Ethnozoological Knowledge of Buffalo (*Syncerus Caffer*, Sperman, 1779) in the Garamba National Park (Haut-Uélé, DRC)

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1 ABSTRACT

Ethnozoological knowledge is essential for understanding the relationship between local populations and wildlife, thus contributing to the conservation and management of buffalo and their habitat. The aim of this study was to determine the ethnozoological knowledge of local people about buffalo in Garamba Park. The methodology consisted of a survey of the local population. Conducted in French and local languages using the Kobocollect application, the interviews involved 429 people, including 153 women (35.7%) and 276 men (64.3%). The results showed that the buffalo is essential to local communities, offering food, medicinal and mystical uses. Its meat is a vital source of protein, while various by-products (skin, bones, fat and viscera) are used for remedies. Although 69% of participants saw the buffalo as a tourist attraction, 24.5% considered it to be aggressive. Ecologically, 6.8% valued its role in dispersing seeds. Knowledge is mainly transmitted orally (84%). These results underline the importance of local knowledge for the conservation of the buffalo and sustainable biodiversity conservation.

2 INTRODUCTION

Human societies have always been curious about their environment. Over time, the relationship between humans and animals has given rise to a variety of representations, highlighting certain animal or plant species. Wild fauna is well known throughout the world, with some animals having cultural and economic importance (Koffi *et al.,* 2019; Mouzoun, 2019a). Large wild animals, often seen as a reflection of the environment, are an essential source of protein and underline the growing importance of nature conservation. (Mouzoun, 2019b; Rabeil, 2004). Protected areas in sub-Saharan Africa, which are rich in biodiversity, are undergoing major transformations, despite the low level of research on fauna (Dieudonné, 2016). The buffalo (*Syncerus caffer*), emblematic of these regions, is studied by local people, who have acquired in-depth knowledge of its behaviour and habits, while interacting with it on a daily basis through traditional practices. (Natta *et al.,* 2014; Roulet, 2007). There are a number of issues surrounding the use of ethnozoological knowledge by local populations. Increased exploitation of natural resources is endangering many species, including the buffalo, thereby

reducing interaction between communities and wildlife. This is leading to a loss of traditional knowledge of animal ecology and behaviour. (Boutelant *et al.,* 2012). Wildlife conservation policies implemented by the authorities have often marginalised local communities by creating barriers between them and the animals. This has led to a disapproval of local ethnozoological knowledge and a loss of cultural biodiversity. (Kouely *et al.,* 2024). And deforestation and the fragmentation of natural habitats have intensified conflicts between buffalo and local populations. Ignorance of buffalo behaviour has also led to an increase in attacks on crops and homes, exacerbating tensions between rural communities and wild animals. (Tchakossa, 2015). It is essential that local populations take account of ethnozoological knowledge about the buffalo if they are to conserve it and live together in harmony with wildlife (Chabi-boni *et al.,* 2019). It is crucial to integrate this knowledge into conservation policies and to promote inclusive approaches that involve local communities in the management of protected areas, while fostering intercultural dialogue between all stakeholders (Daniel, 2016). In the Democratic Republic of Congo, pressure on protected areas is exacerbated by political instability, poverty among local populations and population growth, leading to increased exploitation of natural resources, expansion of farmland and growing urbanisation (Buard, 2014). This high population density generates a demand for bushmeat, which undermines the conservation of natural resources that are essential to our heritage. Human activities are threatening Congolese ecosystems, particularly affecting buffalo populations, which are already fragmented (Mouzoun, 2019a). Moreover, hunting for food remains a common practice, providing an important source of protein for many rural communities (Dieudonné, 2016). Although buffalo are one of the 4,629 mammals listed, they have been little studied in the Democratic Republic of Congo, where research has focused mainly on other species such as primates, okapi and elephants. This gap in knowledge reduces our knowledge of buffalo, excluding them from management plans, which compromises their conservation. This situation is particularly evident in Garamba National Park (Théophile & Désiré, 2012). The aim of the proposed study is to explore the ethnozoological knowledge of buffalo in riparian communities, a subject that has received little attention in the literature to date. Ethnozoological knowledge is essential for understanding the relationship between local people and wildlife, thus contributing to the conservation and management of buffalo and their habitat (Kouely *et al.,* 2024; Tetis, 2021). It is crucial to approach the determination of this knowledge with sensitivity, establishing participatory research partnerships and intercultural dialogue (Boushaba, 2017). This approach aims to gather this knowledge in an ethical and sustainable manner, promoting harmonious coexistence between man and nature in Garamba National Park (Zenaide & Jorge, 2021). To guide our investigation, we explored several questions regarding the local population of the Garamba complex, specifically focusing on their ethnozoological knowledge is transmitted among them, how it is utilized in their daily lives, and the beliefs and ritual practices associated with the buffalo within their community. The aim of this study is to ascertain the ethnozoological knowledge of the local population regading the buffalo in Garamba Park, with a particular focus on the transmission of this knowledge, its daily applications, and the beliefs and ritual practices associated with it.

3 MATERIAL AND METHODS

3.1 Geographical location: This study was carried out in the Garamba National Park, located in the Haut-Uélé province, at an altitude of between 600 and 1,240 meters, at latitude 4.2000° N and longitude 29.1833° E. The Garamba National Park, located in the Haut-Uélé region in the north-east of the Democratic Republic of Congo, covers an area of 5,130 square kilometres. It is bounded by the Garamba and Dungu rivers, and shares its borders with

Lantoto National Park to the south. Its geographical coordinates lie between 4°30' and 5°30' north latitude, and between 29°30' and 30°30' east longitude. The park encompasses a variety of ecosystems including savannahs, forests, rivers and hills, and is surrounded by three hunting areas: Mondo missa, Gangala na bodio and Azande. Renowned for its exceptional biodiversity, it is home to a wide variety of animal and plant species, including elephants, giraffes and buffalo.

