"Identification of animal speciesincriminated in the local typology of human-wildlifeconflicts in the province of Kongo Central in DemocraticRepublic of Congo (Africa)"

Telamanu B.E.[1] *, Didier Tshikung K. M. D.[2], Malemba N.[2], Pati P.P. [1-3], Kasongo A.G [2]

[1]National PedagogicalUniversity, Faculty of VeterinaryMedicine, B.P. 8815, Kinshasa / Ngaliema, DemocraticRepublic of Congo
[2]University of Lubumbashi, Faculty of VeterinaryMedicine, B.P. 1825, Lubumbashi, DemocraticRepublic of Congo
[3]National Institute for BiomedicalResearch, Kinshasa / Gombe, DemocraticRepublic of Congo

IJASR 2021
VOLUME 4
ISSUE 4 JULY – AUGUST **ISSN: 2581-7876**

Abstract: A study on Human-Wildlife Conflicts (HWC) was carried out from January 1, 2018 to June 30, 2020 in the province of Kongo Central. The objective was to identify the wild animal species responsible in the local typology of conflicts. Semi-structured surveys were conducted on the basis of an interview guide among the populations of 8 out of the 10 territories in the province. The sample size was determined using Fréderic's formula at 384 households per territory chosen by the simple random sampling technique, or 3,072 individuals for the entire province. The administration of the questionnaire was carried out by the so-called "PAPI" technique. The results showed that *Dendrospis, Bitisgabonica* and *Potamochoerusporcus* were most cited for injuries, bites and fatalities in humans. Crop depredation data revealed *Thryonomysswinderianus, Ratusratus* and *Cephalophusmonticola* to be the most implicated. "Farmyard animal predation" revealed that *Accipiter misus* was cited the most, followed by *Vulpesvulpes, Viverracivetta* and *Bitisgabonica*. As for "Domestic mammal predation", it turned out that *Python sebae* and *Bitisgabonica* were the most implicated.

Keywords: Human-wildlife conflicts, Semi-structured investigation, Wild species involved, Interview guide.

I. INTRODUCTION

The human-wildlife conflicts, in acronym CHF, constitute a real problem in many countries and they have important consequences in terms of food security, micro and macro economy but also wildlife conservation. The problem arises in a large number of habitat varieties (Siwady, 2010), when humans and wild animals share the same ecosystems (Bipikila, 2008; Lamarque et al., 2010). This situation generates CHF under various types including predation on farm animals, crop depredation, physical threat due to the presence of certain dangerous wild animals (Loxodontaafricanus, Pantheraleo, Hippopotamus amphibius and Crocodylinae, Synceruscaffer, etc ...), the destruction of infrastructure, competition around water points and the disruption of recreational activities (Balna, 2010; Lamarque et al., 2010; Marchand, 2013; Khaled, 2017; Sogbohossou et al., 2017) . HWCs are also the source of difficulties in accessing natural resources and undermine biodiversity conservation strategies because many species have seen their numbers reduced by the modification of their habitats (Eyebe et al., 2012; Ministry of Waters and Forests, 2015). Conflicts between humans and wildlife exist in Kongo Central. It is within this framework that this study has set two objectives: (1) Identify the wild animal species involved in these conflicts, (2) Determine the geographical areas (territories) of occurrence of conflicts. As well as a good knowledge of the animals involved in CHF will not only considerably reduce the direct and indirect impacts on humans but also protect and conserve biodiversity (Lamarque et al., 2010; Ilama, 2015) .

II.MATERIAL AND METHOD

II.1.Study environment

This research was conducted in Kongo Central province in the Democratic Republic of Congo.This province lies between 4 ° and 6 ° South latitude and 12 ° and 16 ° East longitude.It is bounded on the north by the Republic of Congo, on the west by the Atlantic Ocean and the Angolan enclave of Cabinda, on the east by the city province of Kinshasa and the province of Kwango and on the south by the Republic of Angola.The County town is Matadi.Its

population is estimated at 5,813,586 inhabitants and its surface area is 53,855 km².The altitude is 75 to 360 m near the ocean and 300 to 650 m in the Cuvette Centrale (Ministry of Planning, 2015; Governorate of Kongo Central Province, 2016, Special Economic Zones Agency, 2017).

The province is characterized by a tropical climate of the Sudanese type Aw4. The average annual temperature, oscillates around 25 ° C. The vegetation comprises three distinct types of natural formation: (i) The coastal hinterland or the littoral, characterized by a vegetation of mangroves and steppes in the plateaus dominating the coast of Moanda ; (ii) The territories of Lukula, Tshela and Seke-Banza covered by forest over their entire extent; (iii) The territories of Mbanza-Ngungu, Madimba, Kasangulu and Kimvula which, despite heavy rainfall, correspond to a region of savannah interspersed with scraps of forest (Ministry of Planning, 2005; Ministry of Planning, 2015). The relief is very varied in detail, but it is essentially made up of plateaus that are never very high (Agence des Zones EconomiquesSpéciales, 2017).

The province is part of the large Congo River basin, with the exception of Mayombe drained by the Shiloango River. The wild fauna is in loss especially for the large species. Some species are endangered such as Synceruscaffer, Pantheraleo. Small mammals are more likely to be found there (University of Kisangani, 2014). Economically, the Kongo Central province 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 (Ministry of Planning, 2005; Ministry of Planning, 2015).

