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Community attitude towards lion's conservation in Waza National Park, Far North Region, Cameroon

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ABSTRACT

Survey on attitudes are essential tools for social impact assessment and are widely used in the conservation sector. This survey was carried out in Waza National Park, North Region of Cameroon. The aim of this study was to determine the attitude of the local community towards the conservation of lions and specifically, to assess the attitude of the local people towards lions and conservation to determine their view towards human-lion conflicts and to evaluate Government's compensation on attitude of the local people towards lion and conservation. Questionnaires were used to collect information in this study. A total of 166 questionnaires were distributed to people who own livestock according to their availability in 10 villages. The questions were both open and closed ended. The results showed that there were more (94%) males than females (6%) with 63% of them without educational background. Majority (31%) of them had an age range between 31 to 40 years. The community perception towards lion shows that 80% of the population was for the opinion that lions should be maintained in the community. A large proportion (98%) of the respondents agreed that there is conflict with lions in the area and its causing a serious problem. Majority (66%) of the respondents strongly agree that timely compensation makes conflict with lion more tolerable. From the results, Government intervention is important to organize training programs to train livestock owners on how to minimize livestock losses.

KEYWORDS

Lion; Human-wildlife conflict; Threats; Population-decline

ARTICLE HISTORY

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Introduction

Africa harbors a wide variety of mammals, and the lion (*Panthera leo*) is one of the largest feline predators that are emblematic as keystone and umbrella species [1]. Large carnivores such as lions found in grassland, savannas, and open woodlands across sub-Saharan Africa have significantly declined in their geographic range and population [2,3]. Lions are significant in maintaining the ecological structure and balance of terrestrial communities [4]. Moreover, they are also important in human culture [5]. Despite its importance, there is a decline in their population as a result of human activities that led to a decrease in their geographical ranges [6]. Human beings have coexisted with large carnivores such as lions, cheetahs (*Acinoryx jubatus*), and African wild dogs (*Lycaon pictus*) together with livestock for hundreds of years. Until recently, there had been a drastic increase in the frequency of human conflicts that stemmed from an increase in the human population [7]. As a result of human pressure, reduced prey populations, and habitat loss, the population of lions has been endangered in non-protective areas. The recent estimated global population is between 16,500 and 30,000 individuals [8]. Protected areas have become the main refuge for lions and other large African predators. According to the International Union for Conservation of Nature (IUCN), lions are classified as vulnerable due to a continuous decline in their population.

Attitudes are imperative in many studies regarding the human way of looking at wildlife, thereby giving a clear insight into what the opinion of communities holds about issues [9]. The cooperation of local communities is important for effective conservation of biodiversity in protected areas (PAs). According to Schafer and Tait, attitude is defined as a "feeling", belief, and tendency to act towards other persons, groups, ideas, or objects [10], as well as a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor [10,11]. Surveys on attitudes are essential tools for social impact assessment and are widely used in the conservation sector [12]. Involving local communities in effective conservation circles in protected areas is very important [13]. Attitude plays a crucial role in predicting human behavior towards animals and their natural environment [14,15]. Having a deep knowledge of the attitude of local people towards animals, especially those that are endangered, is important and useful to protected area managers and conservation policymakers [16,17].

Lions are amongst those animals that are threatened by humans, partly because they cause the depredation of livestock in many countries, including Cameroon [18]. The majority of the world's lions are found in Africa, which implies that Africa has to develop strategies to conserve and protect them. Lions are known as the flagship species in Africa. They are used for sport hunting, research, and tourism around the

