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Traditional knowledge, attitude and behaviour of indigenous people towards endangered wildlife conservation in Kon Plong District, Vietnam

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Abstract. Indigenous knowledge, attitudes, and perceptions of local people are very important concepts for wildlife conservation. Endangered wildlife species that live in Kon Plong forests have been under pressure from the communities living around them, including wildlife hunting, trapping, capturing, illegal logging, and encroachment for residential and production land. This study aims to understand the knowledge, attitude, and behaviour of indigenous people towards endangered wildlife in order to protect these species. Some participatory rural appraisal tools were used to discuss the situation and collect information in nine villages of four communes in Kon Plong District from December 2019 to March 2020. The results showed that the levels of knowledge about endangered wildlife among indigenous people in communes were statistically different. People's knowledge of the law influenced their behaviour. Gender had the greatest influence on the level of knowledge. Most indigenous people had a positive attitude and wanted to protect endangered animals. "Commune" and "culture" were the two factors affecting people's attitudes. "Commune", "culture", and the level of understanding affected the hunting behaviour of people. Negative human impacts have seriously influenced endangered wildlife species. Therefore, it is necessary to develop a long-term conservation strategy and plan, including the establishment of Kon Plong Special-Use Forests, supporting livelihoods for local people, communicating, and raising awareness among local people, and increasing the participation of community organisations.

Keywords: community conservation, ethnic minorities, Kon Plong Forest, endangered wildlife, PRA tools, SPSS.

1. Introduction

Healthy natural ecosystems can maintain their structures and functions, ensuring the generation and maintenance of natural capital stocks delivering ecosystem services flows vital for human well-being (Grande et al., 2023). Protecting endangered wildlife is one way to protect healthy natural ecosystems. Traditional knowledge and perceptions of indigenous people toward endangered wildlife are very important in the conservation of rare and endangered

wildlife in an area (Gadgil & Berkers, 1993; Mekonen, 2017). They are a combination of knowledge, experiences, as well as the thoughts and beliefs of indigenous people related to wildlife conservation. The study of the traditional knowledge of indigenous peoples to serve conservation has been carried out in countries around the world such as Australia (Pearson et al., 2022), Kenya (Low et al., 2009), Philippines (Wojciechowski et al., 2021), Ethiopia (Mekonen, 2017) Lesotho (Tßepo & Chaba, 2004). Knowledge of endangered wildlife values forms the attitudes and perceptions of locals, which will partly determine the conservation behavior of endangered wildlife species. The success of wildlife conservation depends on local people's awareness and attitudes towards conservation (Allendorf et al., 2012). In other words, "community conservation" can be highly effective for conserving natural resources. "Community conservation" approaches aim to satisfy the needs and aspirations of indigenous peoples by empowering them, promoting their active participation in resource management, and improving their economic well-being (Songorwa, 1999; Infield & Namara, 2001; Mehta & Heinen, 2001). Additionally, various party's collaborations have been shown to successfully increase support for environmental and endangered species conservation efforts (Fajrina et al., 2023). Environmental education is also a way to increase the effectiveness of managing endangered animals (Jha et al., 2021). People working as conservation volunteers is one of the effective ways to manage biodiversity and protected areas (Koleva et al., 2024). In short, preserving endangered animals in particular and biodiversity in general requires the cooperation of all local communities and policymakers.

In Vietnam, studies on traditional knowledge, attitudes, and behaviors of indigenous people applied to the conservation of endangered wildlife in particular and biodiversity in general are still limited. Studies are mainly community forestry, in which the study of forest resource management is based on community (Thuan, 2002) or proposed mechanisms for monitoring biodiversity with the participation of the locals (Hai, 2016), (Long et al., 2016). Some projects of international conservation organizations such as FFI Vietnam and WWF Vietnam used the KAB (Knowledge, Attitude, and Behavior) questionnaire to collect information from the people in order to develop communication strategies for indigenous people and change the locals's habits and behaviors towards the conservation of some endangered animal species and forest resources. Traditional knowledge of indigenous people, especially ethnic minorities, is very rich and diverse (Bruchac, 2014), but its values have not been exploited yet. Specifically, there have been no scientific studies on indigenous knowledge of the locals applied to endangered animal conservation. Therefore, the conservation of forest resources and endangered wildlife in areas in Vietnam is only protected in accordance with state regulations and laws and is implemented mainly by resources outside the indigenous communities.