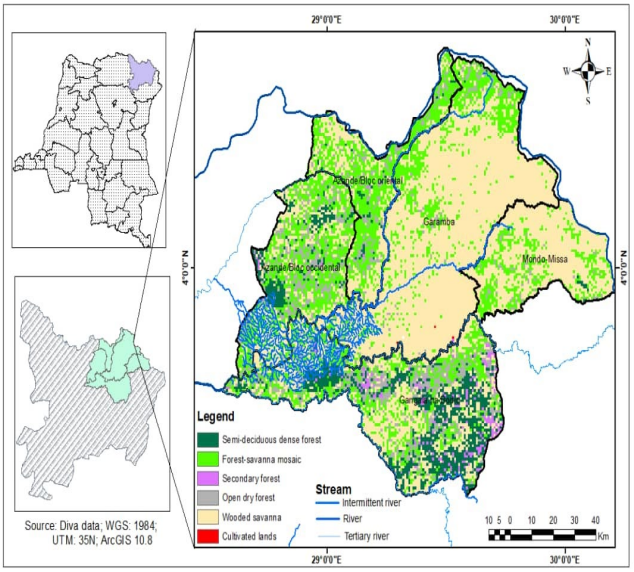

Figure 1: Map of Garamba National Park

3.2 Climate: The Garamba National Park is located in an area with a hot tropical desert climate (BWh) according to the Köppen-Geige classification, with an average annual temperature of 31°C, fluctuating between 28°C and 35°C. Annual rainfall varies between 1,200 and 1,500mm, providing an indication of the rainfall expected in Haut Uélé, particularly within the park.

3.3 Data collection methods and technics : The ethnozoological survey focuses on the interactions between the local population and the buffalo, with the aim of identifying the local uses of this species and the threats associated with it. Conducted in French and local languages using the Kobocollect application, the interviews required the presence of a member of the community to ensure access to reliable and authentic information. The survey questioned 429 people, including 153 women (35.7%) and 276 men (64.3%), representing all age categories from 18 to 75. Nine ethnic communities were included: Logo (37.76%), Bazande (23.31%), Kawa (12.35%), Lugwara (6.29%), Baka (5.59%), Kimondo (7.93%), Bangwetu (2.56%), Avokaya (2.10%) and the Mondu (2.10%). In this study, 8.2% of participants had no formal education, 46.9% had primary education, 29.4% had secondary education, 3.7% had university education and 9.1% had vocational training. The selection of villages, facilitated by their accessibility and proximity to the park, made it possible to interview randomly selected individuals, without ethnic distinction. The data collected on the species concerned its vernacular name and its uses (food, pharmacopoeia, trade), supplemented by direct observations in households, particularly among traditional healers, and at markets.

3.4 Data analysis: The statistical tests were then generated using SPSS software: . The data collected at the end of our investigations was analysed to ensure saturation and to validate the scientific quality of our research. The first part of our work consisted of downloading the

database in Excel format to be used for subsequent analyses. The database obtained was then exported to SPSS statistical processing software to produce cross-tabulations. The initial data tables resulting from this first operation were then inserted into an Excel 19 spread sheet to produce frequency graphs.

4 RESULTS

Section A: Knowledge and perceptions of the buffalo

A1 Knowledge of the buffalo: When asked if the respondents knew anything about buffalo, the majority said yes, as shown in Figure 2.

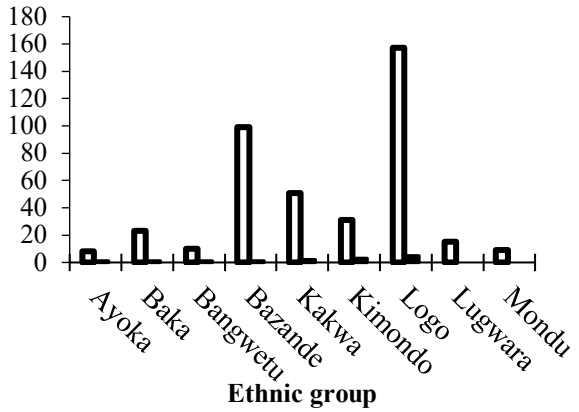

Figure 2: Knowledge of the buffalo

The figure above shows that the majority of respondents in all ethnic groups, 96.6%, know the buffalo, compared with 3.3% who do not. The result of the Fisher test (p=6.0216E-11< 0.05) shows that those who know the buffalo far outnumber those who do not.

A.2 Local name for buffalo: Those who know the buffalo have given the names of the buffalo in their dialects Figure 3.

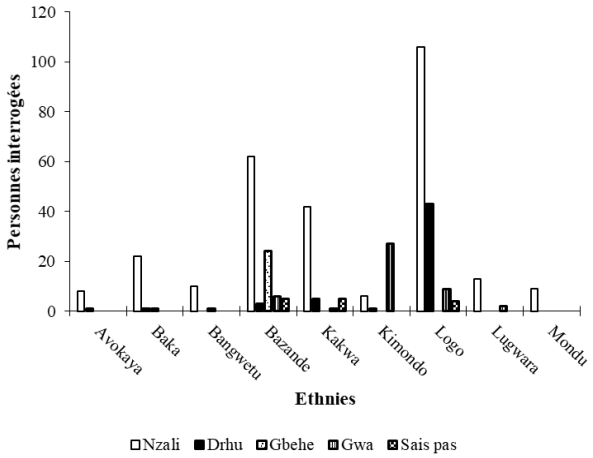

Figure 3: Local name for buffalo

The figure above shows that the buffalo is much more commonly known as "Nzali" (according to 67% of respondents); on the other hand, 3% of respondents do not know the local name for the buffalo. The results of the Chi2 test (p-v < 0.05) show that the local name for the buffalo varies very significantly from one ethnic group to another.

A.3 Signs to recognize the local population: There are several ways to recognise the buffalo as we can see in the buffalo is still mainly recognised by its shape (according to 50% of respondents), followed by its footprints (according to 42% of respondents). On the other hand, a minority (2%) mentioned something else, particularly its excrement. Most respondents had already seen the buffalo, the table above shows that 72% of respondents had already seen a buffalo, compared with 28% who had never seen one. Buffalo are often found in groups. 89% of respondents said they had seen the buffalo in groups, and only 11% said they had seen them alone.

