conservation and sustainable development. It has become an alternative way of paying for nature conservation (Uchene, 2010).

Moreover, some ecotourism operations contribute minimally to local development, with little or no ecotourism revenue reaching local people (Jacobson & Robles, 1992; Healy, 1994; Bookbinder et al., 1998; McLaren, 2003). Even those who profit financially often rely

upon an unstable source of income, one subject to seasonal fluctuations, as well as sensitive to economic and political events (Jacobson & Robles, 1992; Wood, 1998).

Theory and hypothesis

This study utilised the social exchange theory to understand factors that influence local community participation in biodiversity conservation (Mutanga et al., 2015). Social exchange theory (SET) is defined by Ap, (1992) as "a general sociological theory concerned with understanding the exchange of resources between individuals and groups in an interaction situation" (p. 668). Social exchanges theorist asserts that individual often develop set of attitudes towards other people and things on the premise of expected costs and benefits obtained from participating in activities. By comparison, people view activities that bring benefits to have positive influence while they perceive those with negative outcomes to have negative impact (Bagherian et al., 2009).

Therefore, people may like to participate in activities they can derive the greater benefits and avoid those ones with more expected costs or more costs are incurred. In the social exchange theory (SET), the costs and benefit are subjectively analysed by individuals to decide whether to involve in a particular or the other alternatives (Nunkoo, 2016). In doing so costs are assessed in the terms of suitable alternatives or possible options given up by the participants involved (Cook. et al., 2013). However, when benefits and costs are par, they result in equitable exchange or relationship (Bagherian et al., 2009).

This theory contends that implementation biodiversity conservation initiative should enhance the livelihood of the local people. This is especially important for countries such as Nigeria where Gashaka-Gumi National Park has been adopted to promote series of biodiversity activities in support of the Nigerian Biodiversity programme, to ensure local communities in derive equal social and economic benefits from conservation of wildlife and habitat (Alarape et al., 2018). Based on basic assumptions of the social exchange theory, we hypothesized that local communities that derive positive benefits from biodiversity conservation and whose loss of livelihood are adequately compensated will have positive attitude. However, those who do not obtain benefits from conservation of biodiversity and those whose lose source of livelihood are not adequately compensated will exhibit negative attitude

In particular, considering the influence social and financial benefits on attitudes of local community participation in conservation, extent studies have suggested have suggested

mixed results. For instance, Sam et al., (2014) and Mutanga et al., 2015) show that local communities that benefit more financial may have higher desire to support conservation than those that do not. Similar studies have argued the direct economic benefits that accrue to local people has improved conservation (Metcalfe 1994; Wainwright & Wehrmeyer, 1998; Pender et al. (2001); Konopo et al., 2016). On the other hand, Wainwright & Wehrmeyer 1998 asserted that community involvement in conservation has rarely improved the livelihood of the local communities (Wainwright & Wehrmeyer 1998) despite the socio-economic benefits realised from wildlife. Also, Milner- Gulland et al. 2003) argued that local community participate in conservation not because of they perceived the feasibility of economic benefits so success in conservation of biodiversity could be attributed to the accrued benefits but rather the degree of enforcement by local community (Gibson & Marks 1995). This allows to us to formulate our first hypothesis:

METHODS

The study area is Gashaka-Gumti National Park. It is situated at the foot of the Mambilla Plateau and covers a land area of about 6,411 km2. It lies between latitude 6º55'N and 8º05'N and longitude 11o13' to12º11'E. The Park was originally gazetted as Gumti, Gashaka and Serti Game sanctuaries by the defunct Northeast Government in the 1970's. The three game sanctuaries were merged and upgraded to a National Park by the Nigeria National Park Decree of 26th August, 1991 which was repealed by Decree 46 of 1999.Gashaka –Gumti National Park is a vast land of spectacular wilderness (6,000 km2) in the southeast corner of Taraba State, adjoining the Mambilla Plateau (Figs. 1 and 2). The Park is an outstanding tourist landmark in Taraba State and the largest of all the eight national parks in the country. It is a home the most diverse in terms of species distributed within the park, such as the colobus monkey and warthogs, including buffalo, roam antelope, chimpanzee, hippopotamus, hyena, giant forest hog, lion and leopard. The park is surrendered by 25 communities; 5 outside, 11 on the periphery and 9 inside, including 6 enclaves (Deshen et al., 2010) belong to different ethnic groups such as Jibu, Dakka,Ndoro, Tigun, Gbaya, Tiv, Mambilla, Kaka and Fulani in the southern part of the park, while in the northern part or Toungo sector are the Chamba, Kutim Potopore, Fulani, Dakka, Nyamnyam and Kona. The main sources occupations are farming, livestock husbandry,

vocational jobs, civil service with few hunters and fishermen. The best time to visit the park is during dry season that is between Decembers to March yearly.