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globe and same obtains for Waza National Park in Cameroon. The presence of lions in this protected area is a sign of its wild and natural integrity. However, the population of lions is declining due to increased threats. This threat is caused by the interactions between humans, livestock, and wildlife, which accounts for the present decline of lions in Cameroon [19]. According to D. Silvestre, the decline in the lion population is a result of poor management of human-lion conflict and the loss of livestock to these predators [20]. Livestock are vulnerable as prey because they lack the physiological or morphological adaptations to escape from predators and defend themselves, and easy to catch compared to their wild counterparts [21]. In Africa, there are some areas, such as Waza National Park in Cameroon, Makgadikgadi National Park in Botswana, and Tsavo National Park in Kenya, where lions prey on livestock. This happens especially during periods of low wild prey availability, which is the core cause of conflicts with stockbreeders [22-25]. In Central Africa, lions are classified as endangered and their population ranges from 1750 to nearly 4000 individuals [26,27]. This population range has brought about a decrease in their natural prey [28,29]. According to Tumenta et al., lion's diet in Waza National Park constituted a larger amount of wild prey than livestock [21]. Lions prey on medium to large-sized prey, with the most preferred species being the red-fronted gazelle and warthog [21]. Warthogs are preferred as a result of their slow avoidance rate and the fact that lions hunt them inside their burrows [30]. They prefer large prey when hunting livestock; however, in terms of preference index, lions do not prefer large livestock such as cattle, even though they are abundant [21,31,32]. Generally, lions have faced long-term persecution by humans that has reflected an adaptive response; as such, they prefer to hunt wild prey species, which led to the decline of wild prey in Waza National Park [18,33,34]. In addition to livestock conflict, other threats such as poaching, habitat degradation, and excessive trophy hunting have also helped to reduce the population of lions in Cameroon [35]. Over the years, the population has dropped from 100 individuals in 1962 to between 40 and 60 in 2002, and in 2010, the population ranged from 14 to 21 individual adults [26,33,36,37]. Moreover, there has been a drastic drop in the natural prey of lions in Waza National Park, from 25000 in 1962 to about 6000 in 2000 and below 1600 in 2007, causing lions to depend more on livestock [18,38]. Their dependence on livestock causes depredation on the livestock, leading to the massive killing of lions by livestock herders [21].

Studies on the attitudes of local communities have been carried out in African countries such as Kenya, Botswana, and Tanzania to launch conservation action on wildlife in general. Nevertheless, in Cameroon, little or no information about such a study on lions is known. It's for this reason that this study seeks to examine the attitudes of the local community towards the conservation of lions. This will help in the implementation of conservation action. Specifically, this study is to: 1) assess the attitude of the local people towards lions and conservation, 2) determine their views toward human-lion conflicts, and 3) evaluate government compensation based on this people's attitude towards lions and conservation. Based on our objectives, the following hypothesis will be tested: 1) the local community portrays positive attitudes toward lion conservation, 2) livestock depredation incidents negatively influence lzocal people's attitudes towards lions and conservation, and 3) adequate compensation will lead to a positive attitude toward human-lion conflict and lion conservation activities.

Materials and Methods

Waza National Park, the study area, is situated in the Far North Region of Cameroon and lies between latitudes 10°50' and 11°40 and longitudes 14°20' and 15°00' (Figure 1). The climate is Sudano-Sahelian and semi-arid tropical. It has a surface area of approximately 1600 km2. The eastern part of the park is made up of Logone Flood Plain, and the western part is savannah woodland, partially dominated by *Acacia seyal* (Figure 2).

Rainfall is low and irregular between years, with a mean annual rainfall of 600mm [40]. Temperatures range from 15 °C to 48 °C. Waza National Park is characterized by three seasons: a wet season from June to October; a cold dry season from November to February; and a hot dry season from March to May. It harbors animals such as antelope and monkey species, giraffes (*Giraff camelopardalis*), elephants (*Loxodonta africana*), lions (*Panthera leo*), hyenas (*Crocuta crocuta*), and a diverse avifauna [41,42].

Several ethnic groups are found around the park, each having a particular livelihood activity: Mousgoum carries out mostly agriculture combined with fisheries and small-scale animal husbandry; Kotoko carries out fisheries; Kanuri carries out agriculture with some hunting and gathering; and the people of Fulbe and Arab Choa carry out animal husbandry. When the park became a biosphere reserve in 1988, most of the villages found inside the park were resettled out of the park, and nomadic pastoralists were forbidden into the park without consultation and compensation, resulting in conflict and tension [43]. Human wildlife is an issue in the park because of the resettlement of the people around the boundary of the park. Some of the problems are carnivores killing livestock, elephants raiding crops, and grazers and diggers destroying crops [44,45]. There is insufficient staff to enforce park protection, and there has been a rise in the illegal use of resources found in the park since the early 1990s [46].

