Constraints of sustainable management strategies for wildlife resources in Taraba State, Nigeria

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Abstract

Constraints of sustainable management of wildlife resources generated concern among wildlife conservators. This study identified the limitations of managing wildlife resources sustainably in Taraba state, Nigeria. The outcome of the study would provide baseline information for conservationists and researchers to develop emerging management concepts. The sampling tools consist of a structured questionnaire with closed and open-ended questions and an interview guide to elicit information from the public respondents at the LGAs level. Selection of LGAs, wards, and respondents at the ward level was by multistage and random sampling techniques. There was no significant difference (P<0.05) among the constraints indicated by the public respondents on domestication/captive breeding. Illegal hunting /illegal grazing has the highest Mean values of Focus group responses (83.40 ± 1.376). Concerning game ranching, respondents agreed that the land tenure system, illegal hunting, diseases, and natural disasters are the constraints likely to affect game ranching programs. The findings of the statistical analysis showed that a significant difference (P≤0.05) exists between the constraints listed by the public respondents. The result showed that the transfer of disease from wild to domestic animals (68.10 ± 1.123) was significantly higher (P≤0.05) while the problem of cannibalism by wild animals (14.50 ± 0.239) was significantly lower (P≤0.05) than other constraints. Constraints on the integration of wild animals with livestock production revealed the problem of taming wild animals and prejudices as major constraints on this strategy. These constraints were not unconnected with increasing population pressures, which has inevitably led to intensive land use practices. Hence, the option for long-term conservation of wildlife resources, and the management is based on the concepts of community management strategies for sustainable utilization.
Keywords: Conservation, Constraints, Sustainable management, Wildlife resources

Introduction

Sustainable use is perpetuated over the long term. However, all uses, whether consumptive or non-consumptive will impact ecology in some ways and produce some effects on the local environment. Therefore, for any use to be sustainable, it must be so from the social, ecological, and economic point of view (Nasi et al., 2018). The combination of increased hunting pressure and the loss of habitat quality will always result in the decline of wildlife species, especially larger species with specific habitat requirements and low reproduction rates (Hurtado-Gonzales & Bodmer, 2014). Sustainable harvest should not be greater than production, and populations being harvested should not be reduced below the threshold level whereby they can no longer fulfill their ecological role as seed dispersers, pollinators, predators browsers, or grazers. Besides, harvested populations should not be reduced to densities whereby they cease to fulfill their economic role of ensuring sustained livelihoods for dependent populations as well as the social benefits of the wildlife populations (Nasi et al., 2018). Constraints militating against sustainable management of wildlife resources in Africa and Nigeria in particular include inappropriate policies and governance, demography, increased commercialization of the wildlife harvest, deforestation, and fragmentation of wildlife habitats through different land use changes. (Bello, 2003; Nsoss, 2013; Bulte, 2013; Aviram et al., 2023; Laurence et al., 2020). The lack of adequate attention by the government stems from the fact that the potential contribution of wildlife to development is frequently viewed narrowly in terms of direct revenue to the government and the generation of foreign exchange from wildlife-based tourism. At the field level, an antagonistic relationship exists between the local people and government employees entrusted with the responsibility of wildlife management. The result is that in the long run, the sympathy and active participation of the local people cannot be sustained (Dembner et al., 2002). Therefore, sustainable management depends on the creation of adequate opportunities and incentives in the form of tangible benefits to individuals and local communities. Captive breeding/domestication, game ranching, community forestry management for wild animal production, and integrated wild and domestic animal production are still in their infancy as modern methods of increasing animal protein for consumption by the growing population in Africa. These emerging concepts of wild animal management and production are not without impediments. Mohammed (2011) emphasizes that the scientific development of these strategies for sustainable management and production of wild animals would require an in-depth knowledge of all possible constraints that could hinder their

development. Knowledge of these constraints would provide valuable information for conservationists for sustainable implementation of the emerging concepts.