Table 1: The knowledge about buffaloes by the local populations

Local names of buffaloes	Know the species of buffaloes		Signs to recognize the buffalo				Having already seen the buffalo			The buffalo with other animals		
	No	Yes	Shout	Form	Print	Other	No	Yes		No	Yes	Abstention
								Alone	In group			
Nzali	-	278	16	142	119	2	82	19	163	169	5	106
Drhu	-	54	2	36	15	-	4	12	49	34	3	16
Gbehe	-	26	1	9	16	-	3	-	23	23	-	3
Gwa	-	45	6	20	19	-	14	3	31	28	-	16
Unknown	14	-	2	-	6	6	14	-	-	-	-	14
Total Partial	14	403	27	207	175	8	117	34	266	254	8	155
% partial	3.35	96.64	6.47	49.64	41.96	1.91	28.057	8.15	63.78	60.91	1.91	37.17
Total General	417		417				417			417		
% General	100		100				100			100		

A.4. Perception of the buffalo by community: The buffalo is perceived differently by the communities living along the Garamba National Park in Figure 4.

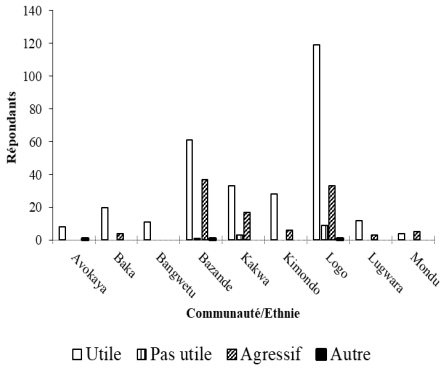

Figure 4: Perception of the buffalo by residents of Garamba National Park

Looking at the figure above, the majority of respondents (80%) indicated that the buffalo is a useful animal; 0.7% gave other reasons (such as it is considered to be the mother of ancestors, an animal that provides strength). The result of the Chi2 test (p-v=0.0029015<0.05) shows that the buffalo is perceived differently by local communities.

A.5 Uses of the buffalo and Socio-cultural importance of the buffalo

Ethnic group	Uses of buffalo			Socio-cultural importance of the buffalo		
	meat	Sacred animal	other	No	Yes	Don't now
Avokaya	-	9	-	-	8	1
Baka	24	-	-	2	9	13
Bangwetu	11	-	-	-	3	8
Bazande	99	1	-	10	12	78
Kakwa	59	1	-	4	24	25
Kimondo	32	-	2	2	12	20
Logo	145	5	5	40	15	113
Lugwara	15	-	-	2	2	11
Mondu	9	-	-	-	-	9
Total	394	16	7	60	85	272
Percent	94,48	3,83	1,67	14,38	20,38	65,22

Respondents gave the importance of buffalo in their area in table 2. Table 2 shows that buffalo are useful mainly for their meat (according to 94% of opinions expressed). However, 2% of respondents indicated that the buffalo is useful for other purposes such as customary ceremonies (weddings, funerals, meetings.).When asked whether the buffalo was of socio-cultural importance to the communities living along the Garamba National Park, the respondents replied as follows Table 2The majority of respondents (65%) did not know the socio-cultural importance of the buffalo in their area. However, a minority (14,38%) said they did. Nevertheless, 20% of respondents recognised the socio-cultural importance of the buffalo in their area. The buffalo is used much more in customary ceremonies (weddings, funerals, meetings, etc.) (according to 52.9% of respondents). On the other hand, 2.4% of respondents said that this animal had totemic value. However, the 3.5% who mentioned medicinal use (UM) indicated that certain parts of this animal are used for traditional deliverance against fetishes. The result of the Chi2 test (p-v > 0.05) shows that there is no difference in the socio-cultural consideration of the buffalo by the ethnic groups living along the Garamba National Park.

Use of different organs, Medicinal properties of buffalo, Change in carcass price and Estimation of the current status of the buffalo population

Organ	Food	Magical power	Medicinal	Total	%
Skin	375	37	5	417	100
Flesh	277	0	4	281	67,4
Tail	4	27	0	31	7,4
Digestive system	9	3	21	33	7,9
Lung and heart	11	11	3	25	6,0
Horn	0	16	1	17	4,1
Frequency	676	94	34		
Test	$\chi 2=661,65$; df=5 ; p-v=$1,114^{E}$-135 < 0,05				

Organ/product	Treated disease	Others
Flesh	Diarrhoea	Bad luck
Skin	Diarrhoea	Bad luck
Tail	- Madness - Eye pain	
Droppings	Dermatosis	Bringer of bad luck
Fat	-Fever -Cough	Against evil spirits
Clog	-Antidote -Skin itching	Bulletproof preparation
Urine	Urinary infection	Against bad spells
Bile	-Hernia -Colic	Support the homemaker
Brain	Memory problems	Labor for agriculture work
Heart	- Miscarriage -Bone solidification -Memory aid	Good luck charm
Horn	Sexual impotence	Fight against infidelity
Bone of the legs	Source of calcium	To cast a spell

The various organs of buffalo have different uses. Feeding was the primary uses. Feeding was the primary use, cited 676 times, while traditional medicine usage was noted 34 times. All respondents used the hide, but only 4.1% mentioned the horns. The Chi-squared test ($p<0.05$) indicates a significant difference in the usage of different organs. In areas near Garamba National Park, buffalo are believed to possess medicinal properties, with twelve elements being used in local traditional medicine. Respondents were asked whether the price of a buffalo carcass varied over time. The current state of buffalo populations is concerning, with 63% of respondents indicating a decline in numbers in the Garamba landscape. Conversely, only 2% felt that populations were increasing. Those who noted the decline suggested several solutions, with 50% advocating for raising awareness among local communities as the primary approach to address the regression of buffalo in the region.