The Kon Plong Forest is considered one of the highest biodiversity areas in Vietnam (Wearn et al., 2021). There are 40 mammal species and 202 bird species found in the Kon Plong Forest, of which 79 are listed in the Vietnam Red Data Book (Wearn et al., 2021). There are 500 Grey-Shanked Douc Langur (*Pygathrix cinerea* Nadler, 1997) individuals, which are endemic primates and are listed in the IUCN Red List as Critically Endangered (CR) species (Wearn et al., 2021). There are 200 Northern Yellow-Cheeked Crested Gibbon (*Nomascus annamensis* Van Ngoc Thinh, Mootnick, Vu Ngoc Thanh, Nadler & Roos, 2010) individuals that are listed as endangered (EN) species in the IUCN Red List (Wearn et al., 2021). However, Kon Plong natural forest has not been strictly protected because it is not a protected area (e.g. a Special-Use Forest). Hunting, trapping, and catching illegal wildlife take place quite often, causing biodiversity to decline sharply in the near future (Wearn et al., 2021). Studying the traditional knowledge, attitudes, perceptions, and behaviors of indigenous people living near the forest towards the conservation of endangered wildlife species is essential in order to contribute to the development of an action plan to conserve wildlife in the area.

The purpose of the article includes (i) describing and analyzing the traditional knowledge and awareness of indigenous people for the conservation of endangered wildlife; (ii) assessing the attitudes of indigenous people in the study area towards endangered wildlife conservation; (iii) describing and analyzing the behavior of indigenous people towards endangered species; and (iv) proposing solutions to improve the efficiency of endangered wildlife conservation in the study area.

2. Methods and Materials

2.1. Study area

The study was conducted in Kon Plong district, which is located in the northeast of Kon Tum province, Vietnam (14° 42' 0" N, 108°15' 0" E, Fig. 1). The study area encompasses a tropical humid monsoon montane climate, characterized by exceptionally high biodiversity within the Kon Plong forests. The Kon Plong forests are a combination of many forest types such as: tropical evergreen broadleaf forest, subtropical evergreen broadleaf montane forest (with dominant species be long to families of Fagaceae, Theaceae, Magnoliaceae, Rubiaceae, Elaeocarpaceae, Rhodoleiaceae, Lauraceae, Rosaceae, Symplocaceae, Annonaceae, Meliaceae, Euphorbiaceae, Arecaceae, Euphorbiaceae, etc.), mixed

broadleaf and coniferous forest (dominant coniferous species are *Dacrydium elatum* (Roxb.) Wall. ex. Hook., *Dacrycarpus imbricatus* (Blume) de Laub., *Podocarpus neriifolius* D. Don and *Pinus dalatensis* Ferré), and subtropical evergreen coniferous montane forest with dominant species of *Pinus merkusi* Jungh. & de Vriese, as recordeded in biological assessment of Kon Plong Forest Complex by Eames et al. (2001). The natural forests here are the protection forest under the management of the Thach Nham Protection Forest Management Board and the production forest under the management of the State Forestry Company in Kon Plong district. The total forest area is 113,469 hectares, accounting for 83% of the total natural area of the district (Kon Plong District People's Committee, 2000). Indigenous people living in the area are ethnic minorities, accounting for 83.57% of the district's population, with the main ethnic groups of Ka Dong, M'Nam, Xe Dang, and some other ethnic groups (Kon Plong District People's Committee, 2000). The study's survey was conducted in nine target villages, whose names are given in Figure 1. These villages were located in four communes: Dak Ring, Dak Tang, Mang Canh, and Ngoc Tem. Among these four communes, Mang Canh commune and Ngoc Tem commune are geographically close to Mang Den town – the national eco-tourism area while Dak Tang and Dak Ring are geographically further away. Therefore, there are differences in approaches to external cultures between these communes. Criteria for selecting target villages include: 1 – villages' indigenous people whose lives depend heavily on forest resources (agricultural land, timber and non-timber forest products, animals, and other resources); 2 – villages' indigenous people have a good knowledge of forests; 3 – villages' indigenous people from diverse ethnic groups such as Ka Dong, M'Nam, and Xe Dang represent the communities of the Kon Plong district; 4 – villages' people participate in forest management and protection activities; 5 – villagers have high community activities, not much affected by urban culture.

