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INFLUENCE OF THE HUMAN-WILDLIFE INTERACTION IN PROTECTED AREAS: A CASE STUDY OF THE OLD OYO NATIONAL PARK, NIGERIA

Munir. K. A. Wahab*, Favour. J. Olanrewaju

Osun State University, Nigeria
***Corresponding author's Email: munir.wahab@uniosun.edu.ng**

Abstract

The human - wildlife relationship within the boundary zone of protected biodiversity conserved areas has led to different forms of conflicts. The study undertaken in the Old Oyo National park (Nigeria) support zone areas was aimed at evaluating and determining the level of damage, and the economics loss to farmers due to a human-wildlife conflict. The research identified the locals' attitude to wildlife conservation management and proposed a mitigating strategy for human interaction with the wildlife. Data were collected by the combination of social survey methods which involved participatory techniques such as on-site field observation, a household survey questionnaire (n =120), a key informant interview, and focus group discussions. Data were presented using a descriptive statistical test to extract information on the socio-economic conditions, including major conflicting animals, crop loss, main season of conflict, and also about the local techniques to mitigate the Human-Wildlife Conflict, the perceptions and attitudes of local people towards the effectiveness of mitigation approaches. Results revealed that the proximity of farmland to the national park is a factor determining the damage caused by the wild animals. It has also revealed that local peoples' attitude to wildlife conservation was positive. Nevertheless, as far as farm produce was destroyed, more than 50% of the respondents expressed dissatisfaction with the park management efforts and its conflict resolution strategy. We have suggested that the meaningful involvement of the local community in the conservation administration from bottom to top levels, including an awareness campaign program will contribute towards a reduction of conflicts. The outcomes of the study will assist in changing the perceptions towards conservation in relation to the human development in the communities surrounding the protected areas.

Keywords: buffer zone, crop destruction, human-wildlife interaction, habitat, management

INTRODUCTION

Nowadays, the massive biodiversity loss and the extinction of a host of species are on the rise. The competition for natural resources between humans and wildlife has escalated their interaction, thus resulting in more conflicts (Packer et al., 2013; Anand & Radhakrishna, 2017). The Human-Wildlife Conflict (HWC) is one of the major factors negatively affecting conservation in many protected areas around the world (Dickman, 2010). Humans and animals are adversely affected as a result of the human-wildlife interaction, and this is one of the most complex and urgent problems facing wildlife management and conservation, because HWC is a reciprocal process (König, et al., 2020). A Human-Wildlife Conflict is any interaction between humans and wildlife that results in negative impacts on the social, economic or cultural life, on the conservation of wildlife populations, or on the environment (Sadie, 2019). This interaction has existed since the time humans and wildlife have shared resources and landscape (Akinsorotan et al., 2021). These conflicts occur when wild animals damage crops, threaten, kill or injure people and domestic animals (Mekonen, 2020). The

creation of Protected Areas (PAs) helps to reduce biodiversity loss and provides a significant contributions to the global conservation efforts. However, due to population expansion, most African protected landscapes are surrounded by local people who are predominantly crop farmers, nomadic herders, fishers and miners (Schulte-Herbrüggen et al., 2013). Based on these reasons, HWC are particularly prevalent in and around PAs across the continent (Makindi et al., 2014). Consequently, wild animals moving out from the parks damage agricultural crops, livestock and properties and frequently cause injury or even death to humans. The destruction caused by wild animals is often voiced with resentment by local people. There are cases of retaliatory killings of endangered species (Silwal, 2022, Banikoi et al., 2017).