Materials and methods

Study Area

Taraba State is located in the North East of Nigeria, (Figure I). The state lies between latitudes 6^0 and 9^0 N of the equator and between longitudes 9^0 and 12^0E of the Greenwich Meridian. It occupies a total land mass of approximately 60,291.82 km^2. The State is bordered on the west side by Gombe and Plateau States and by Adamawa State in the northeast. Taraba State is separated from the Republic of Cameroon by an international boundary on the eastern part of the state (Figure 2) (Emeka & Abbas, 2011). Taraba State is characterized by two (2) seasons, wet and dry climate. The State experiences high temperatures all year round because of its latitudinal location. The mean maximum temperature for most parts of the state is about 30°C. The highest air temperature is normally experienced in March and April in the northern part of the state. Maximum temperature ranges between 21°C to 29°C in Sardauna town on the Mambilla plateau and between 24°C to 39°C at Gassol station (Taraba central). On the Mambilla plateau, the highest temperature is recorded in February and March while the lowest temperature is recorded in July, August, September, and October while in the Central and Northern parts highest temperature is recorded in March and April (Emeka & Abbas, 2011).

The vegetation of Taraba State comprises three types of ecological zones namely; the Southern Guinea Savanna, Northern Guinea Savanna, and Montane Forest. Southern Guinea Savanna is characterized by mainly forest and tall grasses. This zone is found in the Southern part of the State, like Wukari, Takum, and Donga. Northern Guinea Savanna is characterized by short grasses interspersed with short trees and is found in Jalingo, Lau, Ardo-Kola Yorro, and Karim Lamido, while the Montane Forest zone is marked by luxuriant pasture and tall trees found on the Mambilla Plateau. The State has 28 forest reserves, 98 plantations, 2 major game reserves, and Gashaka Gumti National Park (Dumke, 2016).
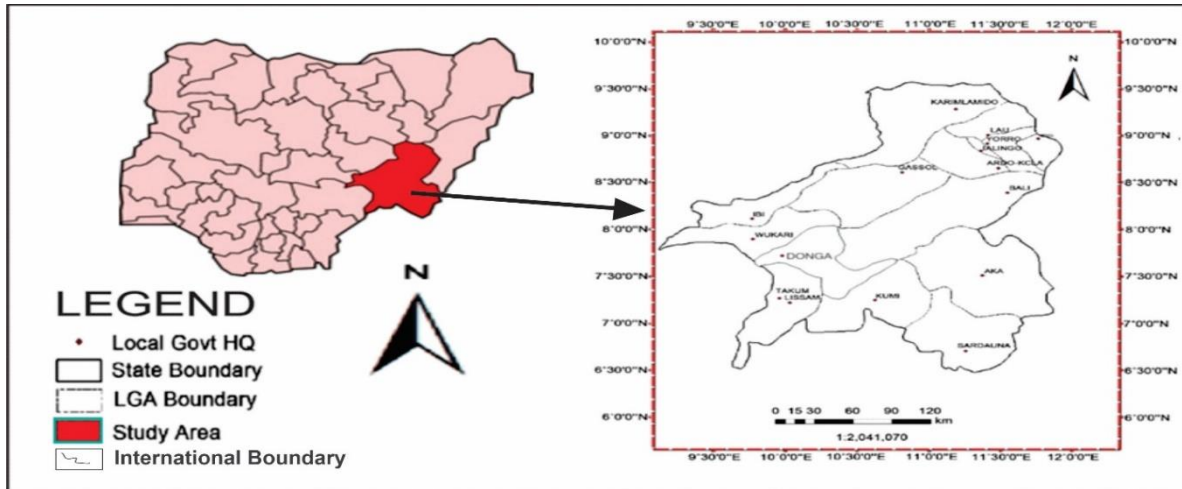
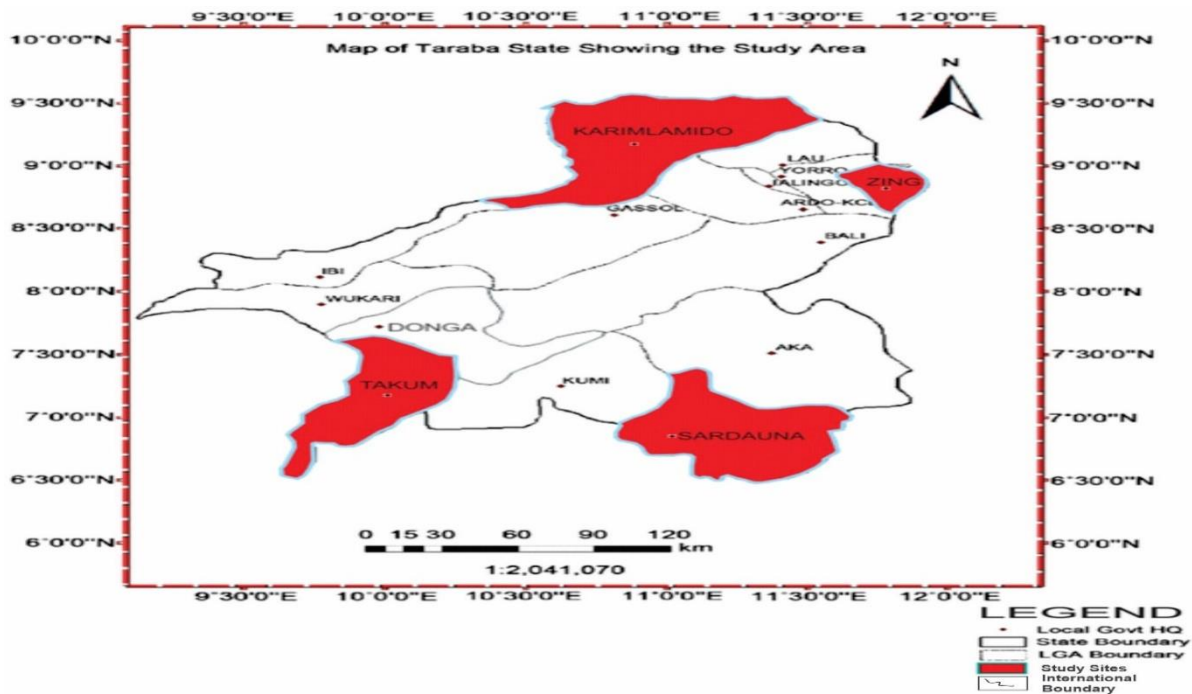**Figure 1.** Map of Nigeria Showing Taraba Stat Source: GIS, 2018

