

Problematic of human-wildlife conflicts in Kongo central province in the Democratic Republic of the Congo (Africa)

Edouard Telamanu Bafwanga ^{1,*}, Didier Tshikung Kambol Mosses ², Gilbert Malemba Nsakila ⁴, Patient Pyana Pati ^{1,3} and Grégoire Kasongo Aseke ²

¹ National Pedagogical University, Faculty of Veterinary Medicine, B.P. 8815, Kinshasa / Ngaliema, Democratic Republic of the Congo (Africa).

² University of Lubumbashi, Faculty of Veterinary Medicine, B.P. 1825, Lubumbashi, Democratic Republic of the Congo (Africa).

³ National Institute of Biomedical Research, Kinshasa / Gombe, Democratic Republic of the Congo (Africa).

⁴ University of Lubumbashi, Faculty of Economics and management, B.P. 1825, Lubumbashi, Democratic Republic of the Congo (Africa)

World Journal of Advanced Research and Reviews, 2022, 13(03), 393–400

Publication history: Received on 12 February 2022; revised on 19 March 2022; accepted on 21 March 2022

Article DOI: <https://doi.org/10.30574/wjarr.2022.13.3.0241>

Abstract

A study on the issue of Human-Wildlife Conflicts (HWC) was carried out from January 1, 2018 to June 30, 2020 in the province of Kongo Central. It consisted of: (1) Identifying the causes of Human-Wildlife Conflicts in the province, (2) Determining the social impacts generated by Human-Wildlife Conflicts and (3) Identifying the prevention and mitigation measures applied to resolve the problems of Human-Wildlife Conflicts in the province. Semi-structured surveys were carried out on the basis of an interview guide among the populations of 8 territories. The sample size was 384 households per territory chosen by the simple random sampling technique. The results showed that the competition of humans and wildlife for spaces was the leading cause of Human-Wildlife Conflicts in Kongo Central province to have been cited in 41.16% of the responses of the respondents. The loss of agricultural or pastoral production cited in 27.81% of the respondents' responses would be identified as the most significant socio-economic impact that the populations would suffer. Lethal control would be the preferred measure to prevent conflict in Kongo Central province with 30.44% of citations. Finally, community awareness and compensation by the State in the event of damage would be the measures proposed in 34.93% and 23.57% respectively of the responses of the populations.

Keywords: Human-Wildlife Conflicts; Semi-Structured surveys; Study variables; Traditional measures; Mitigation measures.

1. Introduction

In the Democratic Republic of Congo (Africa), human-wildlife conflicts as a result of the occupation of areas reserved for wildlife by different actors for interests in most cases opposed are very real. The Sub-Regional Monitoring of Human-Wildlife Conflicts [1] revealed in its August-September 2015 publication that out of more than 236 notifications it received in the first five months of the year, 36% were from DR Congo. The problem of the incursions of wild animals into crops arises acutely in the Okapi Wildlife Reserve of the Ituri forest (DR Congo), where approximately 4,700 to 10,000 elephants cause significant damage to crops, especially bananas, which is their favorite food [2]. Tshikung [3] highlights in a study conducted in Upemba National Park the anthropogenic pressure experienced by *Tragelaphus scriptus* (Guib harnaché). In their study, Kazaba and al. [4] analyzed the opportunities for human and wildlife contact

* Corresponding author: Edouard Telamanu Bafwanga

National Pedagogical University, Faculty of Veterinary Medicine, B.P. 8815, Kinshasa / Ngaliema, Democratic Republic of the Congo (Africa).

on the basis of data on the presence of wildlife near homes and fields and also damage caused by wild animals on the outskirts of Kundelungu National Park in DR of the Congo. The observations made during the pre-survey show a typology of Human-Wildlife Conflicts leading to socio-economic consequences and physical insecurity on local populations. To date, there is no reliable data on conflicts or the means used locally to prevent them. It is within this framework that this study set itself 3 objectives:

- Identify the causes of Human-Wildlife Conflicts in the province.
- Determine the social impacts.
- Identify the prevention and mitigation measures applied by local populations to fight against conflicts. The originality of this research lies in the fact that it will make it possible to understand the complexity of human-wildlife interactions in community spaces throughout the province.