A.6. Knowledge of the ecological importance of buffalo: Respondents were asked whether they were aware of the ecological/environmental importance of buffalo. The proportions of their answers are shown in Figure 15 below:

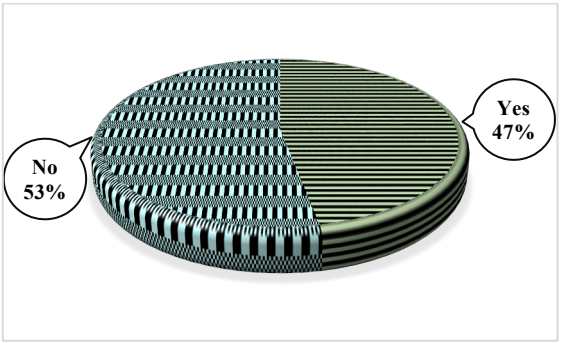

Figure 5: Knowledge of the ecological importance of buffalo

The majority of respondents (53%) were unaware of the ecological importance of buffalo. However, 47% of respondents were aware of the ecological importance of buffalo. Those who did know that buffalo are ecologically important indicated this in Figure 6.

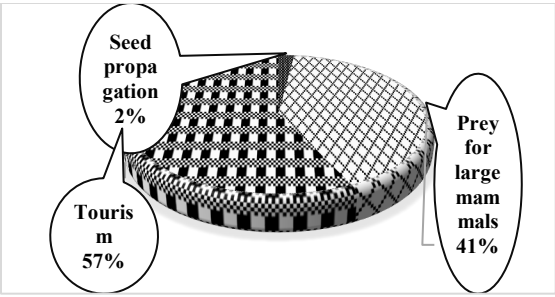

Figure 6: Ecological importance of buffalo

The figure above shows that tourism is the main importance mentioned by the majority of respondents (57%). However, a minority, 2% of respondents, indicated that buffalo are involved in the propagation of seeds for certain plants.

A.7 Buffalo as a vermin: To find out whether the buffalo is a nuisance to the local population, respondents replied as follows Figure 7

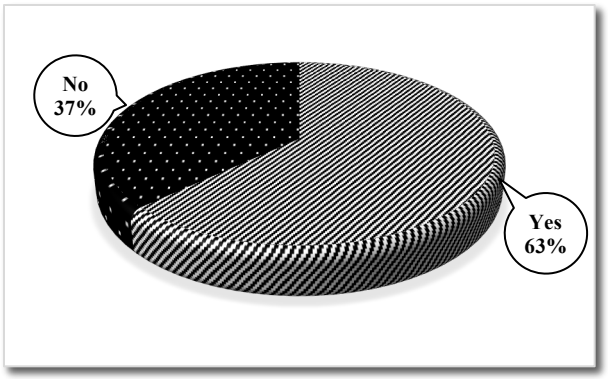

Figure 7: Buffalo as a vermin

63% of those questioned agreed that the buffalo is a harmful animal; 37% disagreed.
The explanations for each response are given in Figure 8 below:

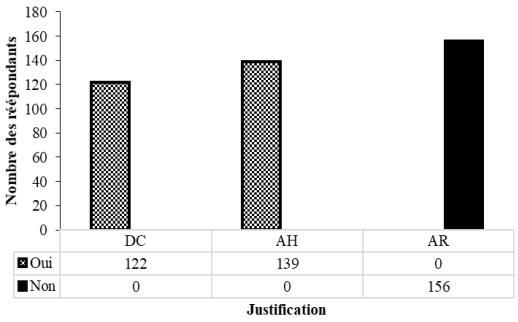

Figure 8: Justification for the answers given in Figure 7

The figure above shows that 53% of people who say that the buffalo is a pest justify their statement by saying that it attacks humans, and 47% of them mention the ravaging of fields. On the other hand, 100% of those who disagreed that the buffalo is not a harmful animal explained it by the fact that it is respected.

A.8. Conservation organisation protecting buffalo: We wanted to find out whether there were any conservation organisations involved in protecting buffalo in the Garamba landscape. This was confirmed by the minority of respondents in Figure 9.

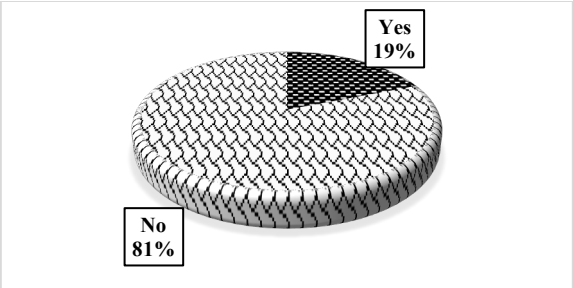

Figure 9: Opinion on the existence of conservation organisations

According to the figure above, 81% of respondents do not recognise the existence of conservation organisations involved in protecting buffalo. However, 19% of respondents stated that there was a conservation organisation called ICCN involved in protecting buffalo in the Garamba landscape.

Section B. Passing on knowledge about buffalo.

B. 1 Ways of passing on knowledge about buffaloes: Different ways of passing on knowledge about buffalo are used by local residents of the Garamba National Park, as shown in Figure 10.