RESULT AND DISCUSSION

Assessing Tourism Development in Gashaka Gumti National Park

Table 1 showed the results of tourism development in Gashaka Gumti National Parks. The results were obtained from the univariate statistical analysis presented in terms of percentage and frequency. The local community responded strongly disagree, disagree neither disagree or agree, and strongly agree. About 28.7% of the community strongly agrees that tourism development brings more job opportunities to local people and 20.7% strongly agree that tourism development in the park has benefitted the community financially. That Tourism development improves the livelihood of the community, only 19.7% strongly agree. Thus, it can be concluded that the more job opportunities for local people, the more they agree to support tourism development to conserve biodiversity.

Table 1. Tourism Development in Gashaka Gumti National Park (not all respondent answer the question. this needs to be shown

	Strongly disagree (%)	Disagree (%)	Neither agree nor Disagree (%)	Agree (%)	Strongly Agree (%)
Support tourism development in the park	16.0	27.7	24.5	21.8	10.0
Tourism helps the local community to better appreciation of the community	11.2	15.4	30.3	29.8	13.3
Tourism development improves the livelihood of the community	17.0	20.7	17.6	25.0	19.7
Tourism developments bring more job opportunities to local people	8.5	14.9	14.4	33.5	28.7
Tourism development in the park has benefitted the community financially	9.6	21.3	15.4	26.6	20.7
Tourism development in the park will improve	11.7	17.6	16.5	32.4	17.0

community participation					
Tourism development adversely affect our cultural heritage	14.4	18.6	25.5	24.5	11.7
Tourism development in the parks has worsened the livelihood of community	10.1	23.9	20.2	24.5	10.1
Tourism developments improve health and sanitation	6.9	15.4	21.8	14.4	5.3
Tourism development has brought vast infrastructure development to the community	12.2	17.6	38.9	14.9	16.4
Tourism developments bring more job opportunities to local people	8.5	14.9	14.4	33.5	28.7
Tourism development in the park has benefitted the community financially	9.6	21.3	15.4	26.6	20.7
Tourism development in the park will improve community participation	11.7	17.6	16.5	32.4	17.0

Direct Benefits of Tourism Development to Local Community

Table 2 shows results on the direct benefits of tourism development to the local community. Merchandise of products has direct economic benefits. Gained employment through development in the park also has direct economic benefits. Taking part in tourism-related activities is also a direct benefit to GGNP.

Table 2. Direct Benefits of Tourism Development to Local Community

	Direct economic Benefits	
	Yes	No
Merchandise of products	143 (76.06%)	45 (23.94%)
Gained employment through development in the park	146 (77.66%)	42 (22.34%)
Took part in tourism related activities	99 (52.6%)	89 (47.3%)

Indirect Benefits of Tourism Development to Local Community

Results of indirect benefits of tourism development to the local community have been shown in Table 3. Findings show that some of the benefits are extremely important than others to the local community. In terms of Increase security, 29.8% of the community considered it significant while 41% found improved wildlife conservation to be significant. Similarly, local communities found improved infrastructure development in the community, tourism brought employment, and enhanced wildlife knowledge to be significant accounting for 34%, 26.1%, and 33.0% respectively. Overall, Employment is the most significant indirect benefit of GGNP to the local communities, while increased security is an insignificant indirect benefit to local people in the park.

Table 3. Indirect Benefits of Tourism Development to Local Communities

	Not Significant (%)	Little Significant (%)	Significant (%)	Very Significant (%)	Extreme Significant (%)
Increased security	25.5	21.8	29.8	14.9	8.0
Improved wildlife conservation	7.4	18.6	41.0	26.1	6.9
Improved infrastructure development in community	16.0	25.0	34.0	16.5	8.5
Tourism Brought employment	14.4	12.2	26.1	28.2	19.1
Enhanced wildlife knowledge.	13.2	22.9	33.0	19.7	11.2

Logistic Regression

In this study, the aim is to model the dependent variable (status of Biodiversity conservation in Gashaka Gumti National Parks) based on one or more independent variables, local, community participation and tourism development.

The Ordinary Least Square (OLS) and the Logistic regression have similar goals. The difference between the two techniques is that the OLS method is often used to predict only a metric dependent variable, that is, a continuous variable while logistic regression is used to estimate non-metric dependent variables (binary/ordinal outcomes). Even if, the OLS is

considered, it will give estimated values beyond the range of (0 and 1) which is more suitable for Logistic regression (LR). Thus, LR requires different estimation techniques as not does for follow classical assumptions of normal distribution (Hair et al., 2010).