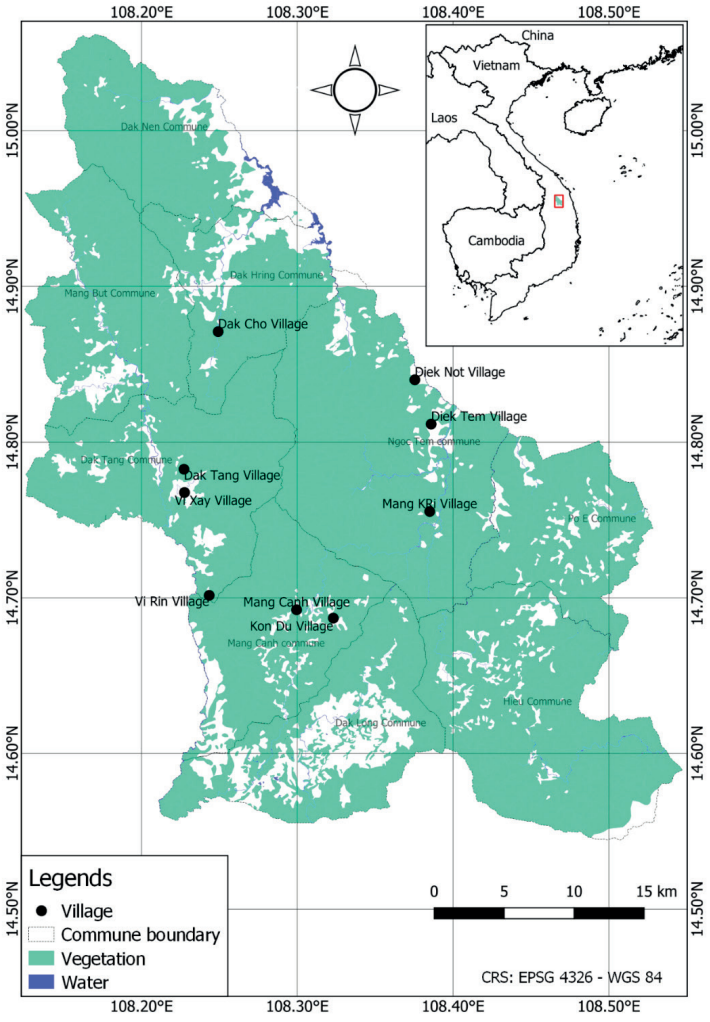

Figure 1. Location map of nine target villages in Kon Plong District

2.2. Data collection

Some participatory rural appraisal (PRA) tools were used to investigate and collect information from the indigenous community on biodiversity conservation (Bui Dinh Toai & Ngai, 1998) (Nguyen Duy Can & Vromant, 2009), including methods of using household interview tools such as questionnaires and semi-structured interviews.

The questionnaire was designed to include fields that need to be interviewed, such as knowledge, attitude, behavior, awareness, ability, and level of participation of local people in conservation. The KAB survey questionnaire was used to assess indigenous people's knowledge, attitudes, and behaviors towards resource conservation and management. The system of survey questions was included in the ArcGIS survey 123 software (https://doc.arcgis.com/en/survey123/reference/whatissurvey123.htm). The interviewers used their smartphones, which contained a questionnaire, to interview and enter answers directly on the device.

A semi-structured questionnaire with open-ended answers was designed to collect information on the beliefs, customary law, and conservation participation of indigenous people in endangered wildlife by means of group discussions and interviews with village leaders and knowledgeable people in the village.

We conducted a survey of 218 questionnaires representing households living in nine villages in four communes, including Dak Tang, Dak Ring, Mang Canh, and Ngoc Tem. The principle of selecting households was based on the list of households in villages with forest-dependent living that were easily accessible for interviews. The study conducted interviews with household representatives with a male-female ratio of approximately 1:1. Ka Dong people interviewed for the highest proportion with 58.7%; the rest are Xe Dang (21.6%), M'Nam (14.2%), H're (2.8%), Kinh (2.3%), and Thai (0.5%). The main occupations are farmers (94%); the rest are civil servants, teachers, and hired workers (6%). The ages 20–35 accounted for 56%, followed by the ages 36–60, which accounted for 33%. The poor households had the majority of samples (29%), the rest were near-poor households, and average people were approximately the same, from 19% to 26%.

2.3. Data analysis

The primary data were converted from smart phone to MS Excel 2016 (Nam, 2016), then transferred to the SPSS version 26 software (IBM Corp. in Armonk, NY, USA) (Nguyen Hai Tuat & Binh, 2005). We coded and converted the collected data from text to numerical form in hierarchical order (in ascending order for education level, occupation, level of knowledge) and (in ascending order for village and commune variables far from town areas, close to town, major roads). Shooting behavior variable from yes (yes = 1) to no (no = 2). Economic and occupational variables are coded in ascending order of income. Age variable coded in ascending order of age; sex variable (male = 1, female = 2) and ethnicity variable automatically coded.