The establishment of the Old Oyo National Park (OONP) has inevitably placed it at an advantageous position with abundant land area as well as diverse wildlife in cultural/historical settings. However, the park is surrounded by human settlements and agricultural land where HWC is a problematic issue. The people living in and around national parks interact with park resources in multiple ways. Some of them have created an ecological and mutually beneficial relationship with the national park (Mekonen, 2020). Conversely, in certain areas, the existence of national parks has raised questions, because of the increasing conflict over land-use rights and practices (Nicole, 2019). The expansion of agricultural activities around protected areas has increased the interface between humans and wildlife: spieces such as the Nile rat (*Arvicanthis niloticus*), Mona monkey (*Cercopithecus mona*) and the Grasscutter (*Thryonomys swinderianus*) have been reported to cause destruction of crops such as cassava, yam, maize, rice, millet, and groundnut in Katsina-Ala local government area of Benue State (Bukie et al., 2018). Several studies have reported that the poor communities are relatively more dependent on forest resources, which increases the complexity of the protected area management for both humans and wildlife (Budhathoki, 2004; Rayamajhi, 2010). If human-wildlife interaction is not properly addressed, the efforts towards the conservation of wildlife and their habitats will lose solidity and advancement, as well as the support of local communities (Madden, 2004). From a wildlife management point of view, the increased number of wild animals living within protected areas is indicative of the success in conservation. Nonetheless, some wild animals (Primates and Ungulates) often cause losses to the people living in the vicinity of protected areas, and OONP is not an exception. The conflicts originating from crop destruction and property damage are serious conservation issues both inside and outside the National Park (Akinsorotan et al., 2021). Proposing strategies for conflict reduction and prevention for the sake of the better well being of both people and wildlife is the main objective of the research carried out in relation to the human–wildlife conflict. Hence, the study investigated the nature of interaction that has produced conflict in the support zone communities. It further explored the extent of destruction resulting from the human- wildlife interaction, including the causes of damages to the crop produce. The findings will help in the process of ameliorating the management strategies and mitigation approaches towards resolving the human-wildlife conflict in and around the Old Oyo National Park.

MATERIALS AND METHODS

Study area

The study was carried out in the buffer zone of OONP located in the Northern part of the Oyo state, southwestern Nigeria (Figure 1). The Park has a total land mass of 2,512km^2. It is made up of two Native Administrative Forest Reserves, the Upper Ogun (1936) and the Oyo-Ile (1941) Forest Reserves. These unique ecosystems and historical relics were converted

to become Game Reserves in 1952 and finally upgraded to the present status of a National Park.

The central part of the Park has isolated hills and ridges of numerous rock out-crops. The extreme northern part has caves as well as rock shelters dominating the axis. The drainage system is also interesting as the Park is well drained by the rivers Ogun, Owu, Owe and their tributaries in the central and southern parts, while the river Tessi drains the north-east part. For eco-tourism development the inventory list with cognizance to the topography of the Park, inevitably includes the rock out-crops (for mountaineering), Ikere Gorge Dam/River Ogun (for water recreation) and the archaeological endowments of Oyo-Ile (for cultural/historical). OONP lies at the geographical location of latitude 8º 15' and 9º 00'N and longitude 3º 35' and 4º 42' E (Digun-Aweto & Merwe, 2019). The Administrative Head Office is located in Oyo, Isokun area along Oyo-Iseyin road, the Oyo state.

OONP is the most unique of all National Park in the country, because it is the only one with a dual function as an archaeological as well as cultural/historical Park. Its uniqueness is a fascinating pocket of archaeological, cultural and historical sites dotted in and around the Park. It offers a wide variety of resources such as vast tracts of unspoiled nature, unique wildlife both fauna and flora, solid mineral deposits among others.

