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Caption: Malabar Slender Loris *Loris lydekkerianus malabaricus* © Dileep Anthikkad.

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COMMUNICATION

Wildlife hunting practices of the Santal and Oraon communities in Rajshahi, Bangladesh

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Abstract: Humans have been depending on wild animals from ancient times for food, medicine, economy, tools, and others. Santal and Oraon are two of the indigenous communities present in the Rajshahi district of Bangladesh. They practice wildlife hunting as part of their traditions. We investigated the wildlife hunting practice of these indigenous communities using a closed-ended questionnaire survey. We interviewed 100 households of both communities from four villages. The study indicated that 76% of respondents hunted (88% Santal and 67% Oraon); and they usually hunt mammals, birds, reptiles, and amphibians, of which the bird is the most preferred (73%) and snake the least (1%). The response of hunting among the two communities significantly differed for tortoise, bird, rabbit, mongoose, jackal, and the Jungle Cat. Eighteen sets of animal taxa were significantly correlated indicating that households exercised preferences in terms of prey. The result also showed that only 14% of Santal and 7% of Oraon were familiar with the Bangladesh Wildlife (Conservation and Security) Act, 2012. Although the impact of wildlife hunting of these indigenous groups is still ambiguous, the present study provides a preliminary database of hunting practices of these communities for future conservation management.

Keywords: Correlation, hunting material, indigenous community, investigation, questionnaire survey, traditions, wildlife act.

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Author details: Azizul Islam Barkat and Sumaiya Akter are enthusiastic researchers majoring in Zoology currently. Ashikur Rahman Shome is a fellow graduate and his field of expertise is Zoology (Wildlife Biology). Fahmida Tasnim Liza is a postgraduate researcher in Zoology, and her research interests extend to wildlife parasitology and conservation. Md. Fazle Rabbe is also a fellow postgraduate who majored in Zoology (Wildlife Biology) and his research interests are biodiversity, wildlife disease and conservation.

Authors contributions: AIB and MFR designed the study and author AIB collected field data. FTL managed the analysis of the study and MFR produced the map. AIB, SA and ARS wrote the first draft of the manuscript. MFR and FTL edited the final version of the manuscript. AIB and MFR contributed equally in the study. All authors read and approved the final manuscript.

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INTRODUCTION

Wildlife has an economic, nutritional, cultural, and ecological role in human society (Chardonnet et al. 2002). Wild animals are a source of food (e.g., protein, fat), medicine, clothes, tools, and adornments as well as rituals and trade (Redford & Robinson 1991; Stearman & Redford 1995; Milner-Gulland & Bennett 2003; Bodmer et al. 2004). However, high rates of wildlife harvest for food and other needs has led to their depletion (Redford & Robinson 1991). Hunting is considered one among the major threats to wildlife worldwide and cause of species extinction (Aiyadurai 2011).

The southern Asian region is rich in wildlife, but has unsustainable hunting practices (Shackleton 2001; Aiyadurai et al. 2010; Nekaris et al. 2010; Aiyadurai 2011; Velho et al. 2012; Selvan et al. 2013). Communities living near the forest area largely depend on hunting for sustenance and cash income (Wilkie & Godoy 2001; Albrechtsen et al. 2007; Aiyadurai et al. 2010). Modern hunting technology increases threat to species due to high success rates (Aiyadurai et al. 2010).

Bangladesh is rich in wildlife as its' in the transition zone of the Indo-Himalayan and Indo-Chinese biogeographical regions (IUCN Bangladesh 2015a; Khan 2018). Indigenous communities, which number around 54, form 1.8% of the population of Bangladesh (BBS 2011; IWGIA 2019). They primarily rely on forest products for their religious, cultural, and socio-economic needs (Khisa 1998; Ferreira et al. 2009). Hunting is among their traditional practices that has led to the endangerment of several species in Bangladesh (Khisa 1998; Rana et al. 2009; IUCN Bangladesh 2015a; Khan 2018).