2. Material and methods

2.1. Study environment

This research was conducted in the Kongo Central province in the Democratic Republic of Congo. It lies between 4 ° and 6 ° South latitude and 12 ° and 16 ° East longitude. It is bounded to the north by the Republic of Congo; to the west by the Atlantic Ocean and the Angolan enclave of Cabinda; to the east by the city province of Kinshasa and the province of Kwango and to the south by the Republic of Angola. The County town of the province is Matadi. It is the only open door of the country to the ocean. Its population has been estimated at 5,813,586. Its surface area is 53,855 km². The altitude is 75 to 360 m near the ocean and 300 to 650 m in the Central Basin [5, 6, 1].



Figure 1 Map of Kongo Central Province

The province is characterized by a tropical climate of the Sudanese Aw₄ type with four months of dry season, according to the Köppen classification. The average annual temperature, quite uniform, oscillates around 25 ° C [5]. The vegetation comprises three distinct types of natural formation: (i) The coastal hinterland or littoral, characterized by vegetation of mangroves and steppes in the plateaus dominating the coast of Moanda; (ii) The territories of Lukula, Tshela and Séke-Banza covered by forest over its entire extent; (iii) The territories of Mbanza-Ngungu, Madimba, Kasangulu and Kimvula which, despite high rainfall, correspond to a region of savannah interspersed with fragments of forest [5]. The relief is very varied in detail; but it is essentially formed of never very high plateaus. There are four regions: the coastal region, the region of Mayombe, the region of Cataracts and the confines of Kongo Central (on the outskirts of Kwango) [7]. The province is part of the large Congo River basin, with the exception of Mayombe drained by the Shiloango River. Wildlife is in decline. Some species are endangered such as the buffalo (*Syncerus caffer*), the lion (*Panthera leo*). Small mammals are more likely to be found there [8]. Economically, it is among the most active in the country with a highly developed economy (agricultural products, industrial production and others), favored by its geographical location (the maritime coast) and its arable land. It has considerable energy potential and a very significant forest capital. Its subsoil is also full of significant mining and hydraulic deposits [5].

2.2. Data collection and analysis

They were obtained using a survey sheet in a cross-sectional and descriptive study, spread from January 1, 2018 to June 30, 2020. These surveys were supplemented by observations and interviews with resource people in the field. For conducting surveys, the semi-structured or semi-structured type was favored [9, 10, 25] with open and closed questions [4, 11].

The size of the sample (n) for determining the number of households to be surveyed per territory was obtained by applying the formula:

$$n = z^2pq / d^2 [12]$$

The "p" not being known, was set at 50% [12]. Thus, the sample size was 384 households per territory chosen by the simple random sampling technique, i.e. 3,072 households for all 8 territories. Each respondent represents a household. The average age was 44 ± 21 years, 69% of respondents were male, the household size was 5 ± 2 people, and 80.37 % of respondents were at the level of less secondary. Regarding the activity carried out, 69.49% are farmers and at the same time breeders, 23.27% farmers, 6.05% breeders and 1.17% exercise other professions. Microsoft Excel 2011 software was used to encode the data which was the subject of descriptive statistics. While the SPSS (Statistical Package for Social Science) 21 was used for the analysis and verification of the links between different variables. The% made it possible to determine the frequency of certain variables.

3. Results

3.1. Examination of the causes of Human-Wildlife Conflicts

Table 1 Causes

Study variables	Total	%
Competition between humans and FS for spaces	2.530	41.16
Migration of humans to spaces reserved for wildlife	1.341	21.81
Attitudes and perceptions	1.284	20.89
Gradual loss of wildlife habitats	574	9.33
Specific anthropogenic activities	280	4.55
Metaphysical	114	1.85
Disease transmission from wildlife to domestic animals	23	0.4
Total	6.146	100

The data shown in table 1 made it possible to identify 3 groups of causes at the provincial level, 4 of which are related to space, 1 related to the minds of populations and 1 other related to the transmission of diseases from wild animals to domestic animals. Major causes related to space: The data revealed 5 causes of which the "Competition between humans and wildlife for spaces" took the 1st place. Indeed, this cause was the most cited with a frequency of 2,530 or 41.16% of the total responses obtained. The "Migration of humans to areas reserved for wildlife" achieved a score of 1,341 or 21.81%% and it was the 2nd cause of Human-Wildlife Conflicts across the province. The "Progressive loss of wildlife habitats" which was cited 574 times or 9.33% and occupies the 4th place in our research. "Specific anthropogenic activities" and "Metaphysical" with a frequency of 394 or 6.41%. Secondary cause related to the mentality of populations: "Attitude and Perception" was cited with a frequency of 1,284 or 20.89%. It was selected as the third cause of Human-Wildlife Conflicts by rural populations during the surveys. Minor cause related to the transmission of diseases from wildlife to domestic animals: The data in table 1 showed that this cause was only cited in a proportion of 0.4% of the total responses obtained.