Hence, the logistic regression technique is adopted. The aim of LR is to determine probability that something will or will not occur based on some factors. In this study, the aim is to determine probability of conserving biodiversity given the participation of local community and tourism development. This model has been used by Chok et al. (2007) and Mugizi et al. (2017).

Interpretation of Results

The directionality of the relationship can be determined directly from the logistic coefficients, where the signs (positive or negative) represent the type of relationship between independent and dependent variable. On the other hand, the magnitude of the relationship is best determined with the exponentiated coefficient, where the percentage change in the dependent variable (the odds value) is shown by the calculation,

$$\text{Exp}(\beta I) = \pi(xi)/(1-\pi(xi)) = \exp(\beta i) \qquad \text{Equation 3}$$

Where, $\hat{\pi}$ (xi)) is the probability of success (case) and$1-\pi$ (xi) is the probability of failure (non-case).

A value less than one indicates that an increase in the independent variable holding other variables constant will result in the outcome less likely to occur whilst a value greater than one indicates that an increase in the independent variable holding other variables constant will result in a high likelihood of occurrence of the outcome. The further the odds ratio is from one, the stronger the relationship. Thus, when, βi is greater than 0, then exp ($\beta 1$) greater than 1, implying an increase in odds of success and, when, βi is less than 0, then exp ($\beta 1$) means a decrease in odds of success.

Table 4. Variables and Measurement

Variables	Explanation	Measurement
Dependent variables		
Health status of Gashaka Gumti National	Outcome of maximizing strengths (Y1)	1= maximize strength, 0 = not maximise strengths
	Outcomes of minimizing weakness (Y2)	1= Minimizing weakness, 0= not minimize weakness
	Outcomes of maximizing opportunity (Y3)	1= maximized opportunity, 0= not maximized opportunity
	Outcomes of minimizing threat (Y4)	1=minimised threat, 0= minimised
Independent Variables		
Local community support tourism development activities	X1	1= agree 0= disagree
Tourism development support community livelihood	X2	1= agree 0= disagree
Tourism development offers job opportunity to local community,	X3	1= agree , = disagree
Tourism development benefit community financially	X4	1= agree , 0= disagree
Tourism developments worsen cultural heritage	X5	1= agree , 0= disagree
Tourism development worsen livelihood	X6	1= agree, 0= disagree
Tourism development improved community health and sanitation	X7	1= agree, 0= disagree
Tourism development improved infrastructure development	X8	1= agree, 0= disagree
Community participates in wildlife and forest conservation,	X9	1= agree, 0= disagree
Community takes conservation initiative,	X10	1= agree, 0= disagree
Community participates in park patrol and protection,	X11	1= agree , 0= disagree
Community participates in park management policy	X12	1= agree , 0= disagree
Community promotes and local products	X13	1= agree , 0= disagree
Local government Help to Local Community unity	X14	1= agree , 0= disagree
Community participates in tourism development	X15	1= agree , 0= disagree

Data analysis

The Enter Method Model Fitting (Opportunity of the Park)

The enter method modeling for maximizing opportunity sought to identify which perceived factors of Tourism development and local community participation predict the two cases (maximizing or not maximizing) opportunity of Gashaka Gumti National Park

4.10.1 Omnibus Tests of Model for Opportunity of the Park using the Enter Method

The enter model shows results in Table 5. after the inclusion of all explanatory variables at the same step. The Omnibus Tests of Model Coefficients show (chi-square =27.752, df =16, p<.034), implying that the current model is significantly better than the base or null model. This is because the Chi-square test static measures the significant difference between these two models, and since the p-value of 0.034 for the new model is greater than 0, the null hypothesis was rejected. Stated differently, the null hypothesis was because the coefficients of all the independent variables were not equal to zero. The implication is that adding explanatory variables to the model improves the model's ability to predict the level of opportunity of Gashaka Gumti National Park. In the full model, the block and the stop valves are equal to the model values because all explanatory variables were added to the model at the same at a go.