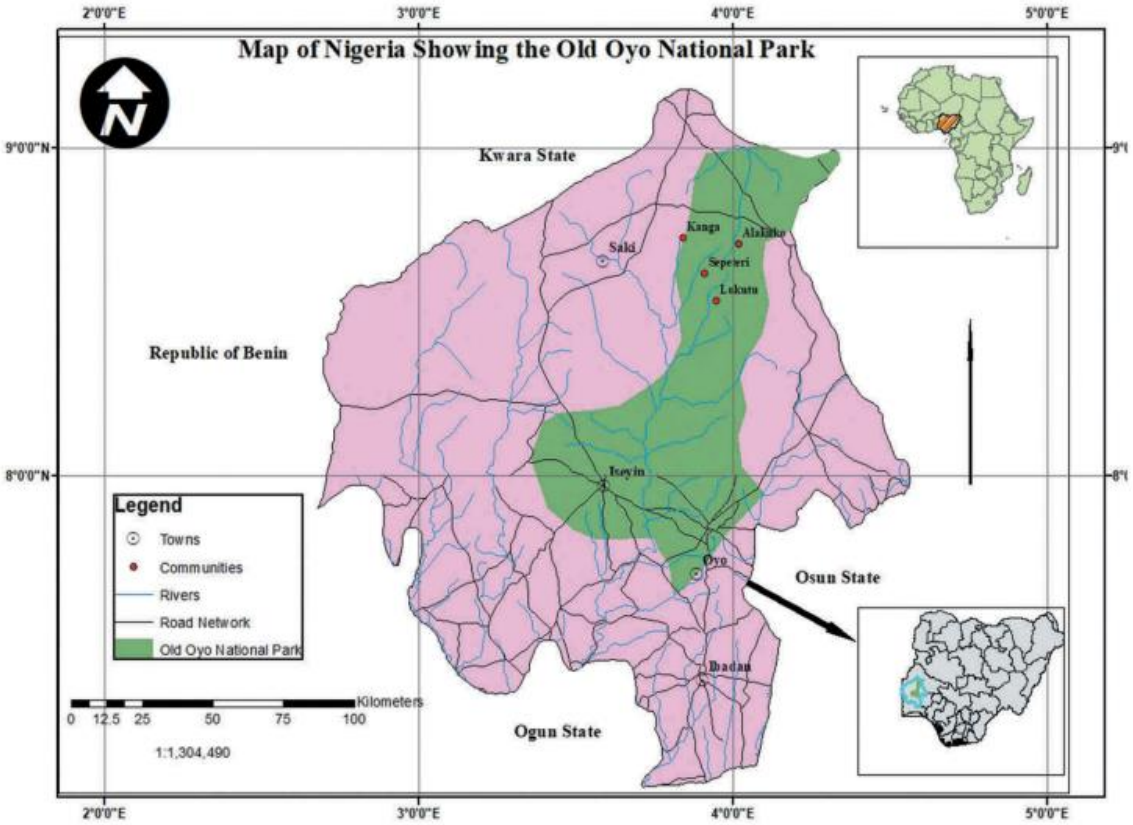

Figure 1. Map of the study area

Data collection and analysis

A reconnaissance survey of the surrounding buffer zone was first carried out before the structured questionnaire administered for the primary data collection. The questionnaire was designed to elicit responses with open and close ended questions. A random sampling method was employed during the data collection targeting the households living around the Old Oyo National Park buffer zone

and those having their farmland located at the park boundary. The sampling was purposive with a sampling intensity of 5%. Both quantitative and qualitative approaches were used to extract reliable data. The primary data were collected from the study site by employing a combination of social survey methods involving participatory techniques such as on-site field observation, a household survey questionnaire (n =120), a key informant interview, and focus group discussions (Megaze et al, 2017) . These methods were applied to extract information on the socioeconomic conditions, major conflicting animals, crop loss, main season of conflict, local techniques to mitigate HWC, perceptions and attitude of local people towards the effectiveness of mitigation approaches. The records of human-wildlife conflicts over specific period of time (secondary data) kept by the park authority in the Old Oyo National Park offices and by other stakeholders in the community were assessed to provide baseline information for the study.

Sample size

The list of different households considered in each of the six ranges along the buffer zone of the park was taken from the Buffer Zone Range Offices. The total number of households located inside the buffer zone of the National Park was 4800. However, 175 households located in high proximity to the park in the six ranges were purposely selected for the study. The sample of 120 households was selected by using the following formula (Taro-Yamane, 1967):

$n= N/ (1+N (e)^2)$

Where:

n signifies the sample size

N signifies the population under study

e signifies the margin error (it could be 0.10, 0.05 or 0.01)

$n= 175/ (1+175(0.05)^2)$

$n= 175/ (1+ 175(0.0025)$

$n= 175 (1+0.438)$

$n= 175/1.438$

$n= 120$

Similarly,

$$\text{Average damage per year per House Holds (HHs) (Kg)} = \frac{\text{Total damage of crops of sampled HHs}}{\text{Number of sampled HHs}}$$

$$\text{Total damage of crops of sampled HHs (Kg)} = \text{Sum of total damage of crops of each sampled HHs}$$

$$\text{Monetary economic value of crops per year per HHs (NRs)} =$$

$$\text{Average damage per year per HHs (Kg)} \times \text{Local market value of each crop per kg}$$

Data Analysis

The data obtained were subjected to descriptive statistics analysis on the mean (average and arithmetic), frequency and percentage. The analysis was carried out using the Statistical Package for the Social Sciences (SPSS) software version'20.