The chi-square test of independence was used to ascertain whether there was a statistically significant association between two category variables after the variables had been coded (Zar, 1999). Over the categories of the second nominal variable, the frequency of each category for one nominal variable was compared (Zar, 1999). Each row indicated a category for one variable, and each column represents a category for another variable in a contingency table that showed the data. For this test, the null hypothesis was that there was no correlation between the nominal variables. The alternative hypothesis was that they were connected somehow (Zar, 1999).

$$\chi^2 = \sum \frac{(f_i - f_e)^2}{f_e} \quad (1)$$

In which: χ^2 was the Chi-square test, f_i was the observed frequency, and f_e was the expected frequency.

Multiple linear regression analysis between one dependent variable (Y) and many independent variables (X) was applied to identify significant factors influencing the dependent variable. The multivariate equation form was used as follows:

$$Y = \beta_o + \beta_1 * X_1 + \beta_2 * X_2 + \ ... + \beta_n * X_n + \varepsilon_i \quad (2)$$

where: Y was the dependent variable;
Xi was the independent variable;
and ε_i was the random error.

3. Results

3.1. Traditional knowledge and perception of indigenous people regarding endangered wildlife animals

Survey results showed that indigenous people's understanding of endangered animals was still limited. Specifically, the percentage of people who have little knowledge (can list one species or describe few details) is the highest at 47%. Meanwhile, the percentage of people who had good knowledge (can list 4–5 species; describe 4 or more details for each species) and had moderate knowledge (can list 2–3 species; describe 2–3 details for each species) accounted for 17% and 19%, respectively. The rest of the people didn't know, didn't care or didn't answer about endangered animals.

Among those who knew a lot endangered animals, the proportion of men accounts for 89% while women only accounts for 11%.

The levels of knowledge about endangered wildlife of indigenous people in communes were statistically different (chi-square test, p-value=0.006). The Dak Ring commune had the highest percentage of indigenous people who knew a lot about endangered wildlife in the four communes, accounting for 30%. The Dak Tang commune had the second highest rate of knowledge compared to other communes, accounting for 22%. In Mang Canh and Ngoc Tem communes, the percentage of indigenous people who knew a lot is only 10% and 11%, respectively. The results showed that the communes with indigenous people living near the forest and heavily dependent on the forest (Dak Ring, Dak Tang) had a higher level of understanding than the communes further away from forests and less dependent on the forest (Mang Canh, Ngoc Tem).

In addition to the results related to wildlife in general, the study also delved into exploiting indigenous people's knowledge about the Grey-shanked Douc langur and some other endangered animals. Grey-shanked Douc Langur (*Pygathrix cinerea*) was an endemic primate in Vietnam, Critically Endangered (CR) in the IUCN Red List of Endangered Species and Vietnam Red Data Book. Among the endangered wildlife species, the Grey-shanked Douc Langur was recognized by many indigenous people with a rate of 59%, followed by the Northern Yellow-Cheeked Crested Gibbon (*Nomascus annamensis*) by 30% of the indigenous people. Some species, such as the Asian Black Bear (*Ursus thibetanus* Cuvier, 1823), monkeys such as the Rhesus Monkey (*Macaca mulatta* Zimmermann, 1780), Northern Pig-tailed Macaque (*Macaca leonine* Blyth, 1863), and Stump-tailed Macaque (*Macaca arctoides* Geoffroy Saint-Hilaire, 1831), Sunda Pangolin (*Manis javanica* Desmarest, 1822), and Pygmy Loris (*Nycticebus pygmaeus* Bonhote, 1907), were less recognized by people.

The indigenous people described some endangered animals along with their distribution locations in Kon Plong Forest. "The Grey-Shanked Douc Langur usually lives in the headwaters of clean water and reproduces in October and spring. They have the habit of holding babies in their stomachs like humans. They walk on the ground and hang on trees. They often eat leaves and fruits. They usually live in