Figure 2. Map of Taraba State Showing the Study Area Source: GIS, 2018

Data Collection and Analysis Techniques

Because of the socio-cultural affinity within each senatorial zone in the state, the entire state was stratified into three zones using the senatorial zones as the bases. Considering that there are 3 senatorial districts in Taraba State: Northern senatorial district (6 LGAs), Central senatorial district (5 LGAs) and Southern senatorial district (5 LGAs). Selection of LGAs, wards, and respondents at the ward level was by multistage and random sampling techniques. In each senatorial zone, one

LGAs were randomly selected. Therefore, in this study, the sample size of respondents from each ward was determined following the method outlined by Babies (1975), in which 30% of the population serves as a representative sample Furthermore, 30% of the population of individuals who had lived 10 or more years in each ward was randomly selected for the administration of the questionnaires. Furthermore, 30% of the population of eligible voters within each ward was randomly selected for the administration of the questionnaires. Table 1 shows the distribution of questionnaires according to Senatorial zones, LGAs, and Wards. The respondents were heads of members of households. The households were randomly sampled from the villages/ settlements/hamlets of each ward. The respondents in each ward included farmers, hunters, pastoralists, civil servants, bushmeat sellers, and businessmen. Focus group members included; traditional rulers, chairmen of the Hunters Association, Directors of Departments of Natural Resources in the LGAs, women leaders, and Non-Governmental Organizations (NGOs) leader. Information was elicited on the socioeconomic characteristics of the respondents, wildlife resources currently available in the study area, perceptions on management strategies for sustainable use of wildlife resources, perceived constraints on each of the management strategies, and the role of wildlife resources on rural livelihood. The sampling tools consisted of a structured questionnaire with closed and open-ended questions as well as an interview guide, which was used to elicit information from the public respondents in each ward at the LGA level. Each respondent served as a sample unit. The questionnaire was validated before final administration.

