

Socio-Zoological Value and Conservation Perception of *Hippopotamus amphibius* at the Bui National Park, Ghana

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Abstract

The interaction between humans and animals is an important element for the survival of humanity. There is frequent interaction between the *Hippopotamus amphibius* and people at Bui National Park, yet the socio-zoological value and conservation perception of *Hippopotamus amphibius* among local people is limited in literature. The study employed informal and semi-structured interviews to ascertain ethno-zoological information in the Ghana Bui enclave. The study revealed that the *Hippopotamus amphibius* is well-known, and different body parts, including the dung, bones, liver, skin, teeth, meat, and tongue, are used for various purposes serving as food, medicine, and use for religious purposes, ceremonies, spiritual protection and tourism. The most common use of hippos is for food and medicine. A wide range of the zootherapeutic use of hippos includes the treatment of measles, body swellings, rheumatism, mental instability, asthma, diabetes and sexual capacity. The respondents acknowledged the decline of the *Hippopotamus amphibius* population; therefore, it is relevant to carryout extensive conservation awareness and educational programs, especially for young people and traders.

Keywords: Conservation; Consumption; Hippopotamus; Zootherapeutic

Introduction

The interaction between humans and animals is an important element for the survival of humanity. This emerging subject of ethnozoology has sparked the relevance of indigenous and consumable significance placed on wildlife by humans [1,2]. Animals are revered across cultures and as a result, the use of wild animals have had a direct link with biodiversity conservation [3]. The use of animals or manufactured goods from animal parts has been well accepted for diverse reasons worldwide, including food (protein-source), medicine, cultural significance and spiritual prowess [4]. Several studies have recorded the use of wild animal species, including 138 animal species in Brazil [5], 1500 animal species in China [6], and 20 animal species in Israel [7] for individual or commercial gains. Many people around the globe rely heavily on wildlife goods as about 80% of the human population use wildlife-based medicinal products [8]. Emphasis could also be placed on nature tourism of wildlife, which adds up to the Gross Domestic Product to the economies of many biodiversi-

ty-rich countries through foreign exchange [9]. The performance of spiritual ceremonies using animals or their parts by local people in many countries reveals how connected humans are to wildlife [10]. For example, the Jirel indigenes of Nepal believe that the semen of pythons kept in the house entrance would ward off ungodly spirits [11]. Wildlife's religious values are also significant. For example, 129 species are said to exist among followers of the Afro-Brazilian religion Candomblé. This traditional knowledge relationship gradually diminishes and affects wildlife conservation [12]. Although it is anticipated that the actual monetary rewards for animal conservation will result in successful conservation [13], social and traditional ideals may be applicable to conserve wild animals successfully [14]. There is a clear indication in many studies of how ethnozoology enables a suitable opportunity for integrating ecological, socio-cultural and human aspects relating to wildlife conservation and

management as well as elucidating the explicit role wildlife plays in cultural context. The Black Volta River within the Bui National Park is one of the few landscapes harbouring the remaining populations of *Hippopotamus amphibius* (here-in-hippo). However, the hippo population is at risk due to high incidents of poaching and habitat destruction [15]. In addition, the construction of a hydroelectric dam in the Bui enclave promoted a high number of migrants to the area, establishing settlements in previously uninhabited areas and increasing poaching. This caused the hippo population to decline by more than 60% (Bempah et al, unpublished). These occurrences have dangerous implications for conserving hippos [16]. This study, therefore, seeks to determine the use-values and perception of hippos. Understanding the scope of these values and perceptions could improve the conservation of hippos in the Bui enclave, Ghana.