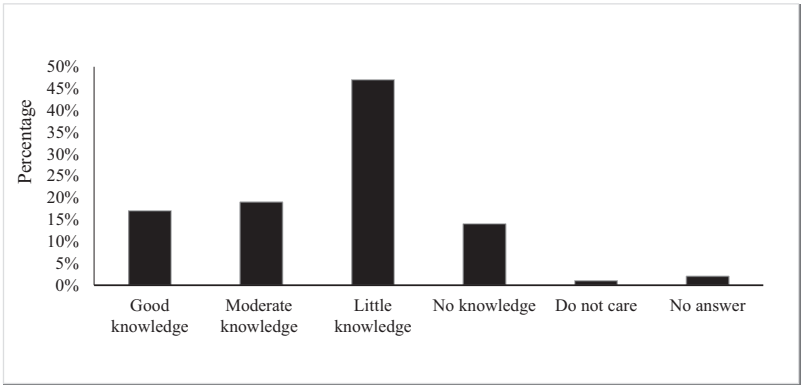

Figure 2. Percentage of indigenous people's knowledge about endangered animals

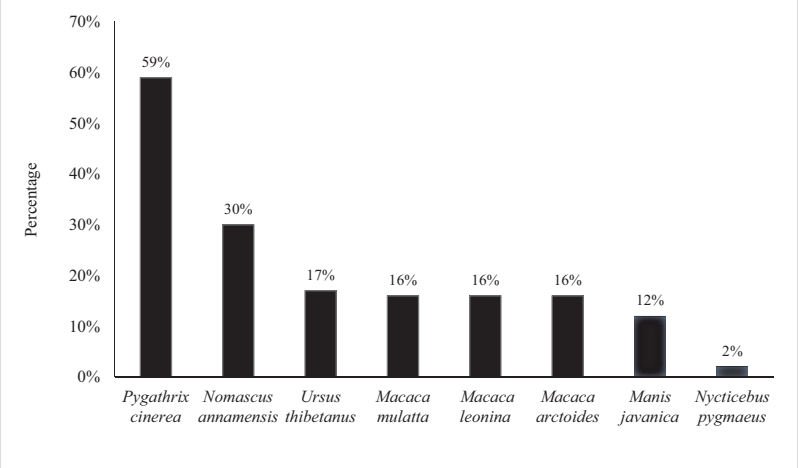

Figure 3. Percentage of indigenous people recognized endangered wildlife species

herds of more than 10 individuals, with a large male leading the pack, followed by many females." If, unfortunately, the langurs got caught in a trap, they would sound like sick people, making indigenous people feel sorry for them.

According to indigenous people in Dak Tang village, "the Northern Yellow-Cheeked Crested Gibbon lived in the Nuoc Ti Forest and Ngok Boc Forest, which were behind Dak Tang village. They lived in pairs consisting of one black individual and one yellow individual. They usually sing in the early morning; males and females sing at the same time. Indigenous people abstained from letting the urine of this species hit people because it brought unlucky things to them. Indigenous people didn't hunt the Northern Yellow-Cheeked Crested Gibbon because it was taboo, and they thought that anyone who hunted them would suffer illness and death."

In addition, the Dak Tang village's people also gave some information about other endangered species, such as Asian Balack Bear, Sunda Pangolin, Owston's Civet (*Chrotogale owstoni* Thomas, 1912), and Mainland Serow (*Capricornis sumatraensis* Bechstein, 1799). "The *U. thibetanus* usually lives in the Xay water area, Ngok Boc Mountain. Indigenous people rarely see the Asiatic Black Bear and have no taboos about this species. The *M. javanica* usually lives in low-impact forest areas with many large trees and holes. The *C. owstoni* usually lives in small, old-growth forests. The Owston's Civet is fragrant, which we often smell it like sticky rice on their way. The *C. sumatraensis* usually lives in old-growth forests far from residential areas such as the Nuoc Oi area. They like to eat taro's leaves, often walk on fallen tree trunks, and breed in winter."

The Dak Cho village's people told each other that: "There were many Strychnine (*Strychnos nux-vomica* L.) tree fruits that were poisonous fruits in the forest. Gibbon, monkey, and langur species usually ate these fruits, then threw them away and didn't let them fall into the stream that brings water to the village. On the contrary, if the Strychnine fruits fell into the water stream, indigenous people who drank that water would easily get sick, especially abdominal pain." Thus, primate species had partly helped indigenous people avoid diseases by using water from natural springs.

The Ka Dong ethnic minority people still believe in celebrating the "Tết Khỉ" (Monkey Festival) every year in February. According to the indigenous people, the previous generation saw the Monkey individuals go to villages dancing and joking happily, so the people also imitated the ceremony, including making "bánh sừng trâu" (croissants from glutinous rice) and cooking wine to share in the fun with the whole village. Since then, Ka Dong people have had Monkey Festival so that everyone can be happy after the harvest. Thereby, it proves that indigenous people from the past have cherished primates and learned good and positive things from them. Moreover, the indigenous people in Dak Cho village of Dak Ring commune also expressed their appreciation for the song of the gibbon. According to indigenous people, the song of gibbons in the early morning made people feel refreshed, and people would feel sad without their songs.