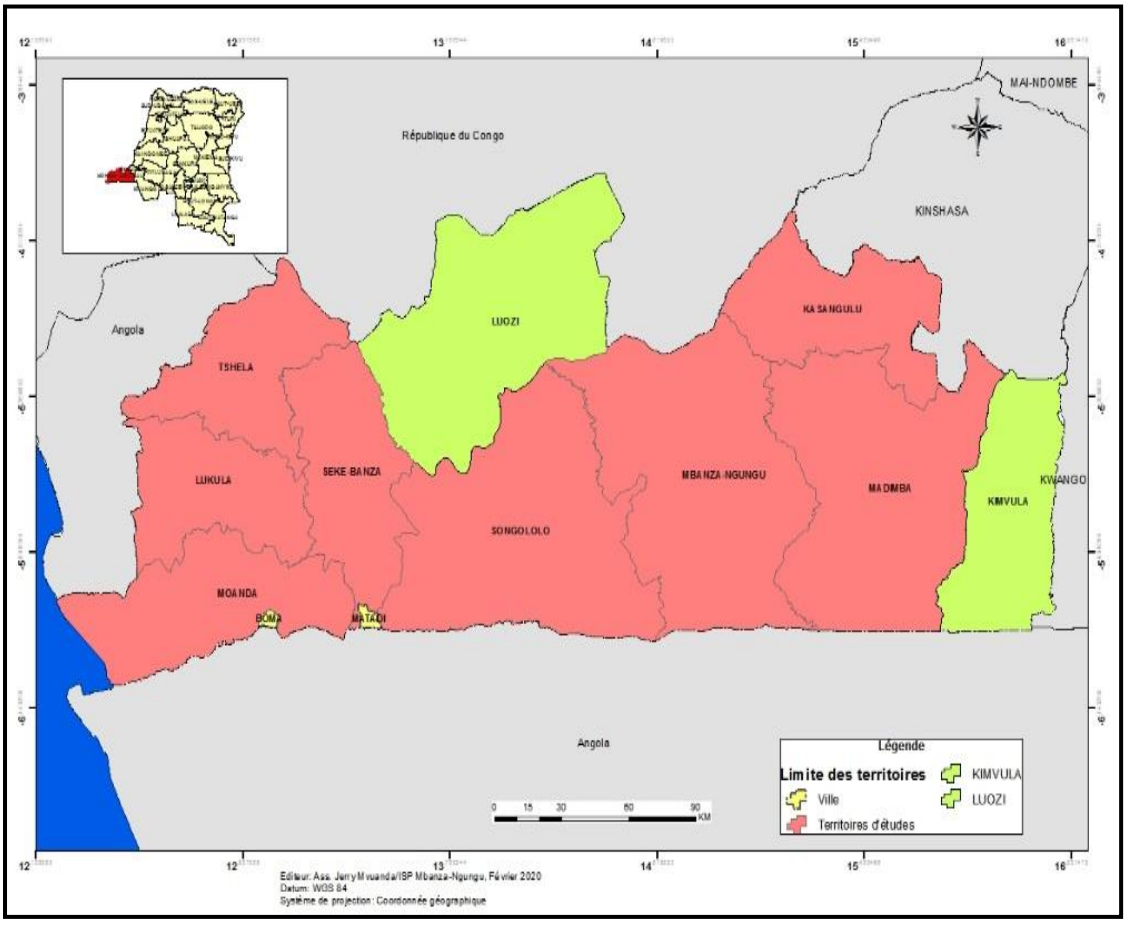

Figure 1: Map showing the location of 8 study areas in red

At the end of the pre-survey conducted between October and December 2017, 8 out of the 10 in the province were selected. These are the territories of: (1) Mbanza-Ngungu (5 ° 15'30 " South and 14 ° 51'30 " East) with 4 sectors (Kwilu-Ngongo: 5 ° 30 'South and 14 ° 30' East ; GombeMatadi: 5 ° 27 'South and 14 ° 35' East; Kivulu: 5 ° 29 'South and 15 ° East; Boko: 5 ° 31' South and 14 ° 82 'East), (2) Seke-Banza (5 ° 20 ' South and 13 ° 16 ' East) with

3 sectors (Isangila: 5 ° 51 'South and 13 ° 54 East; Bundi: 5 ° South and 13 ° East and Lufu: 5 ° 65' South and 13 ° 44 ' Is) ; (3) Kasangulu: 4 ° 35 'South and 15 ° 10' East with 2 sectors (Kasangulu: 4 ° 33 'South and 15 ° 9' East; Luila: 4 ° 35 'South and 15 ° 11' East), (4) Lukula: South 5 ° 38 'and East 12 ° 93' with 3 sectors (Fubu: 5 ° 29 'South and 12 ° 76' East; Tsanga-North: 5 ° 36 'South and 12 ° 98' East; Patu : 5 ° 27 'South and 12 ° 75' East), (5) Madimba: 4 ° 9 South and 15 ° 2 East with 3 sectors (Wungu: 4 ° 18 'South and 14 ° 29' East; Ngeba: 4 ° 14 'South and 12 ° 75' East; Ngufu: 4 ° 19 '% South and 14 ° 26' East), (6) Songololo: 5 ° 42 ' South and 14 ° 02 'East with 3 sectors (Luima: 5 ° 37 'South and 14 ° 08' East; Kimpese: 5 ° 45 'South and 14 ° 17' East and Palabala: 5 ° 40 'South and 14 ° 22' East), (7) Tshela: 5 ° 01 'South and 12 ° 96 'East with 4 sectors (Lubuzi: 5 ° 12' South and 12 ° 76 'East; Loango: 5 ° 54' South and 12 ° 82 'East; Ngand-Nsundi: 5 ° 37' South and 12 ° 66 ' East and Mbanga-Mbanga: 5 ° 37 'South and 12 ° 66' East), (8) Moanda: 5 ° 56 ' South and longitude 12 ° 21 ' East with 2 sectors (La Mer: 5 ° 42 'South and 12 ° 32 'East; BomaBungu: 5 ° 43' South and 12 ° 52 'East). That is to say a total of 24 sectors listed above selected according to the protocol of the National Institute of Statistics (2012).

II.2. Animals

These are different wild animal species belonging to the class of Birds, Reptiles and Mammals (University of Kisangani, 2014) existing in the Kongo Central province that can be implicated in human-wildlife conflicts.

II.3. Equipment

The following materials were used: a survey questionnaire, a Lenovo branded computer, a Kodak c143 brand digital camera, a Garmin branded GPS unit, a compass and telephones.

II.4. Methods

II.4.1. Type and period of study

This study is cross-sectional and descriptive. It was preceded from October 1, 2017 to December 31, 2017 by a pre-survey. The investigations properly ran from January 1, 2018 to June 30, 2020.

II.4.2. Sample size

The size of the sample (n) for determining the number of households to be surveyed per territory was obtained by applying the formula: $n = z^2pq / d^2$ (Frédéric, 2015). The "p" not being known, was set at 50% (Kouao et al., 2018). Thus, the sample size was 384 households per territory, chosen by the simple random sampling technique, or 3,072 households for all 8 territories, each represented by an individual (respondent).