Data collection

Data was collected using questionnaires, in which samples were designed and tested in a village out of the sample villages. Ten out of fifteen villages were selected within the park with the help of the Delegation of MINFOF Maroua through their experience and exposure to frequent lion attacks resulting in human-lion conflicts. The other five villages were left out because of frequent Boko Haram attacks. A total of 166 questionnaires were administered to ten villages as follows: 20 in Mbele, 25 in Halee, 30 in Lougouma, 16 in Ndiguina, 12 in Tagawa, 14 in Mahe, 16 in Zina, 12 in Waza, 11 in Deguere, and 10 in Tchede. The number of questionnaires was distributed according to the population in the different villages. Questionnaires were distributed to owners of livestock and farmers. In cases where a respondent cannot read or write, one member of the team will help interpret the question and fill in the answer. The questionnaires were divided into four different parts: knowledge about lions and

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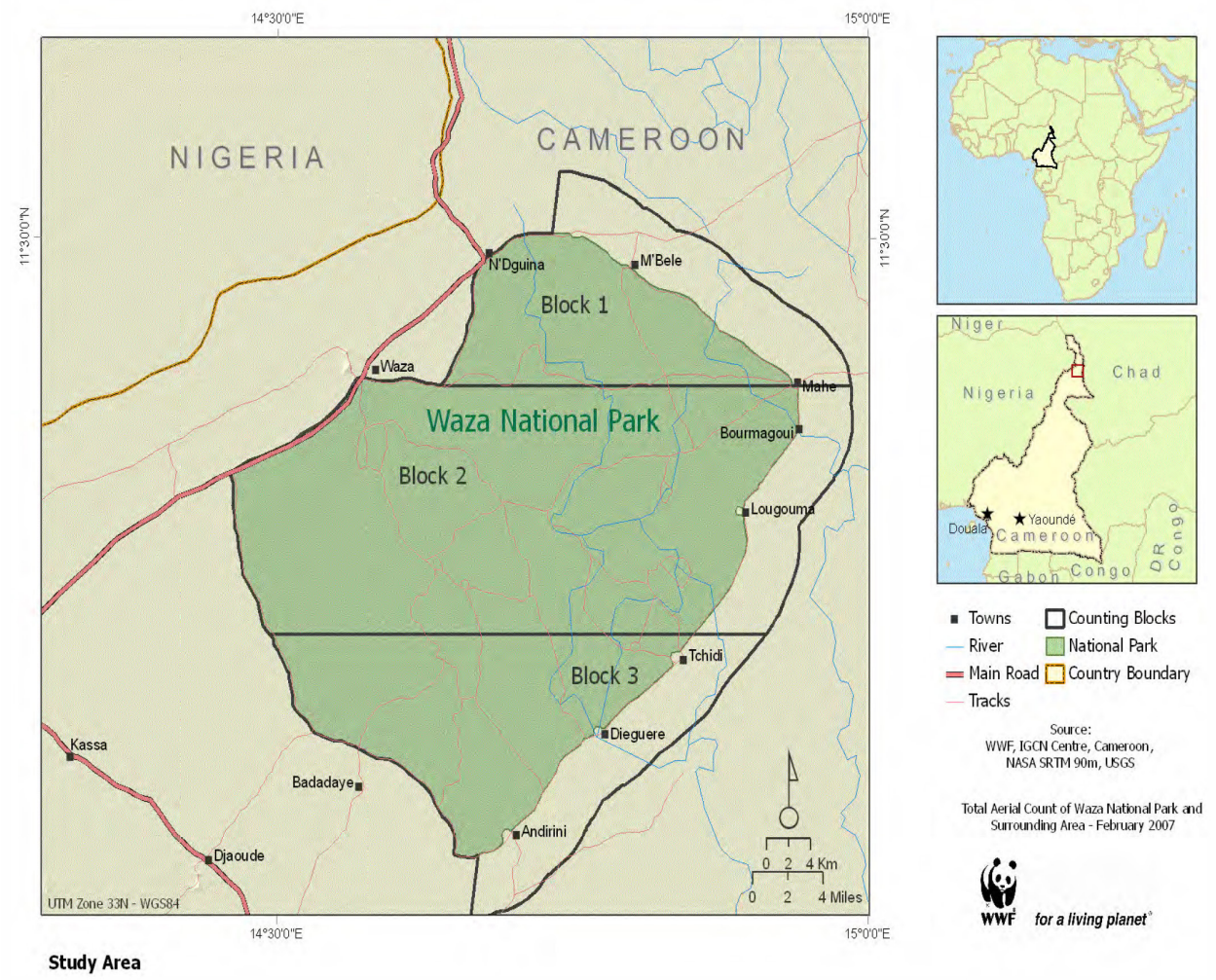

Figure 1. The map of Waza National Park, Cameroon [39].