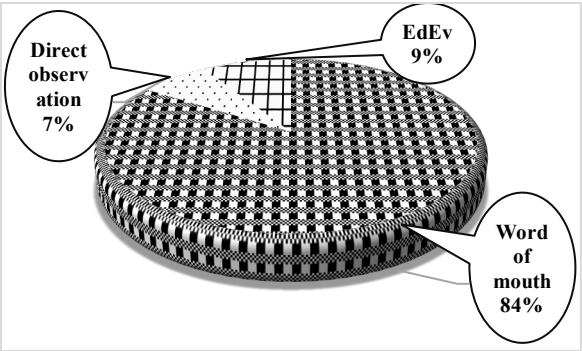

Figure 10: Ways of passing on knowledge about buffaloes

According to the figure above, knowledge about buffalo is mainly passed on by word of mouth through stories, etc. (according to 84% of respondents). However, 7% of respondents said that this knowledge was passed on by direct observation of the animals.The knowledge transmitted from generation to generation has several aspects, as shown in Figure 11

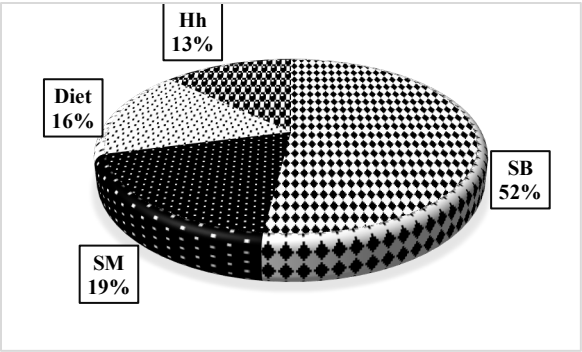

Figure 11: Aspects of knowledge transmitted

The main aspect of buffalo handed down from generation to generation concerns the social behaviour of buffalo (according to 52% of respondents), while 13% of respondents mentioned hunting habits. Several people/groups of people are involved in the transmission of knowledge about buffalo, as shown in Figure 12 below:

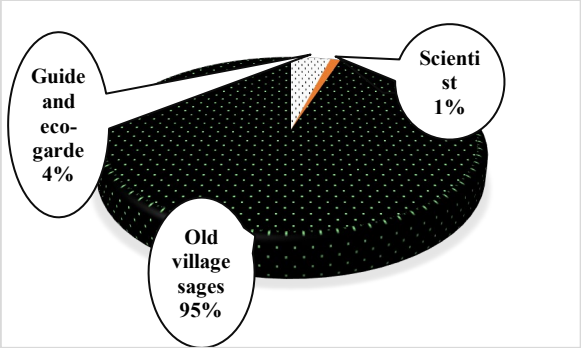

Figure 12: People passing on knowledge about buffalo

Much of the knowledge about buffaloes is passed on by the old wise men living in the various villages (according to 95% of respondents); while 1% of respondents cited scientists (researchers, students, etc.) as the transmitters of this knowledge. The main tools used to transmit this knowledge are oral tradition (stories, tales, etc.), posters, brochures and mesological education (mass awareness-raising).

B.2 Importance of knowledge about buffalo: The interviewees gave some examples of the importance of knowledge about buffalo, including Figure 13.

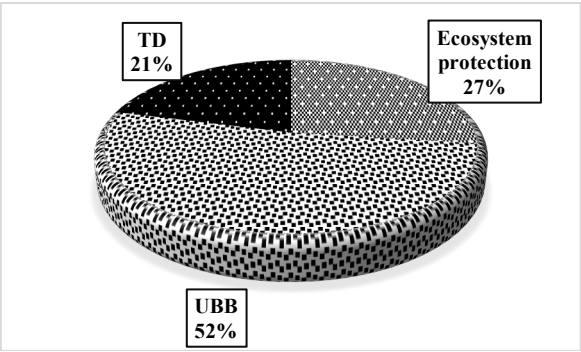

Figure 13: Importance of knowledge about buffalo

Knowledge about buffalo helps to understand the behaviour of these animals (according to 52% of respondents), which in turn helps to develop strategies for living with them. However, this knowledge also makes it possible to develop tourism in the area (according to 21%

of respondents), generating revenue for the local economy.

B.3 Ways in which young people learn about buffaloes and perpetuate their knowledge of them: Several channels are used to teach young people how to perpetuate knowledge about buffalo Figure 14.

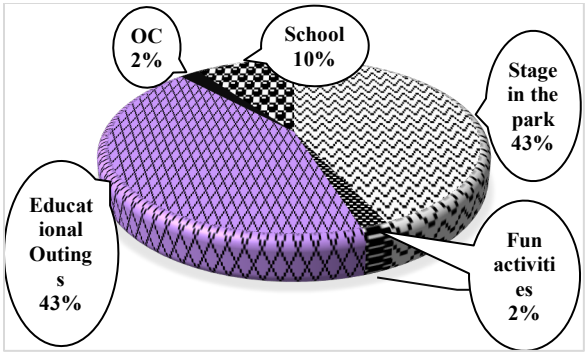

Figure 14: Ways in which young people learn and perpetuate their knowledge of buffalo

Young people learn about buffalo mainly through educational outings (according to 43% of respondents) and through courses organised in the park (according to 43% of respondents). The organisation of competitions and recreational activities also play a part, with a proportion of 2% each.

B.4 Factors influencing the transmission of knowledge about buffalo: Respondents to our questionnaire indicated that certain factors negatively influence the transmission of knowledge about buffalo Figure 15, such as:

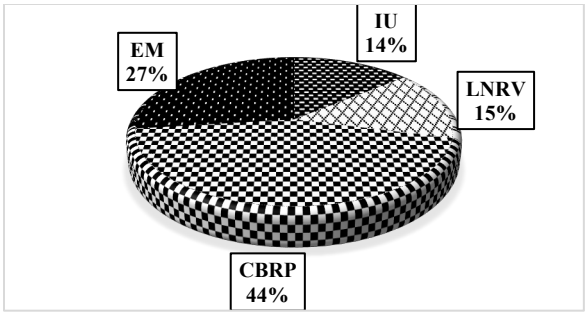

Figure 15: Factors influencing the transmission of knowledge about buffalo

Conflict between local residents and the park (according to 44% of opinions expressed) and the modification/destruction of the environment (27% of opinions) are the main factors negatively influencing the transmission of knowledge about buffalo. Added to this is the loss of values linked to nature (according to 15% of opinions expressed) and increasing urbanisation (according to 14% of respondents).

B.5 Contribution of the Garamba National Park to the transmission of local knowledge about buffalo: The Garamba National Park contributes to the transmission of local knowledge about buffalo in several ways, as shown by the people interviewed in Figure 16.