II.4.3. Fields of surveys

The research sites covered 8 territories including Lukula, Tshela, Seke-Banza, Mbanza-Ngungu, Songololo, Kasangulu, Madimba and Moanda in the 10 territories of the province. These territories were chosen on the basis of: (i) accessibility, state of roads, availability of means of transport, (ii) the existence of conflicts; (iii) the richness of wildlife in the area, (iiii) the presence of family farms and fields in the region. The determination at the level of the territories of the number and choice of sectors, of the number of groups at the level of sectors, of the names of the groups selected and finally of the households in each of the 88 groups thus drawn out of 184 (48%) responded to a good protocol. determined (National Institute of Statistics, 2012a; National Institute of Statistics, 2012b; National Institute of Statistics, 2012c).

II.4.4. Data collection and conduct of surveys

Data collection was carried out using a survey form. It was a question of obtaining from the households represented by the head of the family (male or female) specific information on the wild animal species incriminated in the typology of human-wildlife conflicts at the provincial level. For conducting surveys, the semi-structured or semi-structured type was chosen (Singly, 2012; Saïd, 2013; Fenneteau, 2015). The respondents were made up of people of all ages except children who have not yet reached the age of majority, without discrimination of sex, marital status, level of education, household size. and professional activities, indigenous or not. The interviews were individual and took place either in French, in Lingala or even in Kikongo, the vernacular language. The language used during the interview was freely chosen by the interviewee. In order to make the interview more attractive to the interviewee, the semi-structured method using closed and open questions (Kazaba et al. (2019) was preferred in order to give the

interviewee the opportunity to At the start of each interview, we made it our obligation to first explain to the interviewee the objectives of the survey. All the interviews were carried out with the agreement of the interviewees (e) s The various groups were crisscrossed on foot or by bicycle, but also very rarely by motorbike.

II.4.5. Data analysis and processing

Microsoft Excel 2011 software was used to encode the data which was the subject of descriptive statistics. While the SPPS (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

III.RESULTS

The quotation frequencies of wild animal species reported by the respondents on each type of CHF revealed the observations contained in the tables below:

III.1.a.Bites and wounds

Table I: Animal species incriminated in bites and wounds according to the territories

Animalspecies incriminated	Territories								Total citations
	Seke-Banza	Mbanza-Ngungu	Madimba	Kasangulu	Lukula		Tshela	Songololo	
Dendrospis	179	39	79	155	155	288	0	136	**1.031**
Bitisgabonica	14	78	93	38	72	9	27	11	**342**
Potamochaerusporcus	12	58	9	18	0	24	30	107	**258**
Thryonomysswinderiamus	4	20	0	0	0	0	0	0	**24**
Viverracivetta	8	0	0	0	0	0	11	0	**19**
Cercopithecus spp	5	0	0	0	0	0	0	12	**17**
Herpestes ichneumon	0	2	0	6	0	0	0	0	**8**
Total par territoire	**222**	**197**	**181**	**217**	**227**	**321**	**68**	**266**	**1.699**

The data in Table I revealed that the 384 respondents selected in each territory cited *Dendrospis*in 1st position in the territories of Moanda, Seke-Banza, Kasangulu, Lukula and Songololo with a frequency of 288 (75%) respectively. , 179 (46.61%), 155 (40.36%), 155 (40.36%) and 136 (35.41%). *Bitisgabonica* was placed in 1st place according to 93 (24.21%), 78 (20.31%), 72 (18.75%) of respondents respectively in the territories of Madimba, Mbanza-Ngungu and Lukula. *Potamochaerusporcus* was cited in 1st position in the territory of Songololo with a frequency of 107 (27.86%. It will be noted that the other animal species were weakly mentioned by the respondents.

Compared to the 1,699 cases of injuries and bites recorded at the provincial level, the data in Figure 2 revealed that 60.68% were caused by *Dendrospis*, 20.12% by *Bitisgabonica*, 15.18% by *Potamochaerusporcus*. The other species intervened for 4.02% of the cases.

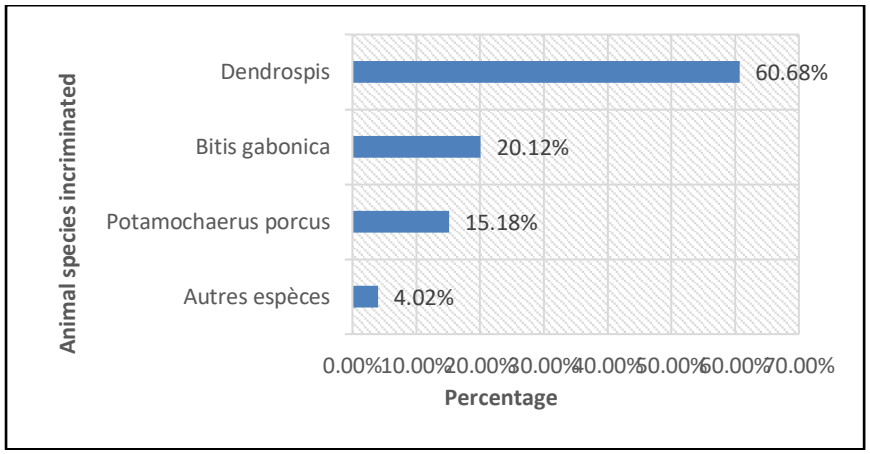

Figure 2: Distribution in% of cases of injuries and bites recorded according to the animal species incriminated in the province of Kongo Central

III.1.b.Human deaths

Table II: Number of cases of human deaths recorded by territory caused by wild animal species in Kongo Central province

Animal species incriminated	Territories								Total citations
	Seke-Banza	Mbanza-Ngungu	Madimba	Kasangulu	Lukula		Tshela	Songololo	
Dendrospis	115	21	22	75	19	42	53	95	**442**
Bitisgabonica	48	24	33	66	0	50	42	39	**302**
Potamochaerusporcus	0	26	6	0	0	0	21	0	**53**
Number of cases per territory	**163**	**71**	**61**	**141**	**19**	**92**	**116**	**134**	**797**

The data in Table II, showed that *Drendrospis* was cited in 1st position in the territories of Seke-Banza with a frequency of 115 (29.94%), 95 (24.73%) in Songololo, 75 (19.53%) and finally 53 (13.8%) in Tshela. *Bitisgabonica* occupied the 1st place according to 66 (17.18%), 50 (13.02%), 48 (12.5%) of respondents respectively in the territories of Kasangulu, Moanda and Seke-Banza.We will have noticed that *Potamochaerusporcus* (Warthog) was weakly mentioned in Mbanza-Ngungu (6.77%) and Tshela (5.46%).