Method

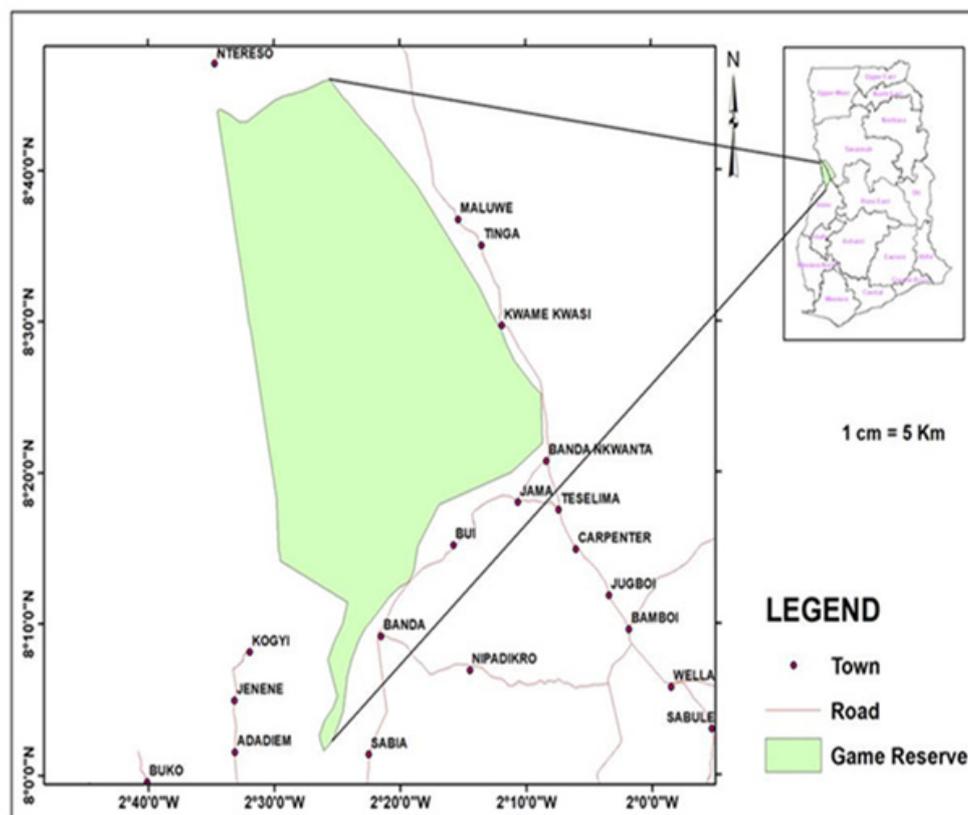


Figure 1: Map of bui national park.

Study area: The study was done in major marketing and fishing communities in the Bono East, Bono and Savanna regions close to the Bui National Park ($8^{\circ}23' 13.2072''$ N, $2^{\circ} 22' 43.9788''$ W), covering an area of about 1800km² (Figure

1). As part of efforts to increase hydroelectric power to meet the socio-economic demands of the country, the government of Ghana, in collaboration with China, constructed a 440 MW hydroelectric dam on the Black Volta River in the Bui National

Park [17]. This human-mediated land use destroyed the habitat of the hippos through flooding. The dam construction also caused an influx of large numbers of illegal migrants, who have settled and put up villages. The Bui National Park is typically a rich biome comprising Guinea Savannah woodland with patches of Moist Semi-Deciduous Forest. The area is home to many endangered species, including the hippos, roan antelope, buffalo, black and white colobus etc. The area's rich fauna and flora concentration have resulted in high human-wildlife interactions, especially the hippos. Fishing, crop farming [18], cattle grazing, and illegal mining are the main land use activities of people living within and outside the protected areas.

Data collection: The socio-zoological survey targeted selected groups, including fisherfolks, canoe/boat operators, traders/market centres, and traditional healers. These people are presumed to possess explicit awareness and experience of the community's use of flora and fauna resources. Therefore, respondents were randomly selected from the focused groups for the interviews. Local people who perform regular activities within the study area were the focus of this study to evaluate the use and perceptions of the hippos. In addition, the main public markets where derivatives from wild animals are traded were also visited. Using questionnaires, semi-structured interviews were

carried out with 95 respondents, complemented by unstructured interviews and informal conversations. The questionnaires covered subjects including the conservation status, respective uses of hippos, most targeted parts if for medicinal use, specific information about their usable parts. In addition, the interviewer sought permission from the respondent to audio record information furnished using a voice recorder.

Data Analysis

Fidelity level: The study assigned the various uses provided by the respondents into five categories: food, medicine, religious ceremonies, spiritual protection, and tourism. Fidelity Level (FL) was adopted for data analysis to determine the respondents' most frequently "use the category" of hippos. The formula performed the FL calculation [19]:

$$FL(\%) = N_p \times \frac{100}{N}$$

Where N_p =number of a particular use category mentioned by respondents and N =total number of all use categories. Fidelity level (FL) ranges from 1% to 100%. With almost 100% representing the most used category. Significant differences between respondents and use category were tested using the Chi-square goodness of fit test.