Data Collected were analyzed using the following statistical tools: Descriptive statistics which consist of tables, frequencies, and percentages were used to present data on wildlife resources of the state and the socio-economic characteristics of the respondents. Data collected were analyzed using Genstat Discovery Edition 4 and subjected to one-way and two-way analysis of variance (ANOVA). The difference between the mean was determined using the least significant difference (LSD) at a 95% confidence level (P=0.05).

Table 1. Distribution of Questionnaires according to Senatorial zones, LGAs, and Wards

Senatorial Zones	LGAs	Ward	Population	Sampled Population
Northern Senatorial Zone	Karim Lamido	Amar	1022.94	307
		Darofai	1459.71	437
		Karim "B"	1080.27	324

	Zing	Bitako	630.81	189
		Monkin "A"	494.91	149
		Zing "B"	717.66	215
Central Senatorial Zone	Sardauna	Gembu "A"	12.77	383
		Gembu "B"	1977	593
		Kakara	1369	411
Southern Senatorial Zone	Takum	Bete	501.03	150
		Fete	722.34	217
		Tikari	1040.69	312
	Total:			3687

Results

Public Responses on Management Constraints of Domestication and Captive Breeding of Wildlife Resources

Results of public responses on constraints of domestication and captive breeding of wildlife resources in the study area are presented in Table 2. The results indicated that there is no significant difference ($P \leq 0.05$) between the identified constraints. The means range from 18.4 to 56.8 with $P<F=0.424$ and LSD of 39.77.

Table 2. Mean values of public responses on constraints of Domestication and Captive breeding as a strategy for sustainable utilization of wildlife resources

Treatments	Mean Values (%)
Difficult to reproduce in captivity	56.80 ± 0.94
Lack of skilled personnel for handling in captivity	43.20 ± 0.71
Problem of adaptation to artificial environment.	48.00 ± 0.71
Difficulty in obtaining stock for breeding and production	27.50 ± 0.45
Poor knowledge of diseases of wild animals and their control	41.20 ± 0.64
Cost of providing accommodation for captive breeding and production	27.90 ± 0.46
Lack of treatment centers	18.40 ± 0.30
P<F	0.420
LSD	39.77

(P<0.05)

Public responses on constraints of game ranching of wildlife resources

Table 3 shows the result of public responses on constraints of Game ranching of wildlife resources in the study area. The results showed that a significant difference ($P \leq 0.05$) occurred between illegal hunting/illegal grazing (83.4) and wildfire (20.8), ownership of wild animals (22.3), natural disasters (18.5), land tenure system (30.3), and insecurity (43.8). Illegal hunting/illegal grazing did not differ significantly ($P \leq 0.05$) from an outbreak of diseases (51.8).

Table 3. Mean values of public responses on constraints of Game ranching as a strategy for sustainable utilization of wildlife resources

Treatments	Mean Values (%)
Insecurity (Communal Clashes)	43.80 ± 0.732
Problems of land tenure system/land use	30.30 ± 0.500
Problems of natural disasters such as flood, drought, and fire.	18.50 ± 0.310
Outbreak of diseases	20.80 ± 0.343
Illegal hunting /illegal grazing	83.40 ± 1.376
Problem of capital	51.80 ± 0.854
Ownership of wild animals under an extensive system	22.30 ± 0.368
P<F	0.014
LSD	34.32

(P<0.05)

Public responses on constraints of community forest initiative and hunting reserves for wildlife resources

The results of public respondents on constraints of community forest initiative/hunting reserves for wildlife resources conservation in the study area are presented in Table 4. The results indicated that significant difference ($P \leq 0.05$) occurred between lack of awareness (5.3), lack of common interest (15.0), lack of technical experts (5.9), Illegal hunting (13.7) and the rest of the constraints which include insecurity (51.7), problem of land tenure system (55.8), leadership problem (23.8), problem of migration and wild animal ownership (33.8), extension of settlements into community forest (39.6), and occurrence of wildfire (41.7). The result showed that the problem of land tenure system (55.8), was significantly higher ($P \leq 0.05$) while lack of awareness (5.3) was significantly lower ($P \leq 0.05$) than other constraints.