Table 5. Omnibus Test of Model Coefficients for Opportunity of the Park using the Enter Method

Enter Model		Chi-square	df	Sig.
Step 1	Step	27.752	16	0.034
	Block	27.752	16	0.034
	Model	27.752	16	0.034

Model Summary (Testing Goodness-of-Fit of the Model) for Opportunity of the Park using the Enter Method

The summary model results in Table 6. indicate the Goodness-of-Fit of the new model. The chi-square shows the difference between the null model and the new model. The -2 Log-likelihood value for the full model is (231.828) and that of the null hypothesis or base model (259.58). Based on the results, the new model is far better than the constant model because the additional explanatory variable decreased the -2 Log-likelihood value by

(259.58-231.828=27.752), which is equal to the chi-square static in the Omnibus Test model. Overall, the explanatory power of the model has been significantly improved

Table 6. Model Summary for Opportunity of the Park using the Enter Method

	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
Step 1	231.828a	0.137	0.183

a Estimation terminated at iteration number 4 because parameter estimates changed by less than 0.001.

Meanwhile, the Cox & Snell R2 attempts to explain the amount of variation in the logistic model just like the coefficient of determination in the multiple regression model, hence the pseudo –R2 value. The static was 13.7% which poorly explains much of the variations in the level of opportunity or model. The Nagelkerke R Square which attempt improves on the Cox & Snell R-square to reach a maximum value of one (1) was 18.3%. These values were insignificant implying that many of the variations in the model were unexplained.

Hosmer and Lemeshow Test for Opportunity of the Park using the Enter Method

The Hosmer and Lemeshow Test in Table 7 assessed the significant difference between the predicted and observed probabilities of the full model to determine the overall Goodness-of-Fit of the model. Based on the test results 0.565 showed that the model is significant and overall, significantly fits the data because the result (p=0.565 >0.05) indicates that this model is not a good fit for the data.

Table 7. Hosmer and Lemeshow Test for Opportunity of the Park using the Enter Method

	Chi-square	Df	Sig
Step 1	6.744	8	0.565

Interpretation of the Current Model for Opportunity of the Park using the Enter Method

The predicted and fitted model using the enter method is in Table 8.

$$\text{Ln}\left(\frac{\boldsymbol{p(x)}}{\boldsymbol{1-p(x)}}\right)=1.490+.653x1+.707x2+.002x3+0.772x4+0.027x5+0.371x6+0.469x7+-.091x8-.019x9+-.035x10+.035x11+.373x12+.671x13+.416x14+.332x15$$

The beta estimate for "community support tourism development" was 0. 653. This means that exp (β) =0.653 ≈ 1.921. Therefore, a unit increase in community support tourism

development leads to an increase of (1.921-1) x100% = 92.7% in the odds of Maximizing opportunities of the park. This means that an increase in community support for development would be positive for the conservation of biodiversity.

The coefficient for "local government Help to Local Community" was -0. 707. This means that exp (β) =-0.707 ≈0.493. Therefore, a unit increase in local government Help to Local Community tourism development leads to a decrease of (0.493-1) x100% =50.7% in the odds of maximizing the opportunity. Thus, a decrease in the local government's helps to the local community would eventually affect maximizing opportunity available for the park and biodiversity conservation implying inverse relations. Therefore, most communities are less likely to engage in biodiversity conservation.

Similarly, the parameter estimate for is community livelihood was 0.02. This means that exp(β) =0.02 ≈ 1.002. Therefore, a unit increase in community livelihood leads to an increase of (1.002-1) x100% =0.2% in the odds of maximizing the opportunity of the park. This implies that as tourism development enhances the community welfare, such communities would like to support this program and thus leading to maximizing opportunity. Hence, an increase in tourism development activities is associated with maximizing opportunities for the park and improving conservation initiatives.

Moreover, the coefficient for tourism development brings Job opportunities was 0.772. This means that exp(β) =0.772 ≈ 2.164. Therefore, a unit increase in job opportunity leads to an increase of (2.164-1) x 100% =116.4% in the odds of increasing the maximizing opportunity of the park. This result implies that increased job opportunities through tourism development would positively influence the conservation of biodiversity because the community would be more likely to support tourism development.

Further, the coefficient for financial benefits was 0.027. This means that exp(β) =0.027 ≈1.028. Therefore, a unit increase in financial benefits leads to an increase of (1.028-1) x 100% =2.8% in the odds of maximizing the opportunity of the park. Thus, the high value of financial benefits through tourism development is associated with maximizing opportunity enhances conservation.

Similarly, a positive coefficient of 0.371 for community participation means that exp(β) =0.371 ≈1.449. Therefore, a unit increase in community participation in tourism development leads to an increase of (1.449-1) x 100% =44.9% in the odds of maximizing

the opportunity of the park and improving conservation in the park because of community willingness to participate

The coefficient for tourism development Worsened cultural heritage was 0.469. This means that exp(β) =0.469 ≈1.598. Thus, a unit increase in tourism development Worsened cultural heritage results in the increase of (1.598-1) x 100% =59.8% in the odds of maximizing of opportunity of the park. Thus, tourism development is associated with maximizing opportunity. Accordingly, the local communities would be more willing to participate in tourism development activities because of they perceive the reality of tourism development would maximize opportunities for the park.