3.2. Determination of social impacts

Table 2 Social impacts

Study variables	Total	%
Loss of agricultural production	1.841	27.81
Precarious living condition	910	13.75
Social unrest	860	12.99

Seed shortag	730	11.03
Rural exodus	665	10.04
Capital decrease	455	6.87
Exacerbation of beliefs	357	5.39
Inability to save	307	4.63
Dependence on other	178	2.68
Difficulty accessing social needs	174	2.62
No impact	141	2.19
Total	6.618	100

The results of the surveys contained in table 2 revealed that out of the 6,618 responses cited by the respondents, 27.81% concerned the "Loss of agricultural or pastoral production" in 1st position. The "precarious living condition" came in 2nd place in 13.75% of responses. The "Social malaise" in 3rd position with 12.99% of responses. 4th place "Seed shortage" was cited by 11.03% of respondents. The "rural exodus" in 5th position recorded a frequency of 10.04% of respondents. The other impacts cited, revealed a percentage of $\leq 6.87\%$.

3.3. Prevention and mitigation measures used by the population against the Human-Wildlife Conflicts

Table 3 Traditional measures

Study variables	Total	%
Lethal control	2.742	30.44
Installation of fences around fields	1.533	17.02
Installation of scarecrows in the fields	1.520	16.87
Containment of animals in secure enclosures	1.270	14.10
Monitoring of fields and livestock by humans	835	9.27
Grouping of fields and farms	622	6.90
Escaping animals by different methods	286	3.17
Metaphysical	198	2.19
Total	9.006	100

The results of the surveys on preventive measures used by rural populations against the Human-Wildlife Conflicts are shown in table 3. It turned out that "Lethal Control" was cited in 30.44% of respondents' responses and occupied the 1st place. "Installation of fences around the fields" took 2nd place with 17.05% of responses. The "Scarecrow Installation in the Fields" took 3rd place with 16.87% of the score. The "Containment of animals in secure enclosures" in 4th place cited in a frequency of 14.1%. Finally, the last 3 measurements occur in a proportion varying between 9.27% and 5.5%.

Table 4 Mitigation measures

Study variables	Total	%
Community awareness	2.358	34.93
State compensation for damage	1.591	23.57
Introduction of less appetizing crops	908	13.45
Free state assistance to breeders	634	9.39
Introduction to forestry	473	7.00

Voluntary displacement of populations	414	6.13
Responsible land use planning	214	3.17
State supply of veterinary inputs	158	2.36
Total	6.750	100

Analysis of the data in table 4 indicated that "Community outreach" ranked first for being offered in 34.93% of the responses received. "State Compensation for Damage" took 2nd place for being offered in 23.57% of citations. The "Introduction of less appetizing crops" which was retained in 3rd position with 13.45% of responses. The "Free State Assistance to Breeders" which took 4th place for collecting 9.39% of citations.

3.4. Validity of results

The results as they were obtained from this research on Human-Wildlife Conflicts in Kongo Central:

- Confirm the concepts or theories of Human-Wildlife Conflicts in the province;
- Indicate facts hitherto unknown because most studies on Human-Wildlife Conflicts are verifiable aspects in society. In this research, in addition to these aspects, we addressed the metaphysical aspect (fetishism or witchcraft) which intervenes in the causes and preventive measures of Human-Wildlife Conflicts;
- Do not contradict the results of other authors who have worked on Human-Wildlife Conflicts.