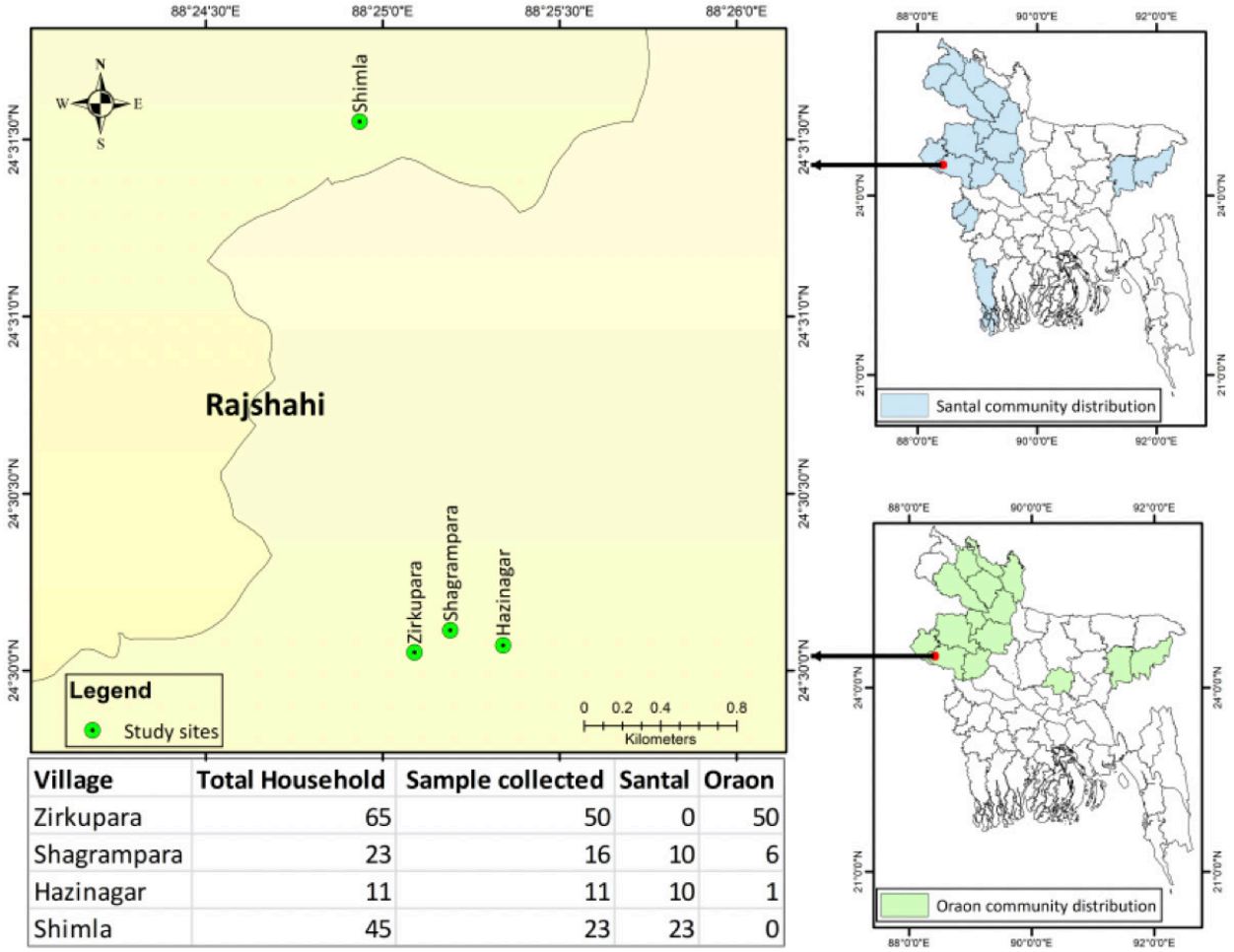
Indigenous people in Bangladesh are mainly clustered in the north, northeastern borders, northcentral region, and the greater Chittagong Hill Tracts (Chowdhury et al. 2014). Santal and Oraon are two indigenous communities living in Rajshahi and the surrounding area (Toppo et al. 2016). About 20% Santal people of Bangladesh are known to live in Rajshahi district whereas the population of Oraon community is increasing (Banglapedia 2014; Shamsuddoha & Jahan 2018). Every year, wild animals are hunted from char, beel and riparian areas of Rajshahi region. There is little information on how many animals are killed each year (Rana et al. 2009; Alliance 2016; Khan 2018). In this study, we have investigated the hunting practices of the indigenous groups in the Rajshahi district, Bangladesh as well as the correlation among the hunted animals.