The beta estimate for community participation was 0.469. This means that exp(β) =0.469 ≈1.598. Therefore, a unit increase in community participation leads to an increase of (1.598-1) x 100% =59.8% in the odds of the high level of opportunity in the park. Thus, those local communities are more likely not to participate in tourism development due to the low level of opportunity of the park.

The estimated parameter for tourism development worsens livelihood was -0. 091. This means that exp(β) =-0.091 ≈0.913. Therefore, a unit increase in the community Worsen leads to a decrease of (-0.913-1) x 100% =-8.7% in the odds of maximizing the opportunity of the park. This tourism development Worsened livelihood is inversely related to maximizing opportunities of the park to conserve biodiversity. Due to negative perception, those local communities whose livelihood is worsened are more likely not to participate in tourism development.

The coefficient for tourism development improved health and sanitation -0. 091. This means that exp(β) =-0.091 ≈0.981. Therefore, a unit increase in the tourism development activities leads to a reduction of (-0.981-1) x 100% =-1.9% in the odds of the maximizing opportunity of the park to conserve biodiversity. Thus, communities that doubt that tourism development would improve health and sanitation are less likely to involve in tourism development and that would affect likely of maximizing the opportunities of the park. In order words, an increase in tourism development activities would not support maximizing opportunities available for the park.

Likewise, the coefficient for tourism infrastructure development was -0.091, implying that exp(β) =-0.091 ≈0.981. Therefore, a unit increase in tourism development enhances infrastructure development in the communities leading to a reduction of (-0.981-1) x 100%

=-1.9% in the odds of maximizing the opportunity of the park. This means that tourism development is negatively associated with maximizing opportunity and thus the community would be reluctant to support this development leading to a negative impact on conservation.

The coefficient for wildlife and forest conservation was 0.373. This means that exp(β) =0.373 ≈1.452. Therefore, a unit increase in community participation in wildlife and forest conservation leads to an increase of (1.452-1) x 100% =45.2% in the odds of opportunity in the park. Thus, local communities would be more likely to participate in wildlife and forest conservation.

Moreover, the parameter estimate for the community conservation initiative was -0.671. This means that exp(β) =-0. 671≈.0.511 Therefore, a unit increase in community conservation initiative wildlife and forest conservation leads to a decrease of (0.511-1) x 100% =-48.9% in the odds of maximizing the opportunity of the park. Hence, local communities are less likely to take conservative initiatives.

The beta estimate for community participation in park management policy was0.416. This means that exp (β) =-0.416≈1.516. Thus, a unit increase in community participation in park management leads to an increase of (1.516-1) x 100% =51.6% in the odds of increasing the level of opportunity in the park. Hence, increased community participation is positively associated with maximizing the opportunity of the park thereby enhancing conservation.

The parameter estimate for community participation in park protection and patrols was -0.332. This means that exp(β) =-0.332≈1.393. Therefore, a unit increase in community park protection results in the increase of (0.511-1) x 100% =-48.9% in the odds of the level of opportunity in the park. Hence, those local communities who disagree that Gashaka Gumti National Park that a high level of opportunity and is less likely to take conservative initiatives.

The parameter estimate for the community conservation initiative was -0.671. This means that exp(β) =-0. 671≈.0.511 Therefore, a unit increase in community conservation initiative wildlife and forest conservation leads to a decrease of (0.511-1) x 100% = 48.9% in the odds of increasing the level of opportunity in the park. Hence, a decrease in community conversation is inversely related to maximizing opportunity. Hence, local communities are less likely to participate in conservation initiatives thereby affecting conservation initiatives.

The parameter estimate for the promotion of local products was 0.51 Which means that exp(β) =0.051 671≈1.052. Therefore, a unit increase in community promotion of local products leads to an increase of (1.0512-1) x 100% = 52% this maximize the opportunity in the park which implying a positive association. Hence, local communities are more likely to promote local products than those that disagree.