Table 4. Mean values of public responses on constraints of community forest initiative and hunting reserves as a strategy for sustainable management of wildlife resources

Treatment	Mean Values (%)
Insecurity (Communal clash)	51.70 ± 0.852
The problem with the land tenure system	55.80 ± 0.921
Lack of awareness	5.30 ± 0.087
Lack of common interest	15.00 ± 0.247
Lack of technical experts	5.90 ± 0.097
Illegal hunting	13.70 ± 0.226
Leadership problems and poor coordination at community level	23.80 ± 0.393
The problem of migration and Wild animal ownership	33.80 ± 0.557
Extension of settlements into community forest.	39.60 ± 0.652
Occurrence of wildfire	41.70 ± 0.688
P<F	0.006
LSD	27.46

(P<0.05)

Public responses on constraints of integration of wild animals with livestock production

Table 5 shows the result of public responses on the constraints of integration of wild animals with livestock production in the study area. The result showed that the transfer of disease from wild to domestic animals (68.1) was significantly higher ($P \leq 0.05$) while the problem of cannibalism by wild animals (14.5) was significantly lower ($P \leq 0.05$) than other constraints.

Table 5. Mean values of public responses on constraints of integration of wild animals with livestock production as a strategy for sustainable management of wildlife resources

Treatments	Mean Values (%)
Control/herding challenges	21.60 ± 0.339
Lack of awareness	27.70 ± 0.457
The problem of compatibility/sociability	32.10 ± 0.529
The problem of credit facilities for wild animal production	23.00 ± 0.380
Lack of experts	33.10 ± 0.546
The problem of transfer of diseases from wild animals to domestic livestock	68.10 ± 1.123
Poor knowledge of wild animal diseases and control	24.00 ± 0.396
Prejudices	47.20 ± 0.778

The problem of cannibalism among wild animals	14.50 ± 0.239
P<F	0.014
LSD	25.60

(P<0.05)

Discussion

The responses of the public respondents on constraints militating against the four management strategies are wide-ranging. There was no significant difference (P≤0.05) between the constraints indicated by the public respondents on domestication/captive breeding. The responses indicated the need for in-depth research on the selection and biological parameters of wild animals meant for domestication/captive breeding and the prejudices exhibited by the public in some communities/societies. These two factors are very important to the success of any domestication/captive breeding program. This is in agreement with the observations of Ogogo *et al.* (2008) that success in the selection of wild animals that can adapt to life in confinement and reproduce, accounts for the success of the program. Another important factor for consideration is the constraints of diseases and their control. However, success can still be achieved in domestication/captive breeding programs of small-sized antelopes, reptiles, birds, and rodents, which were reported by CBD (2018) as the animals mostly hunted for subsistence diet by the rural dwellers in sub-Saharan Africa. These animals such as gazelles, Kobs, duikers, waterbucks, cane rats, African giant rats, crocodiles, and guinea fowl are successfully reared in zoological gardens and wildlife multiplication centers. Therefore, information on housing requirements, diseases, and their control, meat yield, rate of reproduction, and behavior under controlled conditions can also be obtained from these centers. Besides, Akosim and Ironkanulo (2008), reported that diseases can be prevented through appropriate nutrition, general cleanliness, vaccination, regular drenching or dipping.