Compared to the 797 cases of death reported at the provincial level, Figure 3 showed that 55.45% were caused by *Dendrospis*, 37.89% by *Bitisgabonica*, 6.66% by *Potamochaerusporcus*.

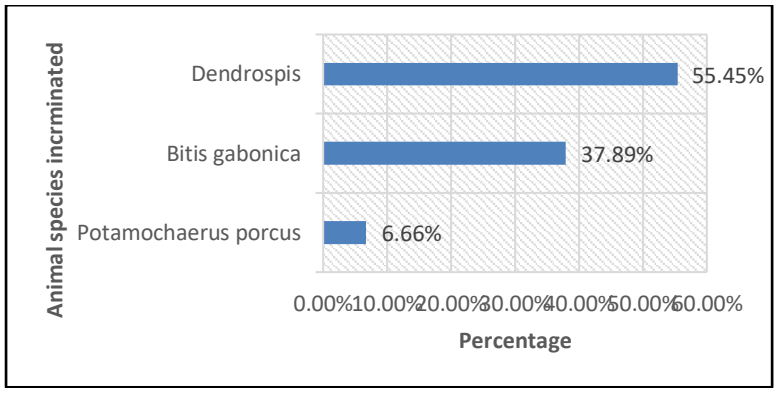

Figure 3 : Percentage distribution of human death cases according to the animal species incriminated in the province of Kongo Central

III.2.Food crop depredation

Table III: Wild animals incriminated in the depredation of food crops according to the territories

Animal speciesincriminated	Territories								Total citations
	Seke-Banza	Mbanza-Ngungu	Madimba	Kasangulu	Lukula		Tshela	Songololo	
Thryonomysswinderianus	352	158	168	354	294	288	279	319	**2.212**
Ratusratus	128	170	314	186	315	158	233	220	**1.724**
Cephalopusmonticola	216	246	129	270	189	258	30	56	**1.394**
Perdrix perdrix	4	42	260	264	144	210	0	0	**924**
Passer domesticus	120	165	114	90	108	88	99	112	**896**
Crycetomysgambianus	84	46	221	192	123	138	6	16	**826**
Numidameleagris	0	10	30	186	21	138	0	0	**385**
Herpestes ichneumon	0	182	36	0	36	30	0	0	**284**
Potamochaerusporcus	0	96	3	42	3	44	0	0	**188**
Cercopithecus spp	32	69	0	0	3	28	9	8	**149**
Accipitermisus	8	5	114	0	21	0	0	1	**149**
Artherure africanus	48	4	0	6	9	8	30	40	**145**
Protoxerusstrangeri	4	8	0	0	0	8	0	1	**21**
Number of citations/Terr.	**996**	**1.201**	**1.389**	**1.590**	**1.266**	**1.396**	**686**	**773**	**9.297**
Number of farmers	**376**	**357**	**353**	**378**	**378**	**354**	**375**	**379**	**2.950**

Table III revealed that *Thryonomysswinderanius* was cited in all the territories but in 1st position in the territories of Kasangulu and Seke-Banza by respectively 354 (93.65%) out of 378 farmers and 352 (93.61%) out of 376 respondents. *Ratusratus* took the 1st position in the territories of Madimba and Lukula with a respective frequency of 88.95% and 83.53% of citations. *Cephalopusmonticola* was cited in the 1st position in Mbanza-Ngungu with 68.9% citation by the respondents. Other species such as *Partridge partridge, Passer domesticus, Crycetomysgambianus, Numidameleagris, Herpestes ichneumon, Potamochaerusporcus, Cercopithecus spp, Accipiter misus*and*Artherureafricanus* have been involved to varying degrees in the depredation of food crops.

Compared to the 9,297 cases of depredations reported at the province level, Figure 4 indicated that 23.79% was caused by *Thryonomysswinderanius*, 18.54% by *Ratusratus*, and 14.99% by *Cephalophusmonticola*. The other species intervened in proportions ranging from 9.63% (*Passer domesticus*) to 0.28% (*Protoxerusstrangeri*).

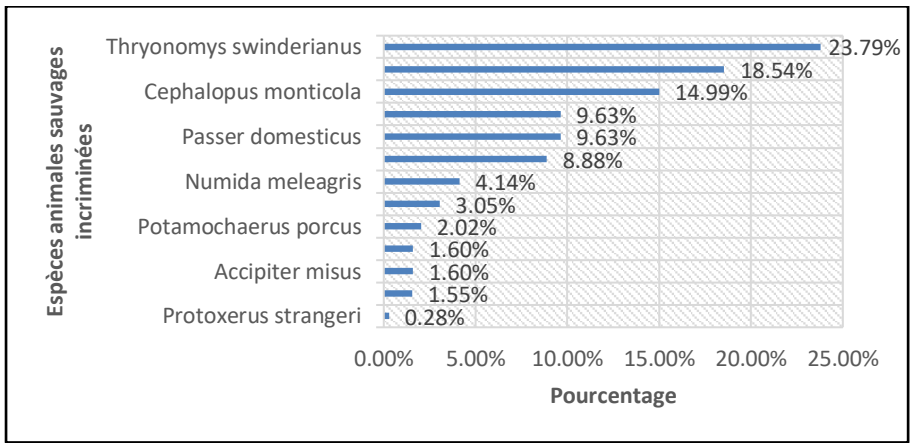

Figure 4: Distribution in% of cases of crop depredation according to the animal species incriminated in the province of Kongo Central

III.3.Farm animal predations

III.3.a.Farmyard predations Table IV: Animal species incriminated in farmyard predations

Animal speciesincriminated	Territories								Total citations
	Seke-Banza	Mbanza-Ngungu	Madimba	Kasangulu	Lukula		Tshela	Songololo	
Accipitermisus	108	222	96	180	178	173	179	187	**1.323**
Vulpes vulpes	96	184	51	174	141	152	160	148	**1.106**
Bitisgabonica	28	57	45	108	85	107	72	109	**611**
Viverracivetta	84	11	0	72	29	37	36	48	**317**
Python sebae	36	46	6	12	18	37	27	37	**219**
Corvuscorax	0	28	0	0	53	37	42	0	**160**
Total citations	**352**	**548**	**198**	**546**	**504**	**543**	**516**	**529**	**3.736**
Total Eleveurs	**316**	**287**	**159**	**222**	**364**	**336**	**301**	**336**	**2.321**

Table IV revealed that *Accipiter misus* was cited in 1st position in all the territories with quotation frequencies of the order of 81.8% in Kasangulu, 77.35% in Mbanza-Ngungu, 60.37% in Madimba, 59.46% in Tshela, 55.65% in Songololo.We will also have noticed that *Vulpesvulpes* is cited in 2nd place in all the territories.The other species are cited at varying frequencies depending on the territory.