Table 8. Variables in the Equations for Opportunity Model of the Park using the Enter Method

	Variable	B	S.E.	Wald	df	Sig.	Exp(B)
Step 1	Support Tourism Development	0.653	0.415	2.480	1	0.115	1.921
	Help to Local Community	-0.707	0.380	3.454	1	0.063	0.493
	Community livelihood	0.002	0.383	0.000	1	0.996	1.002
	Job Opportunity	0.772	0.425	3.307	1	0.069	2.164
	Financial Benefits	0.027	0.393	0.005	1	0.945	1.028
	Community Participation	0.371	0.391	0.899	1	0.343	1.449
	Worsen Cultural Heritage	0.469	0.357	1.723	1	0.189	1.598
	Worsen Livelihood	-0.091	0.348	0.069	1	0.793	0.913
	Community livelihood	0.002	0.383	0.000	1	0.996	1.002
	Improved Health Sanitation	-0.019	0.339	0.003	1	0.954	0.981
	Infrastructure Development	-0.035	0.331	0.011	1	0.917	0.966
	Wildlife Forest Conservation	0.373	0.413	0.815	1	0.367	1.452
	Community Initiative	-0.671	0.340	3.883	1	0.049	0.511
	Park management Policy	0.416	0.344	1.461	1	0.227	1.516
	Park Protection Patrol	0.332	0.344	0.931	1	0.335	1.393
	Promotion local products	0.051	0.335	0.023	1	0.880	1.052
	Constant	-1.490	0.624	5.705	1	0.017	0.225

a Variable(s) entered on step 1: Support Tourism Development, Help to Local Community, Community, livelihood, Job Opportunity, Financial Benefits, Community Participation, Worsen cultural heritage, Worsen Livelihood, Improved health sanitation, Infrastructure development, Wildlife forest Conservation, Community Initiative, Park Management Policy Park Protection Patrol, Promotion local products

The Wald test shows that only community initiative was significant in the estimation of the odds of maximizing the opportunity of Gashaka Gumti National Park because of the p-value of 0. 049 is less than 0.05.

This result means that the local communities in Gashaka Gumti National Park would like to participate in a conservative initiative. This may be due to understanding the need to conserve the wildlife and their habitat for future generations. By so doing the park's potential could develop and thus increase opportunities the community could exploit to their advantage.

It is observed that similar studies had found the same result. As evidence shows that 96% of the respondents of local communities around the management of Oban Hills, River state Nigeria welcomed the idea of communities' involvement management of Oban (Isiugo & Obioha, 2015). However, 46% of the people around Kakum National Park in Ghana declined to participate in forest conservation initiatives (Eshun, 2008).

4.10.5 Classification Table for Opportunity of the Park using the Enter Method

The classification table shows how well the full model predicts cases to the two of the dependent variables not maximizing and maximizing opportunity shown in Table 9. The classification was conducted for both specificities, which is the proportion of the correctly classified "not maximize opportunity at 58.3%, and the sensitivity which is the proportion of the correctly classified maximize opportunity was 68.6%. The overall full model correct classification was 63.9%.

Table 9. Classification Table for Enter Model for Maximising Opportunity of the Park

		Predicted		
Step 1	Observed	Outcomes of Maximising Opportunity		
	Outcomes of Maximising Opportunity	Not Maximise	Maximise	Percentage Correct (%)
	Not maximise	51	38	58.3
	Maximise	32	69	68.6
	Overall Percentage (%)			63.9

a The cut value is 0.500

Validation of New Model for Opportunity of the Park using the Enter Method

Based on the classification accuracy of the fitted new model of outcomes opportunity maximization, it was observed that the correct classification was 1.5(63.9% - 62.2%) less

than the new fitted model of overall outcomes of maximizing opportunity. Therefore, it can conclude that the new model was replicated.

Forward Stepwise Method for Opportunity of the Park

The forward stepwise model fitting for outcomes of maximizing opportunity sought to identify which Tourism development and local community participation factors predict the level of opportunity of Gashaka Gumti National Park

Omnibus Tests of Model Coefficients for Opportunity of the Park using Forward Stepwise Method

The results in Table 10 show a model fitting that starts with the base model and then variables are included one after the other in the model based on their significance score statistic, statistic and deviance, and likelihood ratio. The omnibus tests of model coefficient reports (chi-square =18.723, df =1, p<.000), implying that the new model is significantly better than the base model. Hence, the null hypothesis was rejected because an additional variable entered into the model improves its explanatory power.

Table 10. Omnibus Test of Model Coefficients for Opportunity of the Park using Forward Stepwise Method

Forward Model		Chi-square	df	Sig.
Step 1	Step	18.723	1	0.000
	Block	18.723	1	0.000
	Model	18.723	1	0.000

Model Summary (Testing Goodness-of-Fit of the Model) using Forward Stepwise Method

The results shown in Table 11 indicate how the current model fits the data. The result of the -2 Log-likelihood value for the full model is (225.413) as compared to the null model (253.687) implying a decrease in the -2 Log-likelihood values (253.687-234.964=18.723) improved the predictive power of the model. The Cox & Snell R2 explains only 9.5% variations in the level of opportunity or model. Meanwhile, Nagelkerke R Square which attempts to improve on the Cox & Snell R-square to reach a maximum value of one (1) was 12.8%. These values were insignificant indicating that many of the variations in the model were unexplained.