MATERIALS AND METHODS

We conducted a study on wildlife hunting practices of two indigenous groups (Santal and Oraon) in four villages (Zirkupara, Shagrampara, Hazinagar, and Shimla) of Godagari Upazila at Rajshahi district from March to June 2020. The villages have a total of 144 households, and we collected data from 100 houses across all villages using a random sample method (Yates et al. 2008) (Figure 1). In the studied location, only males go hunting. Hence, we interviewed either male or female (if male respondent was absent) from a household and the female respondent was inquired about the male member's hunting habits. To cross-check the female's response, we asked comparable questions to other adult members of the family. Interviews were carried out with the aid of a field assistant who lived in the study area. The questionnaire was entirely close-ended and delivered in Bangla language (see supplementary file). We stayed up to 20 minutes per session to complete each interview mainly on their hunting practices.

We identified the wildlife hunted by the indigenous people through a pilot survey in the study area. We showed them photographic guides of wildlife (Khan 2018) to get an idea about the wildlife species hunted. Most of them could not identify the animal to species level, only as rabbit, jackal, mongoose, and jungle cat. Hence, we sorted the hunted animals into nine groups (Table 1). The respondents were found to be most familiar with mammals rather than other groups (e.g., birds, frogs). Thus, we finalized the questionnaire prioritizing the response of the interviewees by grouping Amphibia as frog, Reptilia as snake and tortoise, Aves as bird, and Mammalia as rabbit, mongoose, jackal, jungle cat, and rat. We sorted the questionnaires in a series of dichotomous (yes-no) questions, with the information of the wildlife being hunted. Besides, we asked interviewees if they actively hunt and if they were familiar with the Wildlife (Conservation and Security) Act, 2012 of Bangladesh.

To compare the hunting preferences and practices of the two communities, we used chi-square test with a 0.05 significance level. We also calculated the association between the hunted animals using Kendall's tau-b coefficient (R version 1.2.5001).



Village	Total Household	Sample collected	Santal	Oraon
Zirkupara	65	50	0	50
Shagrampara	23	16	10	6
Hazinagar	11	11	10	1
Shimla	45	23	23	0

Figure 1. Map of the study area with the current distribution of Santal (Shamsuddoha & Jahan 2018) and Oraon (Banglapedia 2014) communities in Bangladesh. The table represents the collected sample size for each group with total household number.

Image 1. Oraon male processing hunted rats for consumption. © Azizul Islam Barkat

RESULTS

Wildlife hunting practice of the indigenous communities

Overall, 76% of respondents (88.37% Santal & 66.67% Oraon) responded positively in the question of going hunting. The response varied significantly in two indigenous communities (χ^2= 6.331, p= 0.012). Among the nine animal groups, bird (73%) was the most hunted while snake (1%) was the least. Of the herpetofaunal animal groups, only 5% interviewees were found to hunt frogs, and 64% to hunt tortoises. We found rats as the most hunted mammal group (61%) and jackals the least (6%). Among other mammals, 44% of respondents hunted mongoose, 31% jungle cats, and 28% rabbits (Figure 2).

The positive responses of Santal and Oraon were significantly varied for hunting tortoise (p= 0.006), bird (p= 0.036), rabbit (p< 0.000), mongoose (p< 0.000), jackal (p= 0.040), and jungle cat (p< 0.000) (Table 1). In questioning whether they know about the Wildlife (Conservation and Security) Act, 2012, we found no significant difference among the indigenous groups (χ^2= 1.310, p= 0.252). Only 10 respondents (13.95% Santal & 7.02% Oraon) knew about the act but not many details of it.

Correlation of hunting different wildlife groups

Table 2 represents the correlation of hunting animals that consists of 36 pairs. The dual-trail verification showed that 18 pairs are significantly correlated. The correlativity of hunting 'mongoose' and 'jungle cat' demonstrates the maximum of '0.626'; indicating a significant fairly large overlap in hunting these two wildlife groups. The second highest value (0.545) of correlation is found for 'jungle cat' and 'rabbit' hunting. We also found some negative correlation pairs among the groups (e.g., jungle cat-frog, jungle cat-snake, rat-jackal).