Figure 2. Picture of WNP showing the savannah vegetation.

their ecology, perceptions and views about lions and their conservation, government compensation programs and sightings, livestock predation, or attacks on humans. This quantitative method was used as the most appropriate approach because of the use of the Theory of Reasoned Action that was used to explore local people's attitudes towards lions and lion conservation. Also, the quantitative method is considered to be the preferred approach to testing a theory [47].

Data analysis

The data was analyzed using descriptive and inferential statistics. A descriptive statistic was used to analyze the percentages and mean of community perceptions toward lions and their conservation, the demographic factors of respondents, and the level of conflict between lions and humans. A non-parametric test (Test di Krustal-Walles) was used to test the significant level between community perception toward lions and their conservation. Pearson's correlation was used to test the correlation between two variables. The significant level was determined at a probability level of 0.05.

Results

Demographic factors of respondents

Information was recorded concerning the different demographic factors of the respondents, such as gender, age class, and level of education, as seen in Table 1.

The result shows that the number of males (94%) was higher than the number of females (6%). The large proportion of the age range was between 31 and 40 years. In addition, the majority (63%) of the respondents did not have formal education, and the main occupations of the respondents were fishing, farming, and livestock. Averagely, respondents have lived in that area for 40.8 ± 16.2 years, and the mean number of individuals in a household is 12.4 ± 6.8.

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Table 1. Socio-demographic profile of the respondent.

		Number (n)	Percentage (%)
Gender	Male	156	94
	Female	10	6
	Total	166	100
Age range	10-20	5	3
	21-30	28	17
	31-40	51	31
	41-50	43	26
	51-60	19	11
	61-70	13	8
	71-80	4	2
	80+	3	1
	Total	166	99
Educational level	None	105	63
	Primary	36	21
	Secondary	21	13
	Higher Secondary	4	3
	Graduate	0	0
	Total	166	100

Local people's attitude towards lions and conservation

The attitude or perception of the local communities towards lions in Waza National Park is shown on Table 2. The opinion of the population living around the protected area is vital for proper preservation.

Table 2. Community perceptions towards lions and their conservation.

	Eliminated (%)	Reduced (%)	Maintained (%)	Increased (%)	Mean
The population of lions in WNP should be.	5	13	80	2	3.1
	Love (%)	Like (%)	No opinion (%)	Dislike (%)	Hate (%)
Views towards lions in general	50	25	15	10	5
Views towards lions in their surroundings	3	10	30	40	31

The majority (80%) of the community in the WNP holds the opinion that the lion's population should be maintained, while 5% of the respondents were of the opinion that the lion's population should be eliminated (Table 2). The general view of the community towards lions shows that 75% of the community loves lions and 15% of the community dislikes lions. The community view of lions in their surroundings shows that 71% of the respondents dislike lions being in their surroundings, while 13% of the respondents love that lions should be in their surroundings. Kruskal-Wallis analysis (χ^2 =15.5982, df=4, P=0.0036) indicated that there is a significant difference in the community perception toward lions and their conservation in WNP.

Conflict with lions and patterns in lion attacks

The result of the conflict between lions and livestock, or humans, is presented in Table 3. It shows the degree of conflict with lions in the study area.

Pearson's correlations were performed between the number of problem lions in the area (r=0.0657, p= 0.5935) and the sum of attitudes of the respondents (r= 0.0043, p= 0.9760). The results identified a strong and significant association

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Table 3. Level of conflict with lions.

	Yes (%)		No (%)	
Is there a conflict with lions, in this area?	98.05		1.95	
	More now (%)	Less now (%)	The same (%)	Don't know (%)
Lions or signs of lions in the last two years	70.78	10.39	18.18	0.65
Lion's attacks on livestock in the last two years	70.13	12.34	13.64	3.9

between these variables. Therefore, the hypothesis Livestock depredation incidents negatively influence people's attitudes towards lions and their conservation was accepted. HII: Livestock depredation incidents negatively influence people's attitudes towards lions and their conservation.

Government compensation

Government compensation and programs have been found to be quiet successful in stimulating local support toward conservation. Table 4 shows the responds of the local people towards government compensation.

Table 4. Government compensation program-tolerance to conflict.

	Strongly disagree (%)	Disagree (%)	Unsure (%)	Agree (%)	Strongly agree (%)
Timely compensation makes conflict tolerable	18	1	1	14	66
Adequate compensation makes conflict tolerable	2	23	0	14	61

Ninety-eight percent (98.5%) of the respondents agreed that there is conflict with lions in the area and is a serious problem (Table 3). 70.78% of surveyed population claimed an increase in lions as well as lion sign sightings in comparison to 2 years ago. About the same percentage of respondents (70.13%) stated an increase in the number of lion attacks and instances of livestock depredation in the past 2 years.