RESULTS

The Respondents

The majority (85.0%) of the respondents were male, 84.2% of them were Muslims, while the rest (15.8%) were Christian (Table 1). The overall mean age of the respondents was 44 years. Those in the age bracket 41-50 years (29.2%) constituted the majority, while about 24% were in the range of 31-40 years old.

With an average of five people per home, the married respondents made up the great majority of the sample (99%).

The majority (42.5%) of the respondents had primary education, followed by 30.8% illiterates. Barely 3.3% of them had tertiary education. The majority (92.5%) of the respondents engaged in farming as their primary occupation.

Table 1. Socio-Economic Characteristics of the Respondents

Characteristic (N=120)	**Frequency**	**Proportion** (%)
Gender		
Male	102	85.0
Female	18	15.0
Religion		
Christianity	19	15.8
Islam	101	84.2
Age (years)		
21-30	23	19.1
31-40	29	24.2
41-50	35	29.2
>50	33	27.3
Mean age = 44 years		
Household Size		
1-5	28	23.3
6-10	63	52.5
11-15	24	20.0
>15	5	4.2
Marital Status		
Single	6	5.0
Married	114	95.0
Educational Status		
No formal education	37	30.8
Primary education	51	42.5
Secondary education	28	23.3
Tertiary education	4	3.3
Occupation		
Farming	111	92.5
Hunting	2	1.7
Trading	4	3.3
Others	3	2.5
Expected Annual Farm Income (N)		
<490900 ($328.35)	34	28.3
500000-999900 ($334.44 - $668.81)	33	27.5
1000000-1490900 ($667.77 - 995.57)	19	15.8
1500000-1999900 ($1001.65-1335.47)	6	5.0
>2000000 ($1337.75)	28	23.3
Mean = 1,138,666.67 ($761.63)		

Source: Field survey, 2021**.**

The majority (28.3%) of the respondents evaluated the overall mean profit return less than ₦490,900 ($328.35) per annum, followed by a moderate share (27.5%) who had a profit between ₦500,000 ($334.44) - ₦999,900 ($668.81) per annum, only (23.3%) of them were making more than ₦2,000,000 ($1337.75) per annum. The average mean income of the respondents was ₦1,138,666.67 ($761.63) only. The conversion rate of Naira currency to US Dollar was 0.00067 = $1.

Economic Evaluation of the Human-Wildlife Conflict Among the Farmers

It was observed that the majority (80.8%) of the respondents have experienced a human-wildlife conflict, in which a moderate percentage (63.3%) of them fought against the conflict by invitation of the park management (Table 2). It was observed that the majority (78.3%) of the respondents revealed that the wild animals that raided their farms have completely destroyed their farm produce, with a negative effect (90%) on their annual farm income.

Table 2. Effects of crop-raiding animals on the local community

Variable	Frequency	Proportion (%)
Have you experienced a human-wildlife conflict?		
Yes	97	80.8
No	23	19.2
If yes, how did you fight against the conflict?		
Invitation of the park management	76	63.3
Purposive entry to harvest and vandalize the resources	6	5.0
Others	18	15.0
How bad have you been affected by crop-raiding animals coming into the farms from the park?		
Completely affected	94	78.3
Moderately affected	16	13.3
Not really affected	8	6.7
Not affected	2	1.7
How have crop-raiding animals affected your supposed annual farm income?		
Positively	2	1.7
Negatively	108	90.0
No effect	10	8.3

Source: Field survey, 2021

Attitude of the Local People towards the Park Establishment

The majority (96.7%) of the local people were pleased with the park establishment and believed in the protection of the national park within the community (Table 3). Mainly, 63.3% of the respondents acknowledged to have assisted in one way or the other in the protection and/or conservation of the park resources. A moderate percentage (40.1%) reported intruders in the park, and (15.8%) of the respondents reduced trespassing into the park. The study indicated that (50.8%) of the respondents pointed to the destruction of crops by marauding animals as being a major challenge the local communities faced.