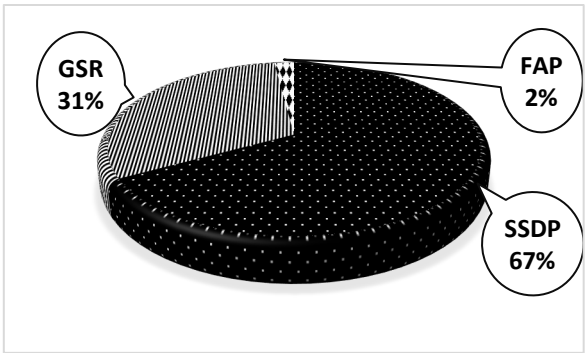

Figure 16: Contribution of the Garamba National Park to the transmission of local knowledge about buffalo.

The figure above shows that the Garamba National Park contributes to the transmission of local knowledge about buffalo by supporting sustainable development projects for the benefit of local people (according to 67% of opinions expressed), by funding awareness-raising projects (according to 31% of respondents) and by awarding study grants and subsidies to local researchers.

B.6 Contribution of local knowledge on buffalo protection: During the surveys, it was noted that local knowledge about buffalo also contributes to the protection of the species (Figure 17). This contribution can be summed up as follows:

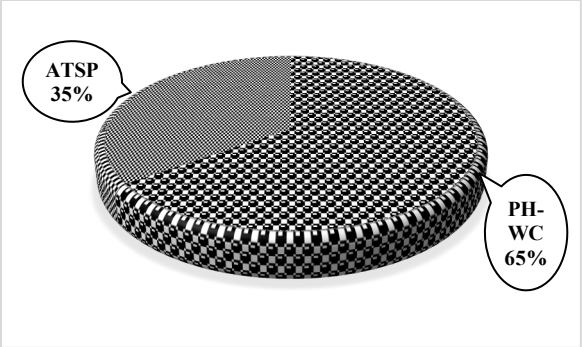

Figure 17: Contribution of local knowledge to buffalo protection

According to the people interviewed, local knowledge makes it possible to prevent human-wildlife conflicts (according to 65% of respondents); on the other hand, 35% of respondents believe that local knowledge is a tool for raising awareness of species protection.

B.7 Obstacle to the transmission of local knowledge about buffalo: Obstacles to the transmission of local knowledge about buffalo (Figure 18) were identified by local residents interviewed around the Garamba National Park.

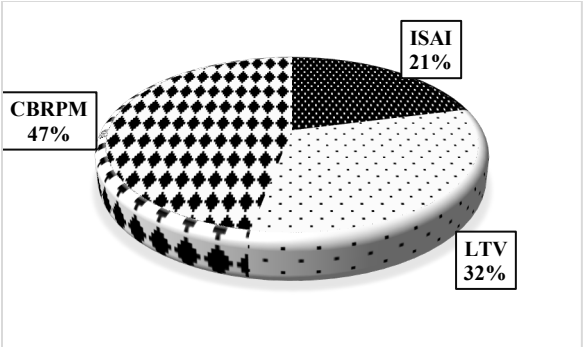

Figure 18: Obstacle to the transmission of local knowledge about buffalo

According to the above figure, the obstacles to the transmission of local knowledge about buffalo are conflicts between local people and park managers (according to 47% of respondents), the loss of traditional values (according to 32% of respondents) and insufficient support for awareness-raising and education initiatives.

B.8 Socio-economic benefits of passing on local knowledge about buffalo: The local people interviewed described the socio-economic benefits of passing on local knowledge about buffalo (Figure 19).

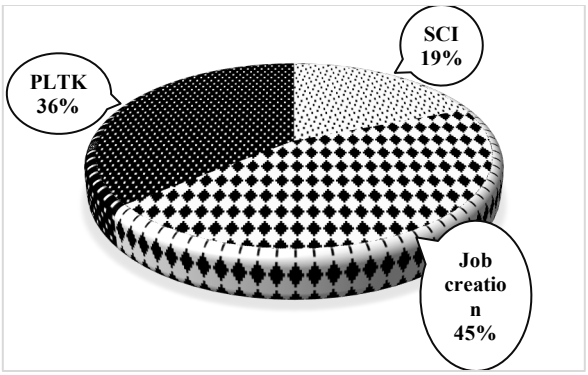

Figure 19: Socio-economic benefits of passing on buffalo knowledge

The figure above shows that passing on knowledge about buffalo creates jobs (according to 45% of respondents) as a result of ecotourism activities; it also helps to promote local traditional knowledge (according to 36% of respondents) and strengthens cultural identity (according to 19% of respondents).

B.9 Future prospects for the transmission of local knowledge about buffalo around the Garamba National Park: The interviewees gave certain prospects for the transmission of local knowledge about buffalo around the Garamba National Park (Figure 20):

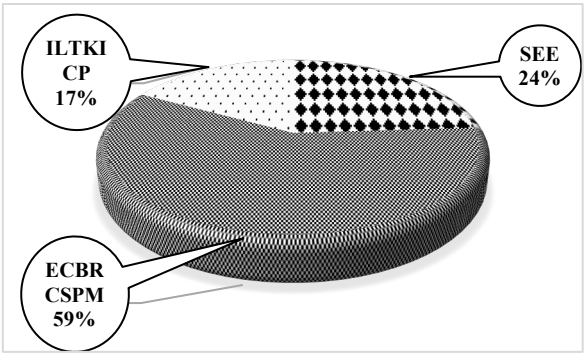

Figure 20: Future prospects for the transmission of local knowledge

Many of the respondents (59%) plan to Strengthen collaboration between local

residents, civil society and park managers. 24% thought that environmental education should be stepped up in the future, while 17% thought that traditional local knowledge should be incorporated into conservation policy.