Compared to 3,736 cases of predation recorded at the province level, the data in Figure 5 revealed that 35.41% were caused by *Accipiter misus*, 29.6% by *Vulpesvulpes*, 16.35% by *Bitisgabonica*,8.48% by *Vivettacivetta*, 5.86% by *Python sebae* and 4.3% by *Corvuscorvus*.

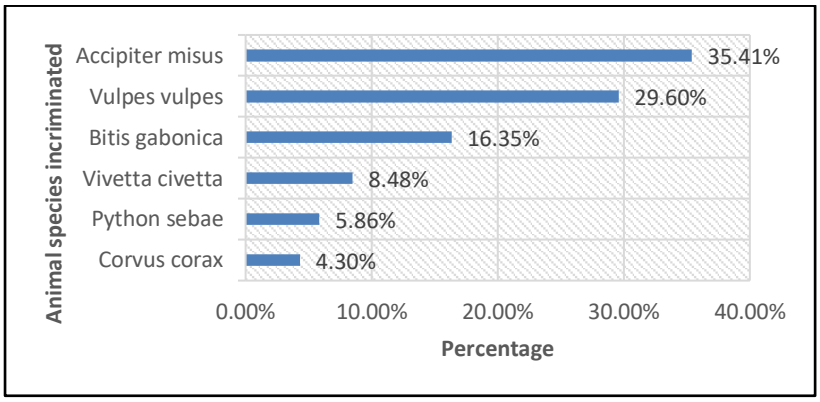

Figure 5: Distribution in% of cases of predation of farmyard animals according to the animal species incriminated in the province of Kongo Central

III.3.b.Predations of domestic mammals

Table V: Animal species incriminated in the predations of domestic mammals

Animal speciesincriminated	Territories								Total citations
	Seke-Banza	Mbanza-Ngungu	Madimba	Kasangulu	Lukula		Tshela	Songololo	
Python sebae	242	236	121	197	324	204	267	303	**1.894**
Bitisgabonica	38	67	137	66	82	94	125	123	**732**
Vulpes vulpes	0	0	0	0	0	0	0	11	**11**
Canisadustus	0	0	0	1	1	0	0	7	**9**
Total citations by Terr.	**280**	**303**	**258**	**264**	**407**	**298**	**392**	**444**	**2.646**
Number of farmers	**316**	**287**	**159**	**222**	**364**	**336**	**301**	**336**	**2.321**

Table V showed that the *Python sebae* occupied the 1st position in quotes from breeders in all territories except Madimba, with frequencies of 90.17% in Songololo, 89.01% in Lukula, 88.73% inKasangulu, 88.7% in Tshela, 88, 22% in Mbanza-Ngungu, 76.58% in Seke-Banza.We will have noticed *Bitisgabonica*was cited in 2nd place in all the territories except Madimba where he occupied the 1st position with an 86.16%.

According to Figure 6, it turned out that of the 2,646 cases of predation reported at the provincial level, 71.57% were caused by *Python sebae*, 27.66% by *Bitisgabonica*, 0.41% by *Canisadustus*and 0.36% by *Vulpesvulpes*.

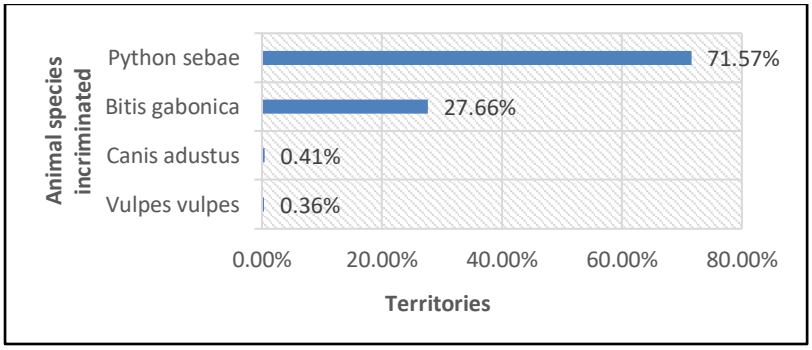

Figure 6: Distribution in% of cases of predation of domestic mammals according to the animal species incriminated by territory in the province of Kongo Central

III.4.Destruction of infrastructure

Table VI: Animal species incriminated in the destruction of infrastructure

	Territories								
Animal specieincriminated	**Seke-Banza**	**Mbanza-Ngungu**	**Madimba**	**Kasangulu**	**Lukula**		**Tshela**	**Songololo**	**Total citations**
Potamochaerusporcus	0	4	0	36	0	12	6	0	**58**

Table VI shows that *Potamochaerusporcus* was the only wild animal species implicated in the destruction of infrastructure.He was cited more in the territory of Kasangulu with a score of 36 (9.37%) votes out of the 384 surveyed.There was a total of 58 (100%) cases reported by all respondents in the province.

The data in Figure 7 showed that all 58 (100%) reported cases were caused by Potamochearusporcus.