Table 3. Community involvement in the park management

Variable	Frequency	Proportion (%)
Do you like the establishment of the Park?		
Yes	116	96.7
No	4	3.3
Do you believe in the protection of the Park?		
Yes	116	96.7
No	4	3.3
Have you helped in any way to protect or conserve the Park?		
Yes	76	63.3
No	44	36.7
If yes, what role have you played?		
Reported offender	48	40.1
Reduced trespassing	19	15.8
Reduced grazing	4	3.3
Reduced logging	1	0.8
Others	4	3.3
What are the challenges faced by your community with the establishment of the Park?		
Inaccessibility of the forest resources	35	29.2
Destruction of crops by marauding animals	61	50.8
Others	24	20.0

Source: Field survey, 2021

Human-Wildlife Conflict Resolution by the Park Rangers

A large percentage (89.2%) of the park rangers revealed that they have experienced a human-wildlife conflict within the park boundary, in which 67% of the rangers reported that the conflict with wildlife was not really affecting the management and conservation of park resources (Table 4). It was observed that the majority (37.5%) of the rangers pronounced and indicated that hunting inside the park was a major problem causing the human-wildlife conflict in the park boundaries, followed by the grazing on farm by livestock.

The rangers stated that conservation education was one of the mitigation strategies adopted to prevent the human-wildlife conflict in the local communities, which have been moderately effective (60.0%).

Conflict Resolution

Close to 60% of the respondents resolved the human-wildlife conflict by reporting to the local authority, while (31.7%) of them resolved the conflict through the intervention of the park management. The majority of the respondents claimed that they normally reported their cases to the park management whenever an invasion of wildlife occurred in their farms, moderate percentage (24.2%) indicated that wild animals were always chased off their farmland, while at least (6.7%) of the respondents killed the animals that raided their farmland.

Table 4. Factors responsible for human-wildlife conflicts and their resolution by the park authority

Variable	Frequency	Proportion (%)
Have you experienced a human-wildlife conflict in the park?		
Yes	107	89.2
No	13	10.8
How does a human-wildlife conflict affect the management and conservation of the resources in the park?		
Affecting much	38	31.7
Not really affecting	80	66.7
Not affecting at all	2	1.7
What do you consider as the major problem causing the human-wildlife conflict along the border of the park?		
Grazing on farms by game	39	32.5
Hunting inside the park	45	37.5
Logging of wood	9	7.5
Farming inside the park	22	18.3
Others	5	4.2
How frequently does the activity occur?		
Very often	22	18.3
Often	84	70.0
Not often	14	11.7
What are the procedures in place to prevent the human-wildlife conflict?		
Anti-poaching patrol	48	40.0
Conservation education	72	60.0
How effective are the procedures?		
Very effective	43	35.8
Moderately effective	72	60.0
Marginally effective	5	4.2

Source: Field survey, 2021

DISCUSSION

Socio-economic characteristics of the respondents

The ecological relationship between humans and wildlife is the most challenging and debated issue. As both of them increasingly find themselves competing for space, a continual struggle for resources on the official conservation territory leads to a human-wildlife conflict. Farming was the main occupation among the respondents living in the vicinity, and the crop damage done by wild animals was reported as great. Cassava was the most damaged and affected crop and a possible reason for this may be its large-scale production and high palatability. As reported for the Kainji Lake National Park (KLNP), crops such as maize, cassava, rice, sorghum, yam were the major target of wildlife such as Primates, Rodents, and Aves (Ogunjobi & Adeola, 2016).

Table 5. Methods adopted for human-wildlife conflict resolution

Variable	Frequency	Proportion (%)
How do you resolve the conflict?		
Local authority	71	59.2
State government	7	5.8
Park management	38	31.7
Others	4	3.3
What type of action do you take when wild animals invade or destroy your farm?		
Kill the animal	8	6.7
Chase the animal away	29	24.2
Report to the park management	77	64.2
Others	6	4.9

Source: Field survey, 2021

Economic evaluation of the human-wildlife conflicts among the farmers

The human-wildlife conflict remains a re-occurring issue in the OONP. The observed distribution of the respondents across the sub-classes of age, marital status and household size implies the almost equal presence of youth, adults and aged people who were inhabitants striving to make ends meet (Wahab et al., 2021). It was observed during the study that the majority of farms were severely destroyed by wild animals in the park. The most frequently seen animals damaging farm crops were primates, especially Patas Monkey (*Erythrocebus patas*), followed by Warthog (*Phacochorus equines*) and other small animals such as Land squirrel, Cane rats (*Thryonomys swinderianus)*, Duikers, etc. These observed animals were similar to that found by Ogunjobi & Adeola (2016) in the Kainji Lake National Park. They reported that Olive baboon (*Papio anubis*), Patas monkey (*Erythrocebus patas*) and Green monkey (*Chlorocebuss abaeus*) were the primates responsible for the raiding of farms in the Borgu sector of the Kainji Lake National Park, and the Filinga Range of the Gaska-Gumti National Park.