Concerning game ranching, the respondents agreed that the land tenure system, illegal hunting/theft, diseases, insecurity, natural disasters (flood, fire, droughts), and ownership of wild animals are the constraints likely to affect game ranching programs in the study area. The findings of the statistical analysis showed that while significant difference (P≤0.05) exists between the constraints listed by the public respondents. The indications of capitalization and land tenure system as constraints are not at variance with the observations of Ogogo et al. (2008) and Akosim *et al.* (1999) that game ranching programs are capital intensive and require a large expanse of land respectively. These constraints according to FAO (2019) will require new laws and policies by the

government for individuals and groups to be able to acquire land for game ranching programs. Other constraints such as skills for animal handling, control of poaching, fire, and cropping under extensive game ranching systems can be acquired through minimal training and the use of traditional skills for domestic livestock husbandry.

The findings of this study on constraints that could militate against community forestry initiatives/hunting reserves indicated that respondents emphasized similar constraints such as land tenure system, insecurity, ownership of wild animals and migration, land use, wildfire, Illegal hunting, and poor coordination at the community level resulting from selfish interest and poor leadership. The public group went further to indicate insecurity, land tenure, wildfire, land use, and ownership of wild animals were found to be significantly different (P<0.05) from other constraints.

The constraints raised by the public group respondents on community forest initiatives should not be considered in isolation. This is because community forestry occurs within the context of common property regimes, where ownership is communal and access is determined by the government. The increasing human population which necessitates more land for growing needs has resulted in changing government policies on land use and land tenure systems. The consequence is the dwindling community forest lands. This development aligns with the report of Ogogo *et al.* (2008) that increasing human population densities and changes in tenure regimes have further resulted in the depletion and fragmentation of the spatial disposition of community forests. However, Asibey (1974) observed that a well-organized awareness creation in rural communities on the importance of community forestry, backed up by law and well-articulated policies, as well as application of appropriate techniques (i.e. adequate range management, proper surveillance, and cropping) could lead to the re-establishment of community forests and increase in sustainable yield of bushmeat in most community forests in the sub-Saharan Africa and the study area in particular. Constraints on the integration of wild animals with livestock production revealed the problem of taming wild animals, prejudices, poor knowledge of wild animal behavior, transfer of diseases from wild animals to domestic livestock, fear of zoonotic diseases, problem of compatibility in housing requirement and food, problem of cannibalism, lack of skills for handling wild animals and problems of herding wild animals as major constraints on this strategy. These constraints were found to be statistically more significant (P<0.05) than other constraints indicated by both groups. These constraints, the rural dwellers believe could lead to a reduction in productivity or death of

the animals as a result of competition between the wild and domestic stock for food and space, poor control of disease transfer, and cannibalism. The indications and fear of the respondents and by extension the rural dwellers in the study area were observed in the report of FAO (2019) that the integration of wild animals with domestic species has been limited by fear of prejudices, cannibalism, diseases, and reduction in productivity or death. However, Asibey and Asare (2013) were of a contrary view, and hence, observed that the integration of wild and domestic species results in efficient utilization of resources particularly fodder on the range, and that what is required is a scientifically determined mix of domestic and wild animal species. Because of the potential for bushmeat production through the integration of wild with domestic stock, it is necessary to focus on developing systems and technologies to improve the strategy.

Conclusion

Domestication/captive breeding of wildlife in terms of poor or lack of reproduction in captivity, problem of adaptation in captivity, disease control, difficulty in acquiring initial stock, and prejudices are the major constraints of sustainable management statuaries for wildlife recourses as indicated for each of the management strategies by both the public and focus groups. Game ranching, community forestry initiatives, hunting reserves, land tenure, the problem of migration and ownership of wild animals, lack of government policy, integration of wild animals and domestic stock, and taming of wild animals were the constraints suggested by the public respondents. The observed constraints are not unconnected with the fact that increasing population pressures, which has inevitably led to intensive land use practices has only one option for long-term conservation of wildlife resources, and that is management based on the concepts of community management strategies for sustainable utilization. Subsequently, the need for income to augment the dwindling proceeds from farming, demands that new approaches that will ensure sustainable utilization of wildlife resources be put in place.

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