4. Discussion

4.1. Causes of Human-Wildlife Conflicts

Major causes related to space the data revealed 5 causes of which the "Competition between humans and wildlife for spaces" took 1st place. These results joined those of Sogbohossou and al. [13] who argued in his study that one of the most important causes of Human-Wildlife Conflicts is competition for habitats and available natural resources between wildlife and humans. Nsonsi [14] and Dibloni and al. [24] went on to say that the competition between humans and wildlife for spaces is the most obvious cause of conflict. Lamarque and al. [15], Balna [16] and Marchand [17] affirmed that the sharing between humans and wild animals of the same ecosystems, generate under various typology. The "Migration of humans to areas reserved for wildlife" was Human-Wildlife Conflicts's 2nd cause across the province. According to Lamarque and al. [15], the migrations of humans towards areas reserved for wildlife would be caused by certain situations including war, floods, drought, civil disturbances or natural disasters. With regard to the Kongo Central province, we are witnessing a new phenomenon that of the migration of people from the city to the countryside for reasons of tranquility or food. For lack of space at the level of the administrative centers of the territories, they settle and build in the bush in areas reserved for wildlife. The "Progressive loss of wildlife habitats" which was cited in 4th place. This result was confirmed during the Reflection Workshop on Human-Wildlife Conflicts organized by the Ministry of Water and Forests (Gabon) [23]. This cause was placed in 1st place among the causes of Human-Wildlife Conflicts in Gabon (Africa) while it occupies the 4th place in our research. This could be explained, certainly, by the fact that these are two environments with different ecosystems. "Specific anthropogenic activities" with a very low frequency because most of the population does not believe that they could be a cause of Human-Wildlife Conflicts. Secondary cause linked to the minds of populations "Attitude and Perception" was cited as the 3rd cause of Human-Wildlife Conflicts by rural populations when surveyed. But the reality is that a fringe of the population (58%) do not recognize them as a cause of conflict because in their understanding, they consider the wild animals living in their environment as property belonging to them. Minor cause related to disease transmission from wildlife to pets. The data in Table 1 showed that almost all of the farmers surveyed claimed not to have recorded cases of trypanosomiasis in their farms. These results have led to the assertion that the "Transmission of animal diseases from wildlife to domestic animals" has a "No" impact on farm animals. The results of molecular biology examinations carried out in parallel with the investigations confirmed this. Indeed, the absence of trypanosomiasis diseases in the targeted herds is corroborated by the work of Kabamba and al. [19].

4.2. Social impacts of Human-Wildlife Conflicts

The data related to these impacts showed that "the loss of agricultural or pastoral production" was considered as the 1st socio-economic impact. This impact as revealed through the results of the surveys joined Balna [16] who asserted: "Human-Wildlife Conflicts have effects that not only compromise the protection of the environment, but also affect the socio-economic". This phenomenon has now become a scourge and compromises the food sovereignty of regions already weakened by ecological violence. The reduction in farmers' incomes which is the consequence of losses in

agricultural production has been targeted as one of the consequences of the social-economic impacts of Human-Wildlife Conflicts [18, 26]. We will have noticed that "the loss of agricultural production" has generated among these rural populations other impacts as revealed in table 2 which are taken up and summarized by Balna [16] in these terms: "The consequences of the damage caused by the wildlife therefore cause socio-economic degradation such as school loss, famine, discouragement and moral depression of populations, the increase in the rate of infant mortality and the constant degradation of certain woody species".

4.3. Prevention and mitigation measures used to combat the Human-Wildlife Conflicts

Table 3 revealed that "Lethal control" was recommended as the first preventive measure by almost all of the respondents. This result is confirmed by Marchand [20] who asserted that lethal control favors human societies, because it is apparently less costly than the implementation of prevention strategies and gives the sensation of an immediate result. Since it contributes, at least for a few days or a few months, to scaring off troubling fauna. The results also revealed that "Installation of fences around the fields" took 2nd place. The "Installation of scarecrows in the fields" took third place. This data is confirmed by Sogbohossou and al. [13], Omobayo and al. [21] who asserted that most of the respondents use the scarecrow pose for conflict prevention.

Analysis of the data in table 4 in relation to the mitigation measures, indicated that "Community sensitization" occupied the 1st place. Sogbohossou and al. [13] confirmed our results by asserting that this measure is the 1st conflict mitigation measure. Batenbaum [22] and Binot and al. [12] argued that the best way to reduce the problems humans face with wildlife and vice versa has been to educate farmers and villagers to view animals as an asset rather than as a threat to be eliminated. This opinion is also shared by Marchand [11] who affirmed that certain young inhabitants of the community of Manaus (Amazonas, Brazil) say they have abandoned lethal control in the majority of cases following the various environmental awareness activities carried out on site.