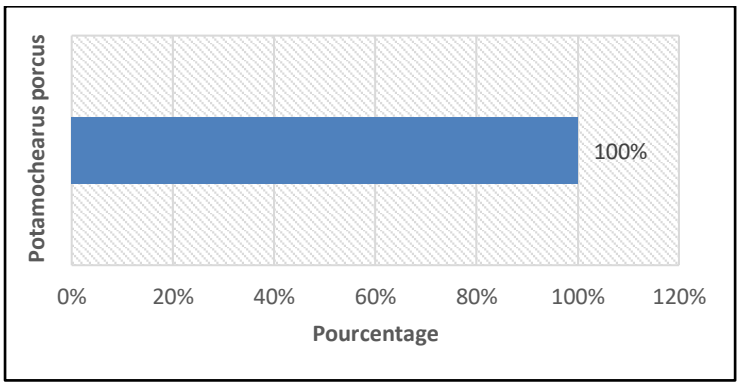

Figure 7: Animal species incriminated in the destruction of infrastructure

III.5. Competition around water points

Table VII: Animal species incriminated

Animal speciesincriminated	Territories								Total citations
	Seke-Banza	Mbanza-Ngungu	Madimba	Kasangulu	Lukula		Tshela	Songololo	
Potamochaerusporcus	12	66	14	35	0	8	15	29	**179**
Herpestes ichneumon	4	0	54	92	0	0	0	15	**165**
Thryonomysswinderanius	24	11	0	0	0	0	0	1	**36**
Total citations	**40**	**77**	**68**	**127**	**0**	**8**	**15**	**45**	**380**

Table VII revealed that *Potamochaerusporcus* was the most cited species.It was cited in 1st position in Mbanza-Ngungu by 17.18% of respondents, followed by Kasangulu with 9.11% of respondents.*Herpestes ichneumon* was cited in 1st position in Kasangulu by 23.95% of respondents, followed by 14.06% of respondents in Madimba.Or 380 (12.36%) of cases reported out of 3,072 surveyed.

The data in Figure 8 showed that *Potamochaerusporcus* was in 1st position in 47.1% of recorded cases (380) of competitions around water points, followed in 2nd place by *Herpestes ichneumon* with 43.42% and finally*Thryonomysswinderanius* in 3rd position with 9.48% frequency.

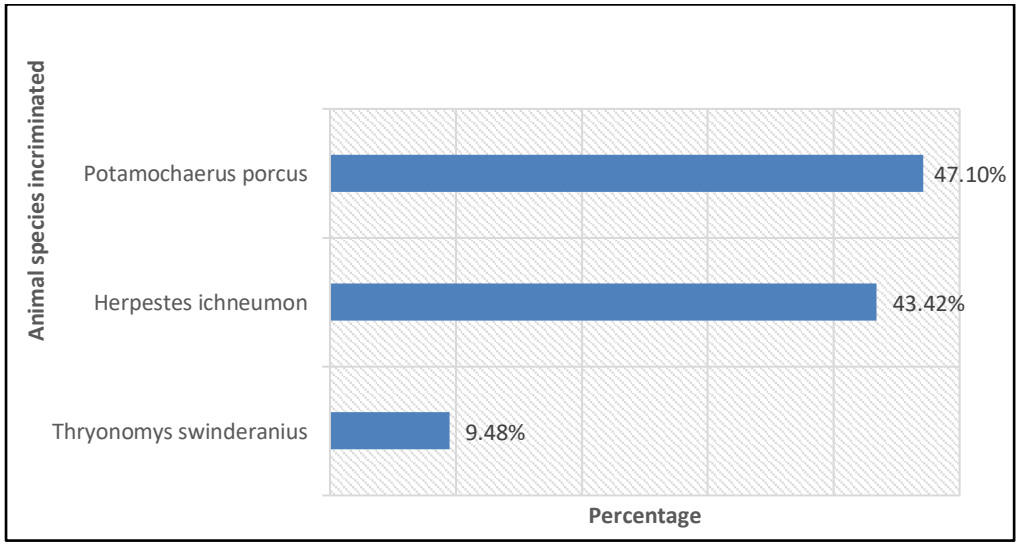

Figure 8: Distribution in% of cases of competitions around water points according to the animal species recorded by territory in the province of Kongo Central

III.6. Destruction of nets

Table VIII: Animal species incriminated in the destruction of the nets

Animal speciesincriminated	Territories								Total citations
	Seke-Banza	Mbanza-Ngungu	Madimba	Kasangulu	Lukula		Tshela	Songololo	
Potamochaerusporcus	52	2	0	0	0	12	0	2	**66**
Scyliorhinusstellari	4	42	3	0	0	0	0	0	**49**
Total citations by terr.	**56**	**44**	**3**	**0**	**0**	**12**	**0**	**2**	**115**

Table VII shows that *Potamochaerusporcus* was more implicated in the destruction of nets in 92.85% of cases.On the other hand, *Scyliorhinusstellari* was mentioned more in the territory of Mbanza-Ngungu with 95.45% of cases.It turned out that this type of conflict was cited by only 3.74% of the 3,072 respondents.

The data in Figure 9 showed that *Potamochaerusporcus* was in 1st position in 57.39% of recorded cases (115) of net destruction, followed in 2nd place by *Scyliorhirusstellari* with 42.64%.

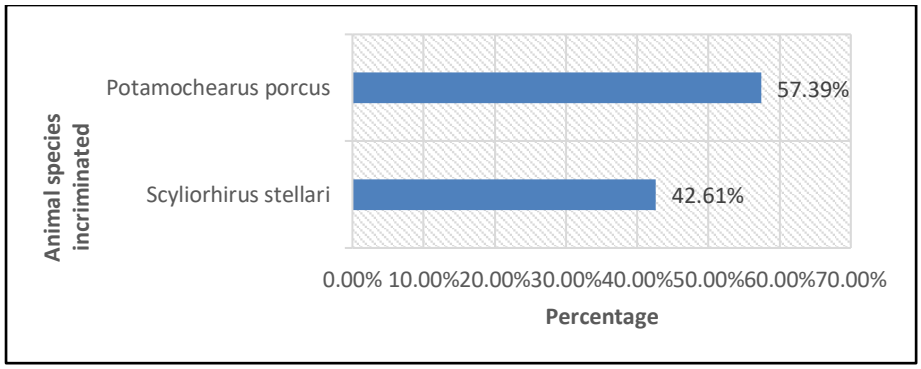

Figure 9: Distribution in% of cases of destruction of nets according to animal species by in the province of Kongo Central

IV. DISCUSSION

IV.1. Bites, Injuries and Death

The classical literature on CHF has reported cases of bites, injuries and deaths of humans by wild animals, but they have mainly concerned large animals such as *Loxodontaafricanus, Pantheraleo, Hippopotamus amphibius*and*Crocodylinae* (Lamarque, 2010; Eyebe et al. , 2012; Marchand, 2013; Dibloni et al., 2020). On the other hand, the results of our study showed that almost all bites, injuries and deaths of humans were perpetrated by reptiles of 2 species including *Dendrospis* and *Bitisgabonica* while those (Table I and II; Figures 2 and 3) caused by *Potamochaerusporcus* are insignificant (6.66%). This predominance of attacks by these two species of reptiles can be explained, according to Triplet (2009), by the fact that the respondents are almost all farmers. According to him, many snakebites occur when farmers start plowing and planting, and during harvest. Also because many farmers still walk barefoot, and cultivate the land using hand tools. This is how most snakebites occur in the foot, or at least below the knee, more rarely in the hand or wrist.