Results

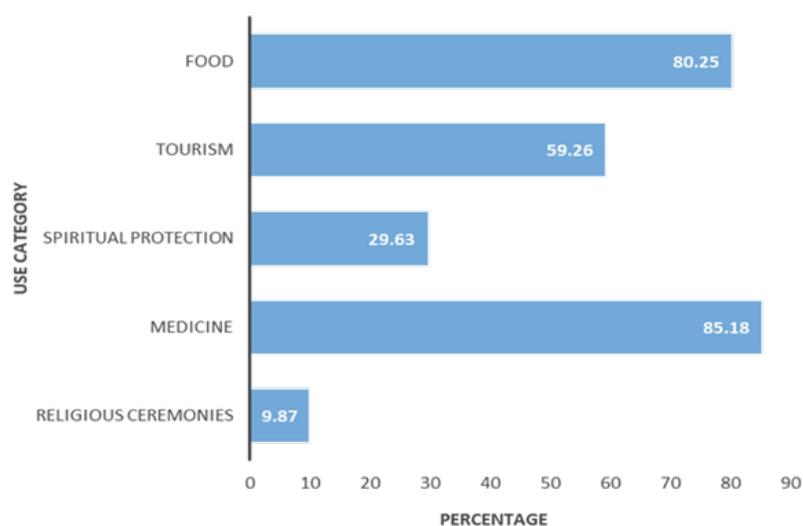


Figure 2: Percentage of different use categories of hippos.

Use of hippos parts and products: The majority of respondents (81.05%) mentioned that they used products made of hippos or parts of the animal for different purposes. Fidelity levels (FL) showed a greater number of respondents (85.01%) revealed that hippos were used for medicinal purposes, while 77.78% of use was for food and 59.26% (tourism, Figure 2). These products were either aimed at

Table 1: Zootherapeutic uses of hippo parts.

Body parts	Use	Disease	Preparations	Mode of treatment
Dung	Medicinal	Measles	Mix the dung with water	Bathing and drinking
Bones	Medicinal	Body swellings, Rheumatism, Mental instability	Mix grounded bones with water. Burn bones	Bathing, inhaling burnt bones
Liver	Medicinal	Asthma	Roast and dry	Chewing
Skin	Medicinal	Diabetes	Roasted	Chewing
Teeth	Medicinal	Sexual capacity	Grounded into powder	Applied to the genital region

Perceptions, interactions and conservation knowledge: The study revealed mixed results regarding the perception of the respondents toward hippos. Respondents who expressed positive perception toward hippos accounted for 55.79%, while those with negative perception accounted for 44.21%. The tourism potentials of hippos and source of income for people who trade in the hippo body parts resulted in the respondent's positive perception. However, concerning negative perception, respondents observed that hippos were highly aggressive and caused harm to humans and properties. The results noted an intermittent conflict between fisherfolks and hippos. A scale of variables impacted variations in perception towards hippos. Female respondents expressed a more negative perception (81.8%) than males (68.6%) toward hippos. There was no significant difference between males and females on their perception toward hippos ($\chi^2=1.969$, $p=0.556$). Most young people (72.2%) expressed negative views, while most adults (63.4%) had positive views of hippos. The study found significant differences among respondents' ages ($\chi^2=15.92$, $p=0.005$). Differences in educational level views were not significant ($\chi^2=2.664$, $p=0.439$). The majority of respondents with non-formal education (77.9%) had a positive perception toward hippos than those with formal education (59.2%). About 80.2% of the respondents claimed they would take the meat of a dead hippo to the market and sell for financial gain.

an individual, household or commercial uses. Respondents mentioned using different body parts of the hippo, including the teeth, sex organ, tongue, placenta, and skin, for spiritual and religious reasons. The meat and liver served as food sources. The dung, liver, bones, teeth, and skin for medicinal purposes (Table 1).

About 75.8% of the respondents said they would hunt hippos in order to sustain their economic activities. Most of the respondents (95.24%) mentioned running away when they met hippos in the forest. About 53.6% claimed they would make noise to scare the hippo away if it came close to their homes, 23.8% stated they would avoid the hippo by seeking safety, 14.7% said they would actively attack the hippos with guns or any other attacking tool, and 8.9% mentioned that they would alert the management of the game and wildlife about the situation. Among the respondents, about 72% claimed they were aware that hippos were being poached for different body parts in the Bui enclave. About 54.7% of the respondents' claimed hippos were killed by carbide, while the use of guns constituted 43% and poisoning (2%, Figure 3). About 95.8% of the respondents believed that hippos are declining drastically and anticipate that the animal may no longer survive.

