Original Research Article

Use Pattern Of Faunal Resources By Tribal And Its Impact On Biodiversity In Dampa Tiger Reserve In Mizoram, India

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Abstract: We conducted a study on use pattern of faunal resources by tribal communities in Dampa Tiger Reserve (DTR) in Mizoram, India. Its impact on biodiversity of the region was assessed. Study area is a part of Indo-Myanmar hotspot region. Mizo, Bru and Chakma tribes inhabits inside the buffer area of the reserve. A semi structured questionnaire was used to collect information from inhabitants on the basis of 10% of the households. Average loss of animal diversity is very high i.e. 525 individuals per year. Commonly extracted animals are Wild boar, Barking deer, Serow, Sambar and Monkeys. 86% of animals extracted are mammals. Of them, 21% are primates, 26.3% ungulates, 21% carnivores. Persons up to 30 years do not participate in hunting and 40-50 years age group predominates among hunters. Average size of hunting party is 2.63 persons. Seasonality in hunting is very evident; primates are hunted during summer and winter. Relation between the distance of villages from core area and rate of hunting is insignificant. Details of therapeutic activities such as methods of process, mode of application and type of ailments to cure are discussed in the paper. Socially amicable alternatives for livelihood of the residents are suggested as effective conservation measures.

Key words: Biodiversity, Conservation measure, Dampa Tiger Reserve, Hunting, Mizoram, Traditional knowledge

Introduction

Indigenous communities have unique culture that is closely integrated with local environment (Solanki *et al.*,2004, 2005). Local ecological knowledge provides information on the availability, distribution, abundance and behaviour of species. The cumulative knowledge, practice and belief that has acquired over a period of time during interactions of people with each other and with their environment (Berkes 2009, Rasalato *et al.*, 2010). The socio-cultural transmission of local knowledge is also free from subjective cultural perceptions. It is therefore suggested that objective for studying the use pattern and status of wild animal populations has three dimensions (i) remote areas where there have been no appropriate scientific studies (Wilhere 2002, Rasalato *et al.*, 2010), (ii) areas that are suffering drastic biodiversity loss (Starr *et al.*, 2011), and (iii) areas in which knowledge is urgently needed to implement appropriate conservation measures (Usher 2000, Steinzmetz *et al.*, 2006; Starr *et al.*, 2011).

Substantial studies on use of faunal resources during various ethnic practices and its implications on biodiversity are not available in this region. A study on use of indigenous knowledge in hunting, extraction and utilization of animals for meat and zoo therapeutic activities was carried out around Dampa Tiger Reserve, Mizoram, India. The emphasis given on traditional knowledge which is utilized in hunting and extraction of animals, seasonality in hunting and therapeutic use value of the animals' body part. This study also evaluates biodiversity loss in the area and suggests appropriate policy oriented conservation measure.

Materials and methods

Study area

Dampa Tiger Reserve (DTR) is the largest protected area in the state of Mizoram in north eastern part of India. Its geographic location lies between longitude 92°13'12" to 92°27'24" East and latitude 23°32'42" to 23°41'36" North in western part of Mizoram. Its western boundary shares international border with Bangladesh. The region is a part of extended Eastern Himalaya. It is also a part of Indo-Myanmar biodiversity hotspot region (Myers, 2000). The total area of the DTR is 500 km^2 that include a core area of 340 km^2 and a buffer area of 160 km^2. Topography is highly undulating, altitudinal variations ranges from 150-2000 m. Forest is subtropical semi-evergreen/evergreen type with varying degree of crown cover density. Some area is represented by closed moist deciduous forest (Devi *et al.*, 2011). Average rainfall is 2595 mm. The map of study site is shown in Fig. 1.

Data collection

Semi structured questionnaire developed by Solanki *et al.* (2005) and modified by Solanki and Chutia (2009) was followed for this study. Study was conducted during January-April, 2013. Nine villages are situated inside the buffer zone of DTR. The present study focused on seven villages namely Phuldungsei, West Phaileng, Saithah, Teirei, Lallen, Damparengpui and Kawnmawi. Two villages, Rajivnagar and Tuipuibari were not included in the study because of activist inflicted area. Mizo, Bru, and Chakma tribes inhabit in these villages; Mizo and Bru are the major ones. Number of households in all villages are 1730. One hundred seventy two, 10% of total households were interviewed with elderly residents and village chieftain by two co-authors for collecting data. The data were collected on animal species hunted, season of hunting, age of hunters and use of animals and their body parts for therapeutic purposes. The villages are located at unequal distances from the core area of the DTR. The relationship between distances of villages from DTR and animals hunted and extracted computed by Kruskal-Wallis test using SPSS ver.20.0 at significance level $P < 0.05$.