IV.2. Food crop depredation

Our results (Table III and Figure 4) corroborated those of Kouao et al. (2018) who affirmed that by comparing data from surveys with those from direct observations, several wild animal species are involved in crop damage with unanimity on *Thryonomysswinderanius* which causes damage in almost all fields. Eyebe et al. (2012) also confirmed our results by citing *Thryonomysswinderanius, Passer griseus, Poicephalussenegalus, Psittaculakrameni* and *Queleaquelea* and antelopes (Cephalophs) as responsible for serious damage inflicted on food crops while it is mainly towards large mammals that more attention is paid. Sogbohossou et al. (2017) state that rodents and birds can cause the most damage to crops. In Gabon, Sogbohossou et al. (2017) estimated that crop damage caused by *Thryonomysswinderanius* greatly exceeded that of all other species including *Loxodontaafricanus*.

IV.3. Farm animal predation

The data in Table IV and in Figure 5 indicated that *Accipiter misus* occupied the 1st place in predation of backyard animals. According to Marchand (2013), this can be explained by the fact that village spaces are more open than in urban areas, which seems to offer ideal conditions for attacking raptors. Marchand (2013) goes on to say that if 65% of breeders confine their hens and chicks in henhouses at night, they are very rudimentary, protecting them poorly against predators such as *Vulpesvulpes, Viverracivetta, Bitisgabonica* and *Python sebae*. Table V and Figure 6 showed that *Python sebae* came in first with 84% and *Bitisgabonica* in 2nd position with 16% of citations. Marchand (2013) states: "Several spatial causes can be put forward to explain predations on farm animals, but the main explanatory factor is undoubtedly their free wandering. Regarding goats/sheep and domestic pigs, the few families who own them leave them to their own devices on their former land because they are not accepted near the villages. Their protection is entrusted to dogs which are only very poor defenders against large reptiles several times their weight. Cattle are a little more closely watched. In general, the places where goats, cattle and pigs graze are never very far from forest areas (thickets of secondary vegetation) which offer an excellent point of support for reptiles to launch their attacks ".

IV.4. Destruction of infrastructure

The study revealed 1.88% (Table VI) of cases of Destruction of infrastructure reported by the 3,072 respondents for the entire Kongo Central province, all caused (Figure 7) by *Potamochearusporcus* (100% of cases) . This result corroborated with that of 3% found by Moumbock et al. (2020). These 2 data did not show a significant difference ($p > 0.05$). Eyeba et al. 2012) also, in their study, alluded to cases of destruction of property and infrastructure without giving the figures. Lamarque et al. (2010) also reported cases of degradation of water supply equipment in Namibia by elephants.

IV.5. Competition around water points

Table VII shows 12.36% of cases of competition around water points reported by the 3,072 respondents. This confirmed the existence of this type of conflict in the province but with a high intensity in the territory of Kasangulu. This was justified by the fact that in this territory, water points are very rare in the bush. Humans and wildlife compete for the few found near villages. In this study, Figure 8 showed that the incriminated animals are *Potamochaerusporcus* and while Lamarque et al. (2010), in the Gourma region, located in the sub-Saharan part of Mali, alluded to competition for water between cattle and humans on the one hand and elephants on the other.

IV.6. Destruction of nets

These nets are used to enclose fields or poultry yards in order to protect them against the entry inside of certain herbivorous animals or predators. Table VIII showed a very low figure of 3.74 % of net destruction cases.

V. CONCLUSION

The CFH study in Kongo Central province showed that this phenomenon is real and continues over the years. Almost all rural people have experienced damage from wildlife to varying degrees of intensity. From this study, it emerges that wild animals represent the number one problem for the rural populations of the province both for their personal safety and for the economic damage they cause. The results of this research showed that the wild animal species responsible for CHF have varied from one territory to another and also according to the typology of

the conflict. Thus, Dendrospispolylepis and Bitisgabonica incriminated in bites and wounds occupied the 1st position in the territory of Moanda while for human deaths, these two snakes were awarded in the territory of Seke-Banza. Thryonomysswinderianus, Ratusratus and Cephalopusmonticola were cited in 1st place in the depredations of food crops in the territory of Lukula. Accipiter misus and Vulpesvulpes incriminated in the predation of farmyard animals were awarded in the territory of Mbanza-Ngungu. Python sebae which predates other domestic animals, Potamochaerusporcus recognized in house destruction and competition around water points all held 1st place in Kasangulu territory. Finally, Potamochaerusporcus and Scyliorhinusstellari incriminated in the destruction of the nets was awarded in the territory of Seke-Banza. The results of this study provided an overview of the wild animal species involved in conflict.