The traditional knowledge of indigenous people about the laws (legal and illegal) of actions related to endangered animals was relatively good. Over 50% of people correctly answered the behaviors that were prohibited by the government (illegal). Indigenous people answered that illegal activities include hunting endangered wild animals (95%), setting traps in protected forests (93%), raising endangered animals for commercial purposes (74%), catching endangered animals and keeping them for ornamental purposes (82%), using some parts of endangered animals for jewelry or home decoration (79%), wildlife trading and transportation (91%), hunting for endangered birds in your garden (79%), and fishing with explosives and pulses (81%).

The results of $\chi 2$ analysis showed that there was a clear relationship between people's perceptions and behaviors related to endangered wildlife (Sig < 0.05). In other words, the people's perception of the law influenced their behaviors (chi-square test, p-value < 0.05).

Table 1. Number of households aware of the law of wildlife-related behaviors

Contents	Legal	Illegal	Unknow-ability
Hunting endangered wildlife	7	187	24
Raising endangered animal species	26	161	31
Using endangered wildlife for jewelry or for home decoration	39	124	55
Wildlife trading and transportation	39	151	28
Fishing with explosives and pulses	13	188	17

The results of the analysis of the influence of social, economic, and cultural factors on the levels of understanding are presented in the table below. The analysis results showed that of the test factors, the gender factor had the greatest influence on the level of knowledge (sig < 0.05). The correlation between gender and level of knowledge was a negative correlation (Beta<0). According to that result, men had a better level of knowledge than women.

3.2. Indigenous people's attitude towards endangered animals

Most indigenous people had a positive attitude and wanted to protect endangered animals. In particular, 95% of

Table 2. Results of multivariable regression analysis between the level of understanding of forest animals (dependent variable) and social, economic, and cultural factors (independent variables)

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	4.784	.509		9.396	.000
Age	.023	.094	.016	.240	.811
Sex	-.941	.120	-.493	-7.840	.000
Ethnic	.037	.038	.066	.973	.332
Culture	.074	.061	.084	1.214	.226
Economic	.025	.052	.031	.480	.632
Commune	-.104	.059	-.123	-1.770	.078
Village	-.028	.023	-.083	-1.241	.216
Main career	.040	.115	.022	.344	.731

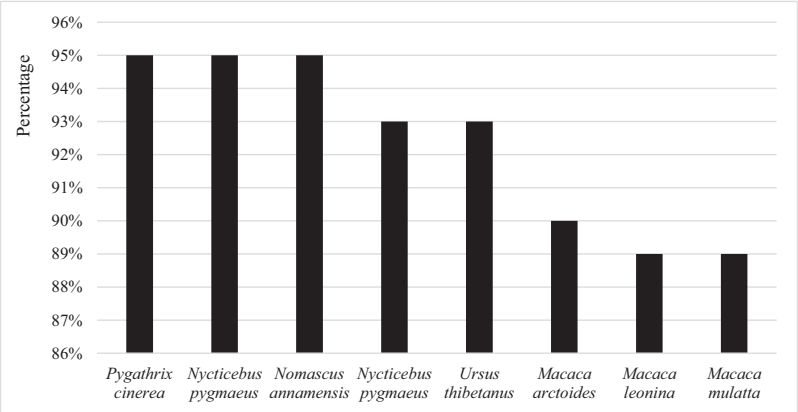

Figure 4. Indigenous people's attitude towards the protection of endangered wildlife (Agree)

Table 3. Results of multivariable regression analysis between the people's attitude variable when endangered wildlife species decline and social, cultural, and economic factors

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	2.398	.783		3.062	.002
Age	.187	.146	.098	1.282	.201
Sex	-.124	.185	-.047	-.671	.503
Ethnic	.039	.060	.051	.662	.509
Culture	.188	.094	.155	2.004	.046
Economic	.076	.081	.067	.935	.351
Commune	-.211	.092	-.182	-2.302	.022
Village	.005	.035	.010	.135	.893
Main career	-.078	.179	-.031	-.437	.663

interviewees agreed to protect critically endangered species such as *P. cinerea*, *M. javanica*, and *N. annamensis*. 93% of interviewees agreed to protect *N. pygmaeus* and *U. thibetanus*.

The results of the relationship analysis between social, economic, cultural, and social factors and people's attitudes towards the decline of primate species showed that "commune" and "culture" were the two factors affecting the people's attitudes (sig < 0.05), in which the "commune" factor had a stronger influence than the "culture" factor. The "commune" factor had a negative relationship (Beta < 0) with people's attitudes towards the decline of primates. The cultural factor had a positive relationship (Beta > 0) with people's attitudes towards the decline of primates. Specifically, indigenous people with a higher level of culture had more

negative attitudes (more sadness and regret) towards the decline of primates. They understood the feeling of a lack of endangered animals.