The "State Compensation for Damage" took 2nd place. These results are supported by Lamarque and al. [15] who asserted that compensation is a method used in the management of Human-Wildlife Conflicts to mitigate damage caused by wildlife. Omobayo and al. [21] asserted that structural methods also try to reduce conflict. Financial instruments (such as incentives, insurance or compensation) or alternative livelihoods are used to reduce the physical costs incurred by wildlife or to discourage the use of certain measures such as lethal control. Other mitigation measures were found to be less popular as they were preferred by less than 50% of respondents.

5. Conclusion

The study on the Human-Wildlife Conflicts issue in Kongo Central showed that the Human-Wildlife Conflicts are effective in the province. The local populations pay an important tribute every year. In view of the results on the causes of conflicts, it appears that the main causes of the Human-Wildlife Conflicts are linked to the use of spaces between humans and wildlife. The provincial state will have to act at this level to create and demarcate areas reserved exclusively for humans and those reserved for wildlife. This measure will reduce the acuity of the Human-Wildlife Conflicts to a minimum in the various environments and also improve the value of wildlife. This will result in the development of income-generating activities linked to the conservation of species. Thus, wild animal populations can be protected for the well-being of communities. The correlation between the socio-economic impacts suffered by the populations and the prevention and mitigation measures used by the populations to fight against the Human-Wildlife Conflicts, showed that the latter would be ineffective. It would therefore be urgent to use more than two at the same time in order to reduce the effects of the Human-Wildlife Conflicts. But also, in order to protect animal biodiversity, it would be preferable to promote compensation by the State for victims of crop damage or predated animals to prevent the impoverishment of populations and famine in certain households. This will help reduce people's adversity towards wildlife.

Compliance with ethical standards

Acknowledgments

We would like to thank Madame ADAMBU Josée who was of considerable help to us for entering the data into the computer. All our gratitude also goes to the pastor couple VEDOSO Jacques for their closeness.

Disclosure of conflict of interest

This article is not subject to any conflict of interest because it is not made at the request of any Organization or Structure that would have wildlife in its attributions or activities.

Statement of informed consent

Before the start of the interview, we made it our duty to explain to the respondent the objectives of the survey. All interviews were conducted with the informed consent of the respondents.