Attitude of local people towards the park establishment

Nearly all respondents supported and believed in the establishment of OONP in their community. In their little ways, a large majority have helped by several means to protect and conserve the park resources by reporting contravenes of park rules to the local authority or to the park management. They pointed to the destruction of their farms by marauding animals as the main challenges in their various communities after the establishment of the national park (Weinmann, 2018).

Human-Wildlife Interaction

The Human-Wildlife interactions in the buffer zone of protected areas have been a source of conflicts in recent years. The local residents at OONP have faced four major problems. The most problematic wild animals encroaching their farms were Primates (especially *Erythrocebus patas*, Patas Monkey). The crop damage was the major problem faced by the inhabitants of the Park. Cassava, maize and yam were the major crops being damaged. The chances for conflict between human and primate animals were high; nevertheless, human casualties were reported for a very few cases.

The observations revealed that the croplands were mostly damaged at the northern part of the Park. There was no reported case of human casualty caused by wildlife. Most of the inhabitants did not use any type of technique to prevent the entrance of wild animals into their farms except for a few who used fencing, scarecrows, guarding and a combination of various techniques. Wildlife conservation was found to be positively viewed by the local inhabitants. The importance of wildlife conservation was significantly perceived differently. A little above the average share of the local inhabitants expressed dissatisfaction with the conflict management efforts of the park authorities. The study revealed that most inhabitants were aware of the wildlife conservation management which is a good sign in conflict mitigation and reduction strategies. A systemic review of the buffer zone community support program implementation should be well understood and designed as improved strategies and policies for compensating crop destruction in the direction of changing people's perception of wildlife management.

Human-wildlife conflict resolution

The respondents viewed the human-wildlife conflict as an issue on their farms. The major mechanism for conflict resolution was applied through the intervention of the local authorities and later the park management. The crop-raiding wild animals have absolutely reduced the expected annual income of farmers from crop cultivation on their farms. Some of them employed as measures the use of scarecrows or guards so that their presence created sounds that scared off the wild animals. These measures were corroborated by the reports of Eniang et al. (2011) in the Filinga range of the Gaska Gumti National Park, Nigeria; Ogunjobi & Adeola (2016) for "wild vertebrates associated with crop raiding around the Kainji Lake National Park, Nigeria"; Magama et al. (2018) study on the "human-wildlife conflict in the Yankari Game Reserve, the Bauchi State, Nigeria"; Geleta et al. (2019) on the "human-buffalo conflict around the Jorgo-Wato Protected Forest, Western Ethiopia"; Odunlami & Osumenya (2020) for the "Human-Wildlife Conflict in Protected Areas in Nigeria: Dimensions and Solution" that elaborated on measures such as guarding the crop fields, chasing animals away, using scarecrows, shooting, making fences and trenches.

Human-conflict resolution done by the park rangers

The park rangers reported the frequent farming along the boundary of the park, hunting inside the park and grazing on farm by game as the main causes of the human-wildlife conflict (Kiondo *et al*., 2019). Conservation education was addressed as the main management tool that can help reduce, and even prevent the human-wildlife conflict. It was reported to have been judiciously effective in preventing conflicts (Chikezie et al., 2023).

CONCLUSION

The abundance of crop cultivation near the buffer zone of the park was observed to be the cause of the human-wildlife conflicts. A key perpetrator in this regards were the primates who caused wanton destruction to the crop farms, thus provoking poaching in retaliation – a practice that was often contested by the park administration. However, the crop losses were not compensated neither by the park authority, nor the government. The destruction occurred mostly during the rainy season when farming activities were at their peak. Although, a peaceful coexistence was established between the community dwellers and the park authority, the activities of marauding wild animals on farmland was a major cause of conflicts between them. Therefore, it is proposed that the park administration should prevent the excessive trespassing of wild animals and provide effective surveillance of the park boundary as a

way of discouraging the practices of illegal farming in the park buffer zone. Also, conservation education should be integrated to help people recognize the value of the park for the socio-economic prosperity of the community. In addition, the community stakeholders should be incorporated into the park administration and management.

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