Discussion

To sustain the conservation of the hippos, its interaction with humans must be given the needed consideration. During the study, young people expressed a more negative perception of hippos, which could be attributed to their lack of experience related to interaction with larger mammals. The adults, however, have had much more experience with large mammals and thus a more positive view of hippos. Other studies have confirmed that adults have a more positive perception of large mammals than young people [20,21].

Women also had a positive perception of hippos than males because most female respondents are market women who trade in hippo parts, especially for food. Their positive view is related to the huge economic gains that accrue from their business. However, this is contrary to other studies [20,21], who found females to express a negative view of hippos. Respondents who expressed negative views of hippos mentioned hippos as a threat to their livelihood, especially fisherfolks and canoe operators, where they encountered frequent conflicts with hippos. Most of the respondents incredibly appreciated the value of hippos by using various parts of the hippos' bodies for different purposes, including food and medicine, spiritual protection, religious ceremony, and tourism. Rural people have continued to preserve their bond to wildlife and integrated it fully into their culture, even though foreign religious beliefs and much-publicized emphasis on modern medicine have penetrated rural societies. Wild animals serve as food (meat) in several rural societies across Africa [20,22]. Again, many of the respondents would use hippo parts or products as medicine. Respondents mentioned treatment of diseases such as asthma, diabetes, measles etc. This was confirmed by a study conducted by Dossou et al. [20] in Benin, who also found zootherapeutic use of hippos. Treatment of diseases using wild animals by many people has been an integral part of many global cultures and traditions [19,23]. For example, 87 animal species were traded as medicine in Nigeria [14] by using different body parts of the animals [24]. In Benin, people use hippo parts to treat diseases like measles and rheumatism [20]. Moreover, the elephant tooth is used to treat pimples and eczema in India [25], swellings in Kenya [21] and rheumatism in Nigeria [26]. Respondents desire to avoid or escape from hippos when meeting them, confirm their fear of the hippos and avoid any direct and predetermined conflict with the animals. This has been recorded in Kenya with the Massai people and elephants [21]. When they encounter hippos in the respondents' homes, most said they would use reasonable methods to chase them away. Therefore, this implies that respondents have compassion for hippos and would not aggressively attack the animals. In most human cultures, specific animals are revered as consecrated, which enhances their conservation. This thereby promotes the positive coexistence between the hippos and humans. For example, the Wechiau people in Northern Ghana believe that hippos saved the lives of their ancestors [27]. To protect the pro-

tector of their ancestors, they have set up a sanctuary and banned the killing of the hippos. Generally, the respondents' perceptions about hippos were portrayed by a negative and positive interface. Respondents are likely to use defensive mechanisms for personal defence and protect their properties, especially fisherfolks who would go fishing in a particular area and encounter hippos, which would lead to fatal consequences for both fisherfolks and hippos. The ability of the respondents to observe that the hippo population was decreasing in the enclave indicates that people were well aware of the conservation status of hippos. The population of hippos has decreased globally [28] and locally (Bempah et al. unpublished). However, the demand for hippo body parts and subsequent killing raises a worrying issue that requires urgent attention in the Bui National Park. People's unwillingness to stop poaching due to a lack of alternative livelihood is most likely to drive further the decline in the hippo population. Among the factors influencing the negative perception of hippos is the lack of significant direct benefits from hippo tourism and the potential injury linked with the aggressively unpredictable hippo. In addition, people's desire to satisfy their socio-economic needs can result in the overexploitation of hippos. A combination of all these factors could impede the conservation efforts of the animals.

Conclusion

The socio-zoological importance of hippos at the Bui enclave serves as food, medicine, religious ceremonies, spiritual protection, and tourism can be incorporated into hippos' management and conservation strategies. The study revealed that the hippo is well-known, and different body parts, including the dung, bones, liver, skin, teeth, meat, and tongue, are used for different purposes. The most common use of hippos is for food and medicine. A wide range of the zootherapeutic use of hippos includes the treatment of measles, body swellings, rheumatism, mental instability, asthma, diabetes and sexual capacity. The respondents acknowledged the decline of the hippo population; therefore, it is relevant to carry out extensive conservation awareness and educational programs, especially for young people and traders.

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