References

- [1] SUB-REGIONAL MONITORING OF HUMAN-WILDLIFE CONFLICTS. Monthly Bulletin, 2015; 4.
- [2] BIPIKILA MM. Human/Elephant interaction at Les Gisir. [Master's thesis dissertation]. Gabon: Omar Bongo University; 2008.
- [3] TSHIKUNG KM. Population dynamics of Guib Harnaché and assessment of anthropogenic pressures in Upemba National Park [Ph.D. dissertation]. Lubumbashi, University of Lubumbashi; 2012.
- [4] KAZABA KP, BAHONGOLI MM, KILEMBA MB, ANKWANDA YA. , TSHIKUNG MD. Mammalian fauna, hunting and human-wildlife conflicts on the outskirts of Kundelungu National Park (DR Congo). Journal of Applied Biosciences. 2019; 139:14147-14156.
- [5] MINISTRY NATIONAL OF PLAN (DR CONGO). Profile of the province of Kongo Central; 2015.
- [6] GOVERNORATE OF THE PROVINCE OF KONGO CENTRAL. Postcard of the Province of Kongo Central. Conference of Governors; 2016.
- [7] AGENCY FOR SPECIAL ECONOMIC ZONES [Internet]: Technical sheet of Kongo Central; [cited 2017 sep 12]. Available from [http:// njno.info/njno_news.php?newsid=1203&idnga=&rubn=Kongo%20Central](http://njno.info/njno_news.php?newsid=1203&idnga=&rubn=Kongo%20Central)
- [8] UNIVERSITY OF KISANGANI – FACULTY OF SCIENCES. State of the biodiversity of the DR Congo; 2014.
- [9] SINGLY DF. The survey and its methods, the questionnaire. 3rd ed. Publisher Armand Colin. 2012.
- [10] SAÏD B. Survey protocol: the interview, Method of research and development of academic work, Pub. Didactic, NICT, Translation and Culture Laboratory; 2013.
- [11] MARCHAND G. Our neighbours, the beasts: human/wildlife conflicts circumstances in a protected area of the periphery of Manaus (Amazonas, Brazil), *Varia*. 2012; 3(1).
- [12] BINOT A, CASTEL V, CARON A. The wildlife-livestock interface in sub-Saharan Africa, *Drought*. 2006; 17(1-2): 349-361.
- [13] SOGBOHOSSOU EA, DANSOU PE, DJAGOUN CAMS. Human-hippopotamus conflicts in the Adjamè Community Reserve in southwestern Benin, *Benin Agricultural Research Bulletin*, 2017; 82 : 22-31.
- [14] NSONSI F. Human-elephant (*Loxodonta cyclotis*) conflicts: A challenge to involve local communities in wildlife conservation, *Tropicultura*. 2018; 36(3): 531-538.
- [15] LAMARQUE F, ANDERSON J, FERGUSSON R, LAGRANGE M, OSEI-OWUSU Y., BAKKER L. Human and wildlife conflicts in Africa, causes, consequences and management strategies; FAO study, *Forest*; 2010.
- [16] BALNA J. Beyond environmental issues in the face of human-elephant conflict in the Cameroonian Sahel [Internet], Institute of Agricultural Research for Development; © 2010 [cited 2019 May 14]. Available from <https://www.geosp.net/wp-content/uploads/2013/07/jules-balna.pdf>,
- [17] MARCHAND G. Human/wildlife conflicts under the gaze of geography [Internet]. © 2013 [cited 2017 November 3]. Available from [http:// cdg.revues.org/1070](http://cdg.revues.org/1070).
- [18] KOUAO ML, BENE JC, KOFFI AD, KOUAE BA, KONE I. Characterization of the damage caused by wildlife on the outskirts of the Maraix Tanoe-Ehey forest in the south-east of Côte d'Ivoire, in *Int . J. Biol. Chem. Science*. 2018; 12(4): 1717-1730.
- [19] KABAMBA MW, MALEKANI J, MASUMU J, PYANA P, MAMOUDOU A, TSHILENGE G. Characterization of *Trypanosoma* sp in domestic animals in four outbreaks in the western part of the Democratic Republic of the Congo, *Rev. Mar. Sci. Agron. Vét.* (2020) 8(2): 215-220.

- [20] MARCHAND G. Analysis of the spatial dimension of human/wildlife conflicts in the Uatumã River Sustainable Development Reserve (Amazonas, Brazil) [Internet]. © 2016 [cited 2017 November 5]. Available from <http://cybergeo.revues.org/27807>
- [21] OMOBAYO G.Z., NOBIME G., SEDAMI A., GAUDENCE D. Crop depredation by the red-bellied monkey (*Cercopithecus erythrogaster erythrogaster*) in Togbota in southern Benin, African Primates. 2019; 13:9-28.
- [22] BATENBAUM JC. The conflict between humans and wildlife must be reduced [Internet]. Ecology and Wildlife Protection; © 2010 [cited 2017 November 5]. Available from <http://www.actualites-news-environnement.com/23914-FAO-faut-attenuer-conflit-Homme-Faune-sauvage.html>.
- [23] MINISTRY OF WATERS AND FORESTS (GABON): Convention on Biological Diversity [Internet]. Reflection workshop on human-wildlife conflicts. © 2015 [cited 2017 December 5]. Available from <http://ci.chm-cbd.net/links/informations/atelier-de-reflexion-sur-les-conflits-hommes-faune-sauvage>.
- [24] DIBLONI OT, OUOBA D, ZOMAN YS, YAMEOGO S. and KABRE BG. Characterization of human-wildlife conflicts in the Mare aux Hippopotame Biosphere Reserve in the southern Sudanian zone of Burkina Faso, Africa SCIENCE. 2020; 17(2): 115-127.
- [25] FENNETEAU H. Survey: interview and questionnaire. 3rd Ed. Dunod; 2015.
- [26] ILAMA L. Forests and People: Investing in a Sustainable Future for Africa, A Toolkit for Human-Wildlife Conflict Management in Central Africa, Nature & Faune. 2015; 29(2): 76.