3.3. Indigenous people's behavior towards endangered wildlife

Negative behaviors

The survey results showed that 68% of households reported that they did not practice hunting. The reason was that forest animals had decreased. They had gone hunting so many times without catching anything, so they were discouraged from hunting activities. At the same time, they were afraid to use guns for fear of shooting the wrong person while hunting. They did not set traps for fear of hitting endangered animals so that they would be fined and likely to go to prison. Indigenous people who heard propaganda from forest rangers also realized the need to protect wildlife. It was also easy to buy food such as meat, fish, and vegetables due to convenient transportation and small traders selling food to the village every day, so people did not have difficulty getting food.

The results of the relationship analysis between hunting behavior and socio, economic, and cultural factors showed that three factors including commune, culture, and level of understanding of forest animals, affect the hunting behavior of people (sig < 0.05). The relationship between factors of commune, culture, and level of understanding and hunting behavior was negative (Beta < 0). Among all social, economic, and cultural factors, the commune factor had the greatest influence, followed by cultural factors and the level of understanding of forest animals.

Positive behaviors

Currently, indigenous people are participating in forest protection by contracting for it and regularly patrolling the forest. Although indigenous people's participation in forest protection had only focused on monitoring forest deforestation and encroachment, they had not paid attention to monitoring endangered animals. However, the patrolling of the indigenous people also made hunters be wary and avoid meeting, so there was a part of limiting the hunting behaviors of outsiders.

3.4. Proposed solutions for endangered wildlife conservation

Kon Plong Forests have had many endangered wildlife species, but they were still forests with protection and production functions. Therefore, the research results showed that the management and protection of endangered animals in particular and natural forests in general were not strict, leading to the extinction of many animal species. Meanwhile, this area had a high biodiversity value and qualified as a Special-Use Forest. Therefore, authorities should soon have a plan to convert forests into special-use forests to better manage and protect biodiversity here.

Environmental protection is often considered as competing with human activities and economic development (Viglia et al., 2013). Thus, it is necessary to increase resources to support livelihoods for indigenous people, from which they can reduce their dependence on forests and participate in better conservation of endangered animal species; to promote positive traditional cultures of the indigenous people, such as eating "Tết Khỉ", loving the songs of gibbons, traditional knowledge about the ability to protect the watersheds of primate species, and taboo hunting primates; and to attract many experienced indigenous people to join the forest protection force and contract to protect the forest. Developing models of community forests for self-management, co-management, or participatory management based on the traditional knowledge of indigenous people. Strengthening

Table 4. Results of multivariable regression analysis between wildlife hunting behavior and socio, cultural, and economic factors

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	2.665	.303		8.805	.000
Age	-.071	.047	-.112	-1.511	.132
Sex	.032	.068	.037	.474	.636
Ethnic	.004	.019	.017	.230	.818
Culture	-.084	.030	-.211	-2.789	.006
Economic	.020	.026	.054	.779	.437
Understanding forest animals	-.075	.035	-.166	-2.161	.032
Commune	-.117	.029	-.307	-4.012	.000
Village	-.015	.011	-.095	-1.298	.196
Main career	.029	.057	.035	.502	.616

legal knowledge and equipping new skills and technologies for endangered animal monitoring for indigenous people to incorporate into forest protection patrols. Increasing indigenous people's awareness of the benefits and values of endangered wildlife conservation through media such as radios, televisions, and smart phones in order to help change the attitudes of locals towards conservation.

Currently, there are not many communities conservation and development organizations coming and supporting at the Kon Plong district. Therefore, it is necessary to strengthen the support of NGOs and state organizations in technical and financial terms so that indigenous people can improve their knowledge and skills in the management and protection of forests and endangered animals.

4. Discussion

Through the results of multivariate regression analysis between social, economic, and cultural factors and awareness, attitude, and behavior of indigenous people toward endangered wildlife, three factors including gender, culture, and commune, had strong influences on people's awareness, attitude, and behavior.

Men often implement activities in the forest, such as wildlife hunting, trapping, and catching; logging for houses; and patrolling the forest, so their knowledge about endangered animals will be greater than that of women at home or around the fields. Indigenous people in the target communities were under a matrilineal regime (the woman was the head of the household) (Nguyen K.C. & Nguyen D.C., 2011). However, hunting and going to the forest were mainly done by men. These are also the traditional works that previous generations of ancestors still implement: men have hunted and women have gathered (Lee & DeVore, 1968), (Dahlberg, 1983). Another study in the world said that women still participate in hunting activities (Anderson et al., 2023). However, we did not find the female's role in hunting in our study.