DISCUSSION

The result showed that birds are most vulnerable to hunting (Figure 2). Among wild birds, doves (*Spilopelia* spp., *Streptopelia* spp.) are mostly hunted because of their availability and ease of capture. Besides, wild birds are a free source of meat. Locals hunt them with a variety of hunting materials such as catapults, snares, traps, and baits. Other indigenous communities in Bangladesh also use these techniques to hunt birds (Chowdhury et al. 2007, 2014). Besides, locals often steal chicks and juvenile from nests. Hunting, poisoning, and trapping of birds remain a big threat despite the strong law and popular sentiment against it (IUCN Bangladesh 2015b).

We found neither Santal nor Oraon are habituated to eating herpetofauna (excluding tortoises). We assume that locals do not regard herpetofauna as a good source of protein. But, in India both the indigenous groups eat snakes, frogs, and other herps (Ghosh-Jerath et al. 2015, 2016). We found only 5% (1% Santal & 4% Oraon) people eating frogs, 1% eating snakes and these did not differ significantly between the two communities (Table 1). For tortoises, the result showed a significant difference between the indigenous groups (p= 0.006). Tortoises used to be hunted on a regular basis, but their population number have suddenly plummeted in the area. So, locals either search for these animals in nearby habitats or purchase them from markets

Table 1. Wildlife hunting practices of the two indigenous groups with a list of animals hunted in the study area.

Genus/Species name	Group	Class	χ2	Yes (percentage)	
				Oraon (n=57)	Santal (n=43)
Hoplobatrachus spp.	Frog	Amphibia	1.136	4(7.01)	1(2.33)
Naja spp.	Snake	Reptilia	0.762	1(1.75)	0(0)
Morenia petersi, *Nilssonia* spp., *Pangshura* spp., *Lissemys punctata*	Tortoise#		7.436**	30(52.63)	34(79.07)
Spilopelia sp., *Streptopelia* spp., *Ardeola grayii*, *Ardea* spp., *Amaurornis phoenicurus*, *Acridotheres* spp., *Passer* sp., *Microcarbo niger*	Bird	Aves	4.399*	37(64.91)	36(83.72)
Lepus nigricollis	Rabbit	Mammalia	33.992***	3(5.26)	25(58.14)
Herpestes edwardsii	Mongoose		24.163***	13(22.81)	31(72.09)
Canis aureus	Jackal		4.237*	1(1.75)	5(11.63)
Felis chaus	Jungle cat		41.049***	3(5.26)	28(65.12)
Rattus spp., *Bandicota* spp.	Rat		0.853	37(64.91)	24(55.81)

Tortoise (#) is the only group that is either consumed by hunting or buying from nearby markets. p-value is represented in asterisk (*p≤0.05, **p≤0.01, ***p ≤ 0.001).

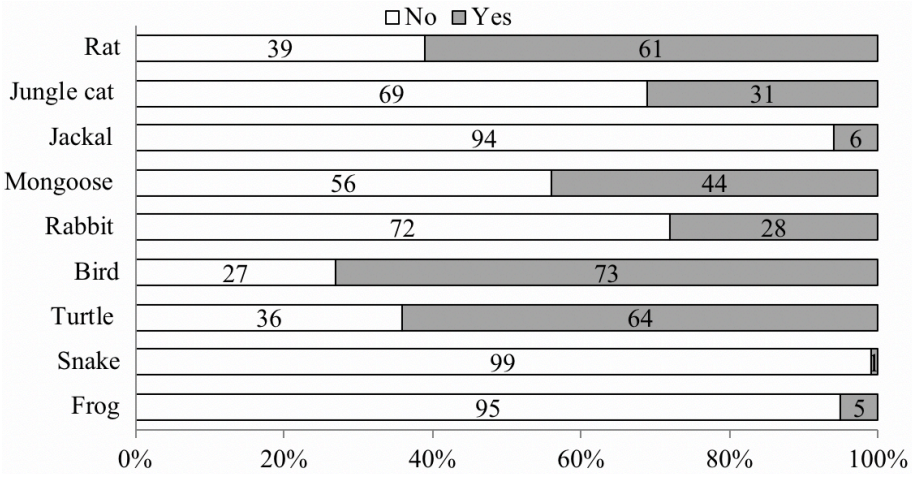


Figure 2. Percentage of hunting different groups of wildlife by indigenous communities.