6. REFERENCES BIBLIOGRAPHIQUES

1. **AGENCE DES ZONES ECONOMIQUES SPECIALES (AZES)** : Fiche technique du Kongo Central, njno.info/njno_news.php?newsid=1203&idnga=&rubn=Kongo%20Central, 2017, consulté le 7/1/2018.
2. **BALNA J**. : Au-delà des problématiques environnementales face au conflit homme-éléphant dans le sahel camerounais. Institut de Recherche Agricole pour le Développement, Cameroun, 2010. https://www.geosp.net/wp-content/uploads/2013/07/JULES-BALNA.pdf, consulté le 14/5/2019.
3. **BIPIKILA M. M. : Interaction Homme/Elephant chez Les Gisir. Mémoire de Maitrise.** Université OmarBongo, 2008. http : // www. Memoireonline.com/03/09/2027/m_interaction, consulté le 24/2/2020.
4. **EYEBE A.J., DKAMELA G.P.** et **ENDAMANA D. :** Tour d'horizon des conflits Homme-faune sauvage. Document de travail au Poverty and Conservation Learning Group n°04, 2012. https://pubs.iied.org/pdfs/G03727.pdf, consulté le 5/3/2020.
5. **FENNETEAU H.** : Enquête : entretien et questionnaire. 3ème édition, Edition Dunod, Paris, 2015, 123 p.
6. **FREDERIC G**. : Conduite d'enquête par questionnaire. Editions du robot furieux, Paris, 2015, 116p.
7. **GOUVERNORAT DE LA PROVINCE DU KONGO CENTRA**L : Carte postale de la Province du Kongo Central. Conférence des gouverneurs du 7 au 16 juin 2016, 2016.
8. **ILAMA L.** : Les forêts et les populations: investir dans un avenir durable pour l'Afrique, Une boîte à outils pour la gestion des conflits hommes-faune en Afrique centrale. Nature & Faune, 2015, 29 (2) : 76. http://www.fao.org/africa/resources/nature-faune/fr/, consulté le 10/11/2017.
9. **INSTITUT NATIONAL DE LA STATISTIQUE (MINISTERE DE PLAN/RDC)** : Résultats de l'enquête sur l'emploi, Enquête 1-2-3, Phase I : Emploi, 2012a.
10. **INSTITUT NATIONAL DE LA STATISTIQUE (MINISTERE DE PLAN/RDC) :** Résultats de l'enquête sur le secteur informel, Enquête 1-2-3, Phase II : Emploi, 2012b.
11. **INSTITUT NATIONAL DE LA STATISTIQUE (MINISTERE DE PLAN/RDC)** : Résultats de l'enquête sur la consommation des ménages, Inégalités et Pauvreté, Enquête 1-2-3, Phase III, 2012c.
12. **KAZABA K.P., BAHONGOLI M.M., KILEMBA M.B., ANKWANDA Y.A. et TSHIKUNG M.D. :** Faune mammalienne, chasse et conflits humains-faune en périphérie du Parc national de Kundelungu (RD Congo). Journal of Applied Biosciences, 2019, 139 : 14147-14156. htpp : //www.researchgate.net>publication, consulté le 21/5/2021.
13. **KHALED B.** : Sûreté de wilaya : Exposé sur «La faune sauvage en conflits avec l'homme», 2017. http://toutsurtlemcen.info/surete-de-wilaya-expose-faune-sauvage-conflits-homme/, consulté le 5/11/2017 à 10.25'.
14. **KOUAO M.L., BENE J.C., KOFFI A.D., KOUANE B.A.** et **KONE I. :** Caractérisation des dégâts provoqués par la faune sauvage à la périphérie de la forêt des MaraixTanoe-Ehey au Sud-est de la Côte d'Ivoire. Int. J. Biol. Chem. Sci., 2018, 12(4) : 1717-1730. http://www.info>index.php>ijbcs>article>viex, consulté le 13/10/2019.
15. **LAMARQUE F., ANDERSON J., FERGUSSON R., LAGRANGE M., OSEI-OWUSU Y. et BAKKER L**. : Les conflits humains et faune en Afrique, causes, conséquences et stratégies de gestion. Etude FAO, Forêt n°157, 2010. http://www.fao.org/docrep/012/i1048f/i1048f.pdf?, consulté 27/12/2017.
16. **MARCHANDG**. : Les conflits hommes/animaux sauvages sous le regard de la géographie, 2013.https://cdg.revues.org/1070, consulté le 3/11/2017.
17. **MINISTERE DU PLAN (RD CONGO) :** Monographie de la province du Bas-Congo, 2005.

18. **MINISTERE DU PLAN (RD CONGO)** : Profil de la province du Kongo Central, 2015. http : //ponabana.com/wp-content/uploads/2013/12/profil-Province-Kongo-Central-2015.pdf, consulté le 10/12/2017.
19. **MINISTERE DES EAUX ET FORETS (GABON) :** Convention sur la Diversité Biologique, Atelier de réflexion sur les conflits hommes-faune sauvage, 2015. http://ci.chm-cbd.net/links/informations/atelier-de-reflexion-sur-les-conflits-hommes-faune-sauvage, consulté le 5/12/2017.
20. **MOUMBOCK E.M., NGABA H.J.Y.** et **MAMADOU L.M.** : Etat des lieux et perspectives d'atténuation des conflits Homme-faune : Cas de la partie Sud-Ouest de la réserve de faune du Dja (Cameroun), 2020. htpp:// www.ijias.issr.journals.org/, consulté le 9/6/2021.
21. **SAÏD B.** : Protocole d'enquête : l'entretien, méthode de recherche et d'élaboration des travaux universitaires. Pub. Laboratoire Didactique, NTIC, Traduction et Culture, 2013, pp. 42-57.
22. **SIDAWY P.** : Etat des lieux des conflits hommes - faune sauvage autour de la Forêt des Marais Tanoé-Ehy en Côte d'Ivoire. Centre Suisse de Recherches Scientifiques en Côte d'Ivoire (CSRS), Abidjan, 2010. htpp://www.academia.edu>hommes_faune_sauvage_autour de…consulté le 15/11/2019.
23. **SINGLY D.F.** : L'enquête et ses méthodes, le questionnaire. 3ème édition, Editeur Armand Colin. Paris, 2012, 124 p.
24. **SOGBOHOSSOU E. A., DANSOU P. E. et DJAGOUN C. A. M. S. :** Conflits hommes-hippopotames dans la Réserve Communautaire d'Adjamè au sud-ouest du Bénin. Bulletin de la Recherche Agronomique du Bénin (BRAB), 2017, 82 : 22-31. http://www.inrab.org, consulté le 18/07/2019.
25. **TRIPLET P.** : Manuel de Gestion des aires protégés d'Afrique francophone, 2009.
26. **UNIVERSITE DE KISANGANI – FACULTE DES SCIENCES** : Etat des lieux de la biodiversité de la RD Congo, 2014, page 40-52. // http://congobiodiversityconference2014.africamuseum.be/sites/default/files/files/reports_rapports.pdf, consulté le 24/2 :2020.