The results showed that the higher the cultural level, the more regretful and sad indigenous people feel, but they do more hunting in the forest than those with a low cultural level. This can be explained by the fact that although they regret endangered animals, due to the difficult economic life and high economic value of hunting wildlife, they continue to participate in hunting. Indigenous people understand the values of wildlife, so when they think about the decline of endangered wildlife species, they will feel even more sad. Kideghesho et al. (2006), Mutanga et al. (2015) showed that people with a high level of education have a more positive perception of wildlife reserves and conservation than those with a low level of education (Kideghesho et al., 2006), (Mutanga et al., 2015). Indigenous people with more education have better access to jobs, providing alternative livelihood strategies that reduce reliance on resources from protected areas for survival. Thus, indigenous people with a high level of education will be the ones who have the ability to determine the effectiveness of "community conservation" (Njukang et al., 2019). Therefore, it is necessary to pay attention to the perceptions, attitudes, and behaviors of highly educated people to help them better conserve endangered wildlife.

Indigenous people living in Ngoc Tem and Mang Canh communes had more negative attitudes than locals living in Dak Tang and Dak Ring communes when primate populations declined. They felt sad and regretful and thought that action should be taken if the primate species declined. This could be explained by the fact that indigenous people in Ngoc Tem and Mang Canh communes had few chances to see endangered primates, so the negative attitude was evident in the people. Meanwhile, indigenous people in Dak Tang and Dak Ring communes still saw primates and heard gibbons sing, so they hadn't thought about the feeling of decline or loss of primate species.

The commune factor had the greatest influence on hunting behavior, followed by cultural factors and the level of understanding of forest animals. This could be explained similarly: communes that were close to the forest or nearly hunting and trading areas, would carry out hunting activities more than communes that were far away or did fewer hunting activities. Next, cultural level affects hunting behaviors. Specifically, the higher the cultural level, the more likely indigenous people were to hunt wildlife. The reason may be that some indigenous people have high awareness of the value of wildlife. They saw profits from trading and hunting animals. The factors of understanding forest animals and hunting behaviors were related together. Specifically, the more they perform hunting behavior, the more forest animals are known.

From the results, it is necessary to extract positive traditional knowledge from men about understanding endangered species and the distribution of endangered wildlife for participatory animal conservation monitoring. In addition, it is necessary to share thoughts and attitudes that want to conserve endangered wildlife with all communities, especially those living near forests.

In general, the communities here are knowledgeable about wildlife. They understand the importance of animal conservation, and they themselves have the responsibility to preserve the endangered wildlife in their homeland. Therefore, communities must be key factors participating in conservation activities. Solutions to conserve endangered animals in particular and wildlife in general must rely on the knowledge of local communities (Gadgil & Berkers, 1993;

Mekonen, 2017). If communities are more empowered in decision-making, community-based conservation activities will be more effective (Songorwa, 1999; Infield & Namara, 2001; Mehta & Heinen, 2001).

5. Conclusions

Indigenous people in Kon Plong district had a rich traditional knowledge of endangered wildlife species, although their understanding of how wildlife was endangered was still limited. Men have better traditional knowledge than women because they often go hunting in the forest. Most of the interviewees agree to protect endangered wildlife species such as grey-shanked douc langur, northern buffed-cheeked gibbon, bear, and pangolin because they have brought spiritual values to indigenous people, such as love and songs every day. Geographical (commune) and cultural factors are two factors that have a great impact on attitudes about the decline of endangered wildlife and hunting behavior. Specifically, indigenous people in communes near the forest, far from the town area, have not seen the decline of any primates, so they do not feel sad or regret if primates are decreasing compared to indigenous people in communes near the town area. The more culturally educated indigenous people are, the more negative attitudes they have towards the decline of primates. Indigenous people who live near the forest hunt more than people far away. The higher the cultural level, the more indigenous people hunting. Indigenous people who hunt a lot know a lot about forest animals.

Kon Plong Special Use Forests should be established soon to increase the rigor of the conservation of endangered wildlife. In addition, it is necessary to focus on developing indigenous people's livelihoods so that people can reduce their dependence on the forest. At the same time, increasing the participation of social organizations to support the improvement of knowledge and skills in forest resource management in general and endangered wildlife in particular.

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