Table 2. Kendall's tau-b coefficient results in hunting different groups of wildlife with p-value in asterisk mark.

Groups	Snake	Tortoise	Bird	Rabbit	Mongoose	Jackal	Jungle cat	Rat
Frog	0.438 ***	0.172	0.140	0.061	0.166	0.328 ***	-0.055	0.183
Snake		0.075	0.061	0.161	0.113	0.398 ***	-0.067	0.08
Tortoise			0.295 **	0.282 **	0.413 ***	0.014	0.232*	0.425 ***
Bird				0.221*	0.221*	0.059	0.213*	0.068
Rabbit					0.479 ***	0.218*	0.545 ***	0.179
Mongoose						0.200*	0.626 ***	0.296**
Jackal							0.286 **	-0.057
Jungle cat								0.181

(*p≤0.05, **p≤0.01, ***p≤ 0.001)

(BDT 700–800 per kilogram). Because of the high price, many cannot afford it and thus, actively go for tortoise hunting. Tortoises are highly-priced for both food and medicinal value (Harrison et al. 2016). Other than nutritional value, we also observed that people of these indigenous communities believe tortoise flesh has curative properties. They believe, it improves vision and keeping tortoise bone in cattle's feeding pot can heal foot and mouth diseases of cattle. Tortoise is also hunted by other indigenous communities such as Mro in Chittagong hill tracts of Bangladesh (Chowdhury et al. 2007, 2014).

Among mammals, rats are hunted mostly by the locals and there is no specific season for rat hunting (Image 1). The indigenous people hunt rats if they find them while working in cultivated land. However, they hunt the animal in huge number after harvesting the crops, so it becomes easier to look for rat nests or holes. We found that 55.81% Santal and 64.91% Oraon hunt rats for meat but their response was not significantly different (Table 1). This practice can lead to decreased use of rodenticides and not hunt the other ecologically useful wild species (Meyer-Rochow et al. 2015).

The hunting percentage for other mammals (except rats) differed significantly among the two communities (Table 1). Table 1 also shows that Santals prefer hunting mammals (e.g., jackal, rabbit, jungle cat) than Oraons. For example, 58.14% of Santal participated in rabbit hunting, whereas only 5.26% of Oraon did. Both communities go for traditional hunting early or late in the winter season. They generally go hunting in char lands, the adjacent area of their settlements, and nearest districts (e.g., Chapainawabganj) but sometimes, they travel further away to other districts (e.g., Naogaon, Joypurhat, Bogura, Kushtia, Pabna, Khulna) for 2–7 days. When they travel a long distance, they use turmeric powder on

skinned prey for preservation. Usually, they go hunting with traditional arms (bow & arrow) in winter (Image 2) (Aiyadurai et al. 2010; IUCN Bangladesh 2015b).

We found that the majority of Santals are hunters (88.37%). Hunting is a common source of animal protein for their households. The studies of Sarker et al. (2017) and Das (2011) showed that Santals are very skilled in hunting different wildlife species (e.g., rats, birds, snakes) in Bangladesh though they are facing vulnerability in present times due to deforestation. Thus, they have started cultivating agricultural lands for livelihood. The Oraon community (66.67%) also harvests wildlife as well, but to a lesser extent than the Santal community. We observed during the survey that although most of the Oraon people are farmers, still a portion has selected other jobs and businesses that reduce their need to go hunting. Besides, the household members with higher economic status are more knowledgeable about wildlife conservation issues than others (Randolph et al. 2007).

Many studies on hunting showed correlation with different factors, like- number of hunters and catch (e.g., Nielsen 2006); distance and hunting rate (e.g., Chutia 2010); hunted species and body weight (e.g., Constantino 2016). We calculated the relationship of hunting different groups of wildlife in this study. The result showed a significant hunting relationship between two carnivores (mongoose-jungle cat). Small carnivores have similar habits and live in similar types of habitats (Chutipong et al. 2017). Hunters can easily hunt multiple species in similar habitats spending minimum effort. The relationship signified that hunters' response in hunting one of these species increases the chance of hunting the other one and vice versa. The negative relationship among other groups such as jungle cat-frog also supports our explanation.