B.10 Evaluation and monitoring by local residents of initiatives to pass on local knowledge about buffalo: To evaluate and monitor initiatives to transmit local knowledge about buffalo around the Garamba National Park, local residents proceed as follows Figure 21:

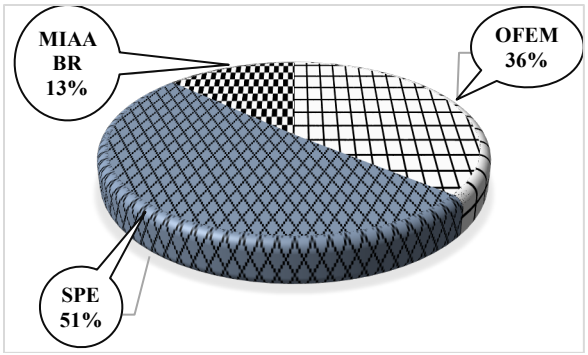

Figure 21: Assessment and monitoring of local knowledge transfer initiatives

The figure above shows that the majority of local residents (51%) use participatory surveys and evaluations to monitor initiatives and assess the transmission of local knowledge. In addition, 36% of respondents said that they use meetings to monitor and evaluate the activities carried out, and a minority, 13% of respondents, measure the impact of awareness-raising and the attitude and behaviour of local residents with regard to local knowledge transfer activities.

B.11 Challenges relating to the transmission of local knowledge about buffalo: Some challenges relating to the transmission of local knowledge about buffalo were given by the respondents in Figure 22

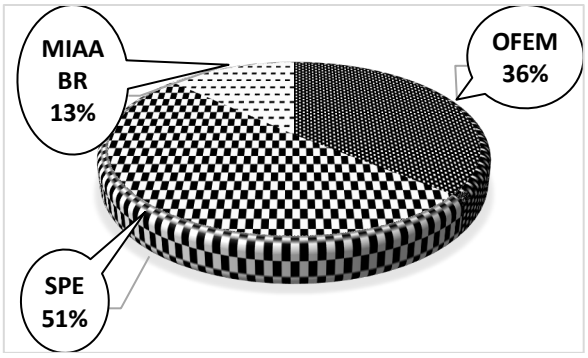

Figure 22: Challenges relating to the transmission of local knowledge

The figure above shows that the major challenge is to strengthen the resilience of local residents in the face of persistent insecurity in the region (according to 46% of respondents). In addition, access to certain communities is difficult as a result of the insecurity (according to 41% of respondents). But there is also a need for cooperation and dialogue between the various parties involved (according to 13% of opinions expressed).

Section C: Usefulness of local knowledge about buffalo

C.1 Use of buffalo by local residents in agriculture: When asked whether buffalo were involved in farming, the vast majority of local residents abstained from answering this question (Figure 23).

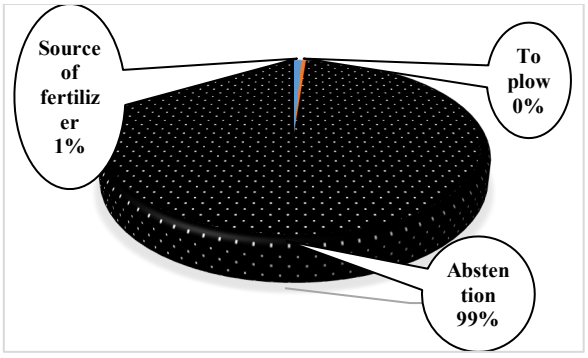

Figure 23: Opinion on the use of buffalo in agriculture

The figure above shows that 424/429 respondents, or 98.8%, did not know whether buffalo are used for farming around the NGP. However, a small minority, 3/429 respondents (0.7%), said that buffaloes were used for fertilizer, and 2/429 respondents (0.5%) said that buffaloes were used for ploughing.

C.2 Use of local knowledge about buffalo in the local economy: The local residents interviewed mentioned the use of local knowledge about buffalo in the economy around the Garamba National Park as shown in this Figure 24:

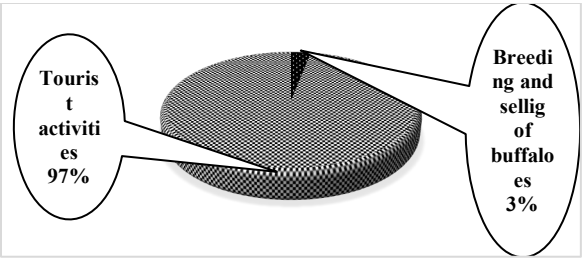

Figure 24: Use of knowledge about buffalo in the local economy

A reading of the above figure shows that 97% of respondents said that local knowledge about buffalo was used in tourism activities, thus generating employment and revenue at local level; on the other hand, 3% of respondents said that buffalo were bred for commercial purposes.

C.3 Use of buffaloes in social interactions: In social terms, the buffalo embodies certain values in the communities along the Garamba National Park, as shown in Figure 36 below

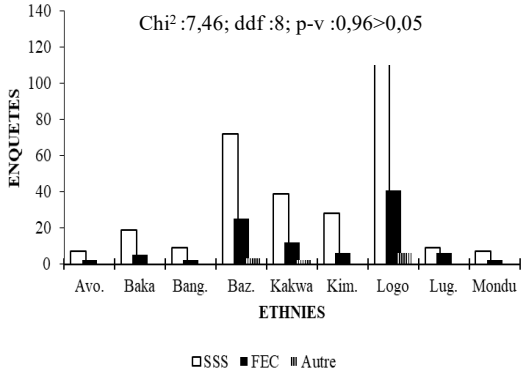

Figure 25: Social use of buffalo around Garamba National Park

According to the results presented in the figure above, the buffalo symbolises social status among all the ethnic groups living along the Garamba National Park (according to 73.1% of opinions expressed) and facilitates community exchanges (according to 24.2% of respondents). The results of the Chi2 test (p-v >0.05) show that the buffalo has the same social status among all the ethnic groups living along the Garamba National Park.

C.4 Cultural values associated with buffalo: In local culture, certain values are associated with buffalo Figure 26.