The findings of this study show that 66% of the respondents strongly agree that timely compensation makes conflict with lions more tolerable, while 18% of the respondents strongly disagree. In addition, 61% of the respondents strongly agree that adequate compensation made conflict with lions more tolerable, while 2% of the respondents strongly disagree (Table 4).

From our informal discussion with the respondents, about 80% of them where of the opinion that even though there is no existence of a compensation scheme, they are ready to tolerate conflicts with lions if an adequate and timely compensation scheme is created. There is a positive correlation (r=0.182, p=0.4181) between adequate compensation and attitude towards human-lion conflict and lion conservation.

Discussion

It was important to take records of the active population of the study area in order to have knowledge on the different categories of respondents that are more active in the community by designing questionnaires based on the age-sex structure and educational level of each respondent (Table 1). Almost (94%) of the respondents were males, with the majority of them in the age group between 31 and 40 years (31%) which falls in the economic activity group, and in addition, most (63%) of them did not go to school, which revealed that the people lack the requisite education that would enable them to compete effectively for jobs in the formal sector. In addition, the people lack the required occupational skills that would allow them to venture into different types of alternative livelihood activities. Giving reasons why they keep livestock that serve as their source of livelihood.

The local people in the community show a positive view of lions in their community. The majority (75%) of the respondents love lions, but on the contrary, they (71%) dislike lions in their surroundings, which indicates that the presence of lions in their surroundings serves as a risk factor for their livestock and their safety. This can be seen in, where the respondents were against lions in their backyard [48]. Livestock depredation serves as one of the reasons why respondents do not like lions in their surroundings. Ericson and Heberlein, Naught-Treves et al. and Sogbohossou et al. also had the same view [49-51]. Even though there is livestock depredation in the community of Waza National Park, some of the respondents were still of the opinion that lions should be conserved, as opposed to respondents from Gambella National Park, Ethiopia, who were of the opinion that lions should not be conserved and should be eradicated from the community as a result of the amount of livestock loss due to lion depredation [52].

Predators such as lions may present actual or perceived threats to humans or livestock. Human attitudes, behaviors, and perceptions toward carnivores resulting from complex social and cultural settings are important factors in understanding human-carnivore conflicts. From our results, it was noticed that there have been more attacks on livestock presently than 2 years ago, and those who suffered from this attack turn to have negative attitudes towards lions and their conservation. This is in line with the local communities in Waza National Park, Cameroon and Ruaha, Tanzania, who considered depredation

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as the top livestock mortality factor, as opposed to a study carried out in Gambella, Ethiopia, where diseases and theft were the leading causes of livestock loss [21,52,53]. This increase poses an even more challenging situation if nothing is done.

Compensation and incentive programs have been found to be quite successful in stimulating local support for conservation [54]. This program could be an effective strategy for conflict mitigation, provided that compensation is adequate and the reimbursement is timely. In this study, adequate and timely compensation was found to improve individual attitudes towards lions. Furthermore, it was seen that most respondents strongly agreed with the fact that there was no compensation scheme or system that existed to compensate for the loss they suffered from depredation by lions on their livestock, but they showed acceptance and favorable attitudes towards lions in spite of the attack so long as they were compensated for their loss. Several studies have demonstrated that compensation plans frequently lead livestock producers to abandon conventional husbandry practices as they become less risk-averse in caring for their cattle as they know they will receive compensation for their loss [55,56]. Contrary to Graham Hemson's Human-Wildlife Conflict in Semi-Arid Botswana, he advocated for the idea that despite compensation, locals still displayed negative attitudes toward lions and their conservation, so there is a great need for the development of an effective and efficient government compensation program that will help foster trust toward the Forestry and Wildlife Department and strengthen positive attitudes towards lions and their conservation [24].

Conclusions

Most of the respondents were males of age range 31 to 40 years and they depend mainly on livestock rearing as their source of livelihood. The community of Waza National Park were for the fact lion should be maintain in their community. There exist conflict between lion and livestock in Waza National Park. Timely compensation makes conflict with lions more tolerant in Waza National Park.

Recommendation

Training programs should be organize to train farmers on how to minimize livestock losses through better husbandry practices, compensation programs for livestock that are killed. Further studies should be carried out in the park to determine the population of lions and the number of livestock depredation.

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Disclosure statement

No potential conflict of interest was reported by the authors.

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