The present study revealed that only 10% of the respondents were familiar with Bangladesh Wildlife Act 2012, as most of the older people of Santal and Oraon are uneducated or illiterate. They were even unaware that hunting wildlife is a crime. We found very few respondents who keep certificates of hunting permission from the police station or union chairman so they can go hunting. But, they could not show us any kind of certificates during the survey. Higher education is still lacking along with the workshops on wildlife hunting and conservation on behalf of the government. Because it is seen that the more these communities are educated, the more they are aware of wildlife conservation (Kaltenborn et al. 1999).

CONCLUSIONS

Indigenous communities harvest wild animals worldwide for different purposes which constitute essential ingredients in daily livelihoods (Ferreira et al. 2009). Santal and Oraon are two closely related indigenous communities of Bangladesh that rely on agricultural day labor. They are unable to buy meat from markets due to their poverty. As a result, they are compelled to hunt wildlife, especially for animal protein consumption. Again, it is seen that they go hunting whenever they are free or jobless. However, many of the respondents of this study also think that the wildlife population is declining due to hunting. We recommend some measures for the conservation of hunted animals in the area.

Image 2. Bow and arrow for hunting mammals like Jungle Cat and Jackal. © Azizul Islam Barkat

1. According to Bangladesh Wildlife (Conservation and Security) Act, 2012, wildlife hunting is a punishable offence; hence the law should be executed strictly to prevent illegal hunting. The government can impose a coordination committee to facilitate the quick execution of the existing law.

2. The respective authorities have to ensure the availability of suitable jobs (e.g., agro-farming, agribusiness) for indigenous people throughout the year.

3. Conservation education and awareness about wildlife should be disseminated among all the stakeholders for future wildlife conservation purposes and management.

4. Existing natural habitats should be conserved and more emphasis should be imposed to ensure undisturbed breeding and feeding grounds.

REFERENCES

Aiyadurai, A. (2011). Wildlife hunting and conservation in Northeast India: a need for an interdisciplinary understanding. *International Journal of Galliformes Conservation* 2: 61–73.

Aiyadurai, A., N.J. Singh & E.J. Milner-Gulland (2010). Wildlife hunting by indigenous tribes: a case study from Arunachal Pradesh, north-east India. *Oryx* 44(4): 564–572. https://doi.org/10.1017/S0030605309990937

Albrechtsen, L., D.W. Macdonald, P.J. Johnson, R. Castelo & J.E. Fa (2007). Faunal loss from bushmeat hunting: empirical evidence and policy implications in Bioko Island. *Environmental Science & Policy* 10(7–8): 654–667. https://doi.org/10.1016/j.envsci.2007.04.007

Alliance, C.C. (2016). A preliminary wildlife survey in Sangu-Matamuhuri Reserve Forest, Chittagong Hill Tracts, Bangladesh. Unpublished report submitted to Bangladesh Forest Department, Dhaka, Bangladesh, 52pp.

BBS (2011). Population and housing census 2011. Bangladesh Bureau of Statistics, Government of the Peoples' Republic of Bangladesh, Dhaka, 3 pp.

Banglapedia (2014). Banglapedia, National Encyclopedia of Bangladesh. Accessed in 15 June 2021. Available at http://en.banglapedia.org/index.php/Oraon,_The

Bodmer, R.E., E.P. Lozano & T.G. Fang. (2004). Economic Analysis of Wildlife Use in the Peruvian Amazon, pp. 191-208. In: Silvius, K.M., R.E. Bodmer & J.M.V. Fragoso (eds). *People in Nature.* Columbia University Press, 464pp. https://doi.org/10.7312/silv12782-012

Chardonnet, P., B.D. Clers, J. Fischer, R. Gerhold, F. Jori & F. Lamarque (2002). The value of wildlife. *Revue scientifique et technique-Office international des épizooties* 21(1): 15–52. https://doi.org/10.20506/rst.21.1.1323