Table 11. Model Summary for Opportunity of the Park using Forward Stepwise Method

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	234.964a	0.095	0.128
2	225.413a	0.140	0.189

An Estimation terminated at iteration number 4 because parameter estimates changed by less than 0.001.

Hosmer and Lemeshow Test for Opportunity of the Park using Forward Stepwise Method

The Hosmer and Lemeshow Test are shown in Table 12 reports a significant result of 0.810 greater than the threshold of 0.05, which significant differences between the predicted and observed probabilities of the full model. The result ($p=0.810 >0.05$) indicates that this model is a significant-good fit for the data. This means that the null model is more desirable.

Table 12. Hosmer and Lemeshow Test for Opportunity of the Park using Forward Stepwise Method

Step	Chi-square	Df	Sig.
2	0.420	2	0.810

Interpretation of Variables in New Model for Opportunity of the Park using Forward Stepwise Method

The predicted model using the forward Stepwise method is as shown in Table 13.

$\text{Ln}\ [(p(x)/1-P(x))] = -0.968 + 0.766x1 + 0.678x13$

Where x1 is community support for tourism development, X13 is community participation in park management policy. The coefficient for community support for tourism development was 0.766. This means that $\exp(\beta) = 0.766 \approx 2.151$. Therefore, a unit increase in community support for tourism development leads to an increase of (2.151-1) x 100% = 115.1% in the odds of maximizing the opportunity of the park. Thus, community support for tourism development and maximizing opportunities of the park are positively related This means that an increase in community support for tourism development leads to maximizing opportunity. Hence, the local communities are more likely to support tourism

development. Moreover, the parameter estimate for community participation in park management policy was 0.678. This implies that exp(β) = 0.67 ≈ 1.970. Therefore, a unit increase in community participation in park management leads to an increase of (1.970-1) x 100% = 97% in the odds of maximizing the opportunity of the park indicating positive relation. Thus, local communities are more likely to take part in the park management policy formulation process.

Table 13. Variable in the Equation for Opportunity of the Park using Forward Stepwise Method

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 2	Support Tourism Development (1)	1.049	0.350	8.980	1	0.003	2.853
	Park management Policy	1.308	0.322	16.494	1	0.000	3.700
	Constant	-1.740	0.344	25.545	1	0.000	0.176

a Variable(s) entered on step 1: Park management Policy.

b Variable(s) entered on step 2: Support Tourism Development.

Classification Table for Stepwise Forward Model for Maximising Opportunity of the Park

The classification table shows how well the full model predicts cases for the two of the dependent variables, the level of opportunity is shown in Table 14. The classification table was conducted for both specificities, which is the proportion of the correctly classified "not maximizing" available opportunity of the park at 41.4%.3%, and sensitivity which is the proportion of the correctly classified "high" in the level of opportunity was 76.2%. The overall full model correct classification was 60.1%.

Table 1**Error! No text of specified style in document.**. Classification Table for Opportunity of the Park using Forward Stepwise Method

	Predicted		
Observed	Outcomes of Maximising Opportunity		Percentage Correct (%)
Outcomes of Maximising Opportunity	Not Maximise	Maximise	
Not maximise	36	51	41.4
Maximise	24	77	76.2
Overall Percentage (%)			60.1

a The cut value is 0.500

Validation of New Model for the Opportunity of the Park using Forward Stepwise Method

Based on the classification accuracy of the fitted new model it was observed that correct classification, it was observed that the classification accuracy was 6.4 less than the new fitted model (60.1% and 53.7% respectively). Therefore, it can conclude that the new model replicated.

Backward Stepwise Methods for Opportunity of the Park

Omnibus Tests of Model Coefficients for Opportunity of the Park using Backward Stepwise Methods

Table 15 shows the results of the model fitting with all the variables and eliminates them one by one depending on the significance of their coefficients. The results indicate (X2=26.690, df=4, p-value=0.00). Based on this result the null hypothesis was rejected because the p-value was less than 0.05. This implies the addition of the independent variable to improve the explanatory power of the model.

Table 15. Omnibus Tests of Model Coefficient for Opportunity of the Park using Backward Stepwise Methods

		Chi-square	df	Sig.
Step 13a	Step	-2.363	1	0.124
	Block	26.690	4	0.000
	Model	26.690	4	0.000

a A negative Chi-square's value indicates that the Chi-squares value has decreased from the previous step.