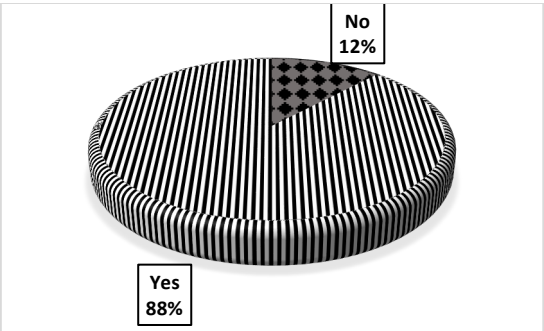

Figure 26: Opinions on the cultural value of buffalo

The figure above shows that 88% of respondents agreed that the buffalo has cultural values among the peoples around PNG, particularly as a symbol of strength and myth. However, a minority (12%) did not recognise these values. The values mentioned by respondents were Figure 27

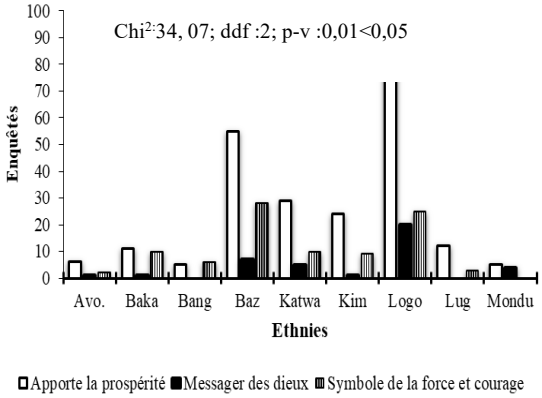

Figure 27: Cultural values embodied by the buffalo

The above figure shows that the buffalo brings prosperity (according to 64.1% of respondents). It is also considered a symbol of strength and courage (according to 25.3% of respondents), as well as being a messenger of the gods (according to 10.5% of respondents). The result of the Ch2 test (p-v<0.05) shows that the cultural values attributed to the buffalo differ from one ethic to another.

5 DISCUSSION

Ethnozoological considerations on buffalo in Garamba National Park enrich our understanding of interactions between human communities and wildlife. Through interviews with local people, this research has revealed cultural perceptions, management practices and traditional knowledge associated with these emblematic animals. The local designations of the buffalo, which vary according to ethnic group, illustrate essential cultural, economic and environmental dimensions. Of the nine groups interviewed, five refer to the buffalo as Nzali, while others use names such as Ghe, Gwa or Drhu, depending on their ethnic group. A comparative perspective reveals that these names, often linked to linguistic roots and histories of human interaction, vary according to usage (draught buffalo, milk buffalo, etc.). These results corroborate the work of Laure Adam, who highlights the significance of names in the transmission of knowledge (Adam, 2008). Seydou Camara has studied the names of buffalo in South-East Asia, highlighting their link with cultural beliefs, often associated with local rituals or legends (Camara, 1996). Hermann L. Strack has identified more than 20 different names in India, depending on the dialect, revealing that these names can indicate specific characteristics of the animal, such as its colour or behaviour (Strack, 2024). The results reveal a wealth of ethnozoological knowledge about buffalo among the ethnic groups surveyed, corroborated by other studies in sub-Saharan Africa. Indeed, Maclatchy's study emphasises that local populations in East African nature parks frequently associate the buffalo with cultural and ritual practices (Maclatchy and al., 2022). Observations in the Garamba region confirm this trend, where the buffalo is considered a totem animal and a symbol of strength. In addition, over 43.8% of the people interviewed attested to the use of buffalo in cultural ceremonies, in particular the use of its horns at community meetings. Our results underline the importance of buffalo in the lives of local people, both economically and in cultural and symbolic terms (Tetis, 2021). Around 69% of respondents recognised their value for tourism and food, while the Avokaya considered them to be sacred, associated with the ancestors. The medical uses of buffalo, such as using their urine to treat infections, reflect similar practices observed in sub-Saharan Africa (Boushaba, 2017). However, 63% of respondents perceive a decline in buffalo in Garamba National Park, mainly due to habitat loss and poaching, while a minority (2%) believe they are increasing, which could indicate perceptions influenced by conservation initiatives (Buard, 2014; TANGUAY, 2010; Zenaide & Jorge, 2021). The study of the medicinal and mystical use of buffalo organs reveals a diversity of applications, particularly in the treatment of pathologies such as urinary tract infections and hernias, highlighting the complex interaction between wildlife and traditional medicine. The mystical beliefs associated with buffalo reinforce their importance in the local belief system, as documented by Assemien (Assemien and al., 2021). Ethnozoological knowledge is mainly transmitted orally (84% of respondents), while direct observation of the animals remains marginal (7%), underlining the importance of local knowledge. However, the introduction of educational programmes by the Garamba Park authorities is intended to counter the loss of this knowledge in the face of the marginalization of the local population. Statistical tests reveal significant differences in the ways in which knowledge is passed on, depending on the ethnic group, with some giving priority to observation and others to storytelling. Furthermore, the

coexistence of humans and buffalo leads to conflict, which 55% of Mondu perceived as a threat, which corroborates Kouely's work on resources and the acceptance of conservation (Kouely and al., 2024). In addition, 44% of respondents felt that tensions between local residents and the park hindered the transmission of knowledge about buffalo. Environmental degradation, mentioned by 27% of respondents, as well as the loss of values linked to nature (15%) and increasing urbanisation (14%), highlight a cultural and environmental change that affects the perception of buffalo.

6 CONCLUSION

This ethnozoological study on the buffalo, carried out among the local populations of the Garamba complex in the DRC, used a questionnaire encoded in Kobocollect to collect data. The results show that the buffalo is essential to local communities, offering food, medicinal and mystical uses. Its meat is a vital source of protein, while various by-products (skin, bones, fat, viscera,. are used for remedies. Although 69% of participants saw the buffalo as a tourist attraction, 24.5% considered it to be aggressive. Ecologically, 6.8% valued its role in dispersing seeds. Knowledge is mainly passed on orally (84%). These results underline the importance of local knowledge for the conservation of the buffalo and sustainable biodiversity conservation.

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