Chowdhury, M.S.H., M.A. Halim, M.D. Miah, N. Muhammed & M. Koike (2007). Research communication: biodiversity use through harvesting faunal resources from forests by the Mro tribe in the Chittagong Hill Tracts, Bangladesh. *The International Journal of Biodiversity Science and Management* 3(1): 56–62. https://doi.org/10.1080/17451590709618162

Chowdhury, M.S.H., S. Izumiyama, N. Nazia, N. Muhammed & M. Koike (2014). Dietetic use of wild animals and traditional cultural beliefs in the Mro community of Bangladesh: an insight into biodiversity conservation. *Biodiversity* 15(1): 23–38. https://doi.org/10.1080/14888386.2014.893201

Chutia, P. (2010). Studies on hunting and the conservation of wildlife species in Arunachal Pradesh. *Sibcoltejo* 5(2010): 56-67.

Chutipong, W., R. Steinmetz, T, Savini & G.A. Gale (2017). Assessing resource and predator effecs on habitat use of tropical small carnivors. *Mammal Research* 62(1): 21–36. https://doi.org/10.1007/s13364-016-0283-z

Constantino, P. (2016). Deforestation and hunting effects on wildlife across Amazonian indigenous lands. *Ecology and Society* 21(2): 3. https://doi.org/10.5751/ES-08323-210203

Das, S. (2011). Indigenous people's access to land in Northern-belt of Bangladesh: a study of the Santal community. Master's thesis, Universitetet i Tromsø. https://munin.uit.no/handle/10037/3471

Ferreira, F.S., S.V. Brito, S.C. Ribeiro, W.O. Almeida & R.R. Alves (2009). Zootherapeutics utilized by residents of the community Poco Dantas, Crato-CE, Brazil. *Journal of Ethnobiology and Ethnomedicine* 5(1): 1–10. https://doi.org/10.1186/1746-4269-5-21

Ghosh-Jerath, S., A. Singh, M.S. Magsumbol, T. Lyngdoh, P. Kamboj & G. Goldberg (2016). Contribution of indigenous foods towards nutrient intakes and nutritional status of women in the Santhal tribal community of Jharkhand, India. *Public health nutrition* 19(12): 2256–2267. https://doi.org/10.1017/S1368980016000318

Ghosh-Jerath, S., A. Singh, P. Kamboj, G. Goldberg & M.S. Magsumbol (2015). Traditional knowledge and nutritive value of indigenous foods in the Oraon tribal community of Jharkhand: an exploratory cross-sectional study. *Ecology of Food and Nutrition* 54(5): 493–519. https://doi.org/10.1080/03670244.2015.1017758

Harrison, R.D., R. Sreekar, J.F. Brodie, S. Brook, M. Luskin, H. O'Kelly, M. Rao, B. Scheffers & N. Velho (2016). Impacts of hunting on tropical forests in Southeast Asia. *Conservation Biology* 30(5): 972–981. https://doi.org/10.1111/cobi.12785

International Work Group for Indigenous Affairs (IWGIA). (2019). Indigenous World 2019: Bangladesh. https://www.iwgia.org/en/bangladesh/3446-iw2019-bangladesh.html

IUCN Bangladesh (2015a). *Red List of Bangladesh Volume 2: Mammals*. IUCN, International Union for Conservation of Nature, Bangladesh Country Office, Dhaka, Bangladesh, 49pp.

IUCN Bangladesh (2015b). *Red List of Bangladesh Volume 3: Birds*. IUCN, International Union for Conservation of Nature, Bangladesh Country Office, Dhaka, Bangladesh, 45pp.

Kaltenborn, B.P., T. Bjerke & J. Vitterso (1999). Attitudes toward large carnivores among sheep farmers, wildlife managers, and research biologists in Norway. *Human Dimensions of Wildlife* 4(1): 57–73. https://doi.org/10.1080/10871209909359142

Khan, M.M.H. (2018). *A Photographic Guide to Wildlife of Bangladesh*. Arannayk Foundation, Dhaka, Bangladesh, 488pp.

Khisa, S.K. (1998). Ethno-botanical cultural background of ethnic communities in forest resource management in Chittagong Hill Tracts, pp. 56–63. In: Banik, R.L., M.K. Alam, S.J. Pei, & A. Rastog (eds.). *Applied Ethnobotany.* Chittagong: Bangladesh Forest Research Institute.