Model Summary (Testing Goodness-of-Fit of the Model) for Opportunity of the Park using Backward Stepwise Methods

The model summary results shown in Table 16 indicate how the model fits the data. The -2 Log-Likelihood result for the full model (226.997) and the base model (null model) was (253.687), indicating a decrease of 26.690=(253.687-226.997) which improved the full model after addition variable than the base model considered only constant-coefficient The Cox & Snell R2 value was only of 13.2% and Nagelkerke R2 was 17.9% These results imply

that independent variables did not explain much of the variations in the level of opportunity to Gashaka Gumti National Park.

Table 16. Model Summary for Opportunity in the Park using Backward Stepwise Methods

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
13	226.997a	0.132	0.179

a; Estimation terminated at iteration number 4 because parameter estimates changed by less than 0.001.

Hosmer and Lemeshow Test for Opportunity in the Park using Backward Stepwise Methods

The Hosmer and Lemeshow test in Table 17 reports a significant result of 0.820 greater than the threshold of 0.05 which is a significant different between the predicted and observed probabilities of the full model. This result (p=0.820 >0.05) indicates that the overall Goodness-of-Fit of the full model did not fit the data. Otherwise, the null model is more desirable.

Table 17. Hosmer and Lemeshow Test for Opportunity in the Park using Backward Stepwise Methods

Step	Chi-square	df	Sig.
13	3.646	7	0.820

Predicting and Interpretation of Model using Backward Stepwise Method

$$\ln\left[\frac{p(x)}{1-P(x)}\right]=0.347-0.687x1+0.700x2-0.881x3+0.653x5$$

The coefficient of community support for tourism development was -0.687. This means that exp(β) = -0.687 ≈0.502. Therefore, a unit decrease in community support for tourism development leads to a decrease of (0.502-1) x 100% =-49.8% in the odds of maximizing the opportunity of the park. Hence, local community support for tourism development is negatively related to maximizing opportunity and conservation of biodiversity.

Moreover, the parameter estimate for tourism helps local communities to participate in biodiversity was 0.700. This implies that exp(β)=0.700≈2.014. Therefore, a unit increase in helping local community management leads to an increase of (2.014 -1) x 100% =101.4% in the odds of the maximizing opportunity of the park, indicating a positive relationship. Thus, local communities that agree that tourism helps community development are more likely to take part in conserving biodiversity in the park thereby increasing the level of opportunity.

Meanwhile, the coefficient for tourism development brings job opportunities was -0.881. This implies that exp (β)=-0.881≈0.441. Thus, a unit increase in tourism development brings job opportunities would lead to a decrease of (0.441 -1) x 100% =55.9% in the odds of maximizing the opportunity of the park. This indicates a negative association and thus local communities are less likely to involve in tourism development activities there adversely affecting conservation activities in the park.

Furthermore, the coefficient for tourism Worsen Cultural Heritage was -0.573 which translated into exp(β)=-0.573≈0.564. This implies that a unit increase in tourism development would lead to a decrease of (0.564 -1) x 100% =43.6% in the odds of the maximizing opportunity of the park. This result shows an inverse association indicating that a one-unit increase in the tourism development activities would not maximize the opportunity of the park. Thus, local communities perceived that tourism development worsened Cultural Heritage is less likely that they support tourism development

Similarly, the coefficient for a community initiative to conserve biodiversity was 0.653 which also indicates exp(β)=-0.653≈1.920. This shows that a unit change in a community initiative to conserve biodiversity in Gashaka Gumti National Park would result in increases of (1.920-1) x 100% =92.0% in the odds of maximizing the opportunity of the park. In that case, the local communities would be more likely to take conservative initiatives and thus impact positively conservation activities in the park.

In addition, the coefficient of community participation in Park Management Policy was -0.546. The figure shows exp(β)=-0546≈0.579 which implies that a unit change in community participation in the formulation of park management policy would lead to a decrease of (0.579-1) x 100% =42.1. % in the odds of maximizing opportunities of the park. Thus, community participation in park management policy and maximizing

opportunity are inversely related. For that reason, local communities would be less likely to participate in park management policy in conserving biodiversity in the park.

CONCLUSION

This shows that a unit change in a community initiative to conserve biodiversity in Gashaka Gumti National Park would result in increases of 92.0% in the odds of maximizing the opportunity of the park. In that case, the local communities would be more likely to take conservative initiatives and thus impact positively conservation activities in the park. In conclusion it was observed that tourism development and biodiversity conservation bring development, knowledge, employment and awareness to the local community and the country at large.

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