Meyer-Rochow, V.B., K. Megu & J. Chakravorty (2015). Rats: if you can't beat them eat them! (Tricks of the trade observed among the Adi and other North-East Indian tribals). *Journal of Ethnobiology and Ethnomedicine* 11(2): 1–12. https://doi.org/10.1186/s13002-015-0034-2

Milner-Gulland, E.J. & E.L. Bennett (2003). Wild meat: the bigger picture. *Trends in Ecology & Evolution* 18(10): 351–357. https://doi.org/10.1016/S0169-5347(03)00123-X

Nekaris, K.A.I., C.R. Shepherd, C.R. Starr & V. Nijman (2010). Exploring cultural drivers for wildlife trade via an ethnoprimatological approach: a case study of slender and slow lorises (Loris and Nycticebus) in South and Southeast Asia. *American Journal of Primatology* 72(10): 877–886. https://doi.org/10.1002/ajp.20842

Nielsen, M.R. (2006). Importance, cause and effect of bushmeat hunting in the Udzungwa Mountains, Tanzania: Implications for community based wildlife management. *Biological conservation* 128(4): 509–516. https://doi.org/10.1016/j.biocon.2005.10.017

Rana, M.P., M.S.I. Sohel, S. Akhter & M.R. Hassan (2009). Indigenous Food Habit of the Hajong Tribe Community in Bangladesh: Implication for Sustainable Extraction and Biodiversity Conservation

in North-East Bangladesh. *Journal of Forest and Environmental Science* 25(2): 101–109. https://www.earticle.net/Article/A114942

Randolph, T.F., E. Schelling, D. Grace, C.F. Nicholson, J.L. Leroy, D.C. Cole & M. Ruel (2007). Invited review: Role of livestock in human nutrition and health for poverty reduction in developing countries. *Journal of Animal Science* 85(11): 2788–2800. https://doi.org/10.2527/jas.2007-0467

Redford, K.H. & J.G. Robinson (1991). Subsistence and commercial uses of wildlife in Latin America. *Neotropical Wildlife Use and Conservation* 6: 23.

Sarker, M.A.R., N.A. Khan & K.M. Musarrat (2017). Livelihood and vulnerability of the Santals community in Bangladesh. *The Malaysian Journal of Social Administration* 12(1): 38–55. https://doi.org/10.22452/mjsa.vol12no1.2

Selvan, K.M., G.G. Veeraswami, B. Habib & S. Lyngdoh (2013). Losing threatened and rare wildlife to hunting in Ziro Valley, Arunachal Pradesh, India. *Current Science* 104(11): 1492–1495. https://www.jstor.org/stable/24092472

Shackleton, D.M. (2001). A review of community-based trophy hunting programs in Pakistan. IUCN, the World Conservation Union.

Shamsuddoha, M. & M.R. Jahan (2018). Santal Community in Bangladesh: A Socio-historical Analysis. *Asian Journal of Humanity, Art and Literature* 5(2): 89–100. https://doi.org/10.18034/ajhal.v5i2.339

Stearman, A.M. & K.H. Redford (1995). Game management and cultural survival: the Yuquí ethnodevelopment project in lowland Bolivia. *Oryx* 29(1): 29–34. https://doi.org/10.1017/S0030605300020846

Toppo, A., M.R. Rahman, M.Y. Ali & A. Javed (2016). The socio-economic condition of plain land tribal people in Bangladesh. *Social Sciences* 5(4): 58–63. https://doi.org/10.11648/j.ss.20160504.12

Velho, N., K.K. Karanth & W.F. Laurance (2012). Hunting: A serious and understudied threat in India, a globally significant conservation region. *Biological Conservation* 148(1): 210–215. https://doi.org/10.1016/j.biocon.2012.01.022

Wilkie, D.S. & R.A. Godoy (2001). Income and price elasticities of bushmeat demand in lowland Amerindian societies. *Conservation Biology* 15(3): 761–769. https://doi.org/10.1046/j.1523-1739.2001.015003761.x

Yates, D.S., D.S. Starnes & D.S. Moore (2008). *The Practice of Statistics*. Research design: Qualitative, quantitative, and mixed method approaches. W.H. Freeman, 858pp.

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