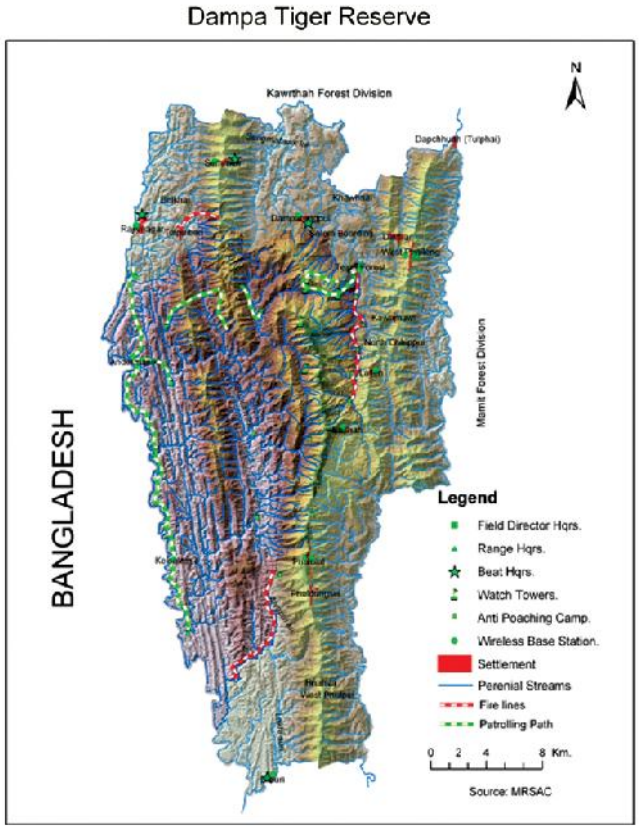

Fig. 1. Map of Dampa Tiger Reserve

Results

Age group of hunters and size of hunting party

People of three age groups viz. 30-40 years, 40-50 years and > 50 years were involved in hunting and extraction of animals. 26% of the hunter belongs to 30-40 years, 38.5% comes from 40-50 years age group and 35.5 % of the hunters were above 50 years of age. Persons less than thirty years of age did not participate in hunting. Size of the hunting party varies from 1 to 10 individuals. Number of hunters in each village and average size of the hunting party is given Table 1.

Table 1. Age group of hunters and average size of hunting party in different villages

Name of villages	Age groups and no. of hunter			Average size of
	30-40yrs	40-50 yrs	>50yrs	hunting party/village
Phuldungsei	12	12	7	2.59
W.Phaileng	12	36	42	2.74
Saithah	2	4	2	3.13
Teirei	6	2	1	2.55
Lallen	6	5	6	2.57
Damparengpui	4	4	0	2.50
Kawnmawi	2	2	2	2.36

The average size of the hunting party including all the villages is 2.63 persons. Two major categories of hunter were reported: (a) group of 1-3 individuals, (b) group of 4-6 individuals. The group of 1-3 individuals constitutes 79.6% of the total hunting groups and group of 4-6 individuals constitutes 20.4%. 48% of smaller size of the hunters and 56.25% of larger size of total hunters both comes from the West Phaileng village.

Number of animals extracted

Animals extracted in each village during last thirty years is given in Table 2. Twenty two animal species were extracted. Average of 525 individuals/year of all categories was extracted. Commonly extracted animals are Wild boar, Barking deer, Serow, Sambar and Monkeys. 86% of animals extracted are mammals. Of them, 21% are primates, 26.3% ungulates, 21% carnivores. Two species of bear, Himalayan black bear and Malayan sun bear which is endemic to the area were also extracted. 43.4% of total extraction was from Phuldungsei and 38.5% was from W Phaileng. Both the villages are at unequal distance from core area. Kruskal-Wallis test was employed to understand the rate of extraction of animals in different villages. The variation in numbers of animals extracted by different villages (x^2= 83.00; df= 6; p= 0.001) are significant in-spite of unequal distance from core area of DTR.

Hunting Seasons

Pattern in hunting of different animal categories in different seasons was found to be very distinct (Table 3). Primates are hunted in the summer and winter and ungulates in winter and monsoon. Porcupineis hunted only during the winter and bears in summer.

Table 3. Seasonal pattern of hunting different groups of animals

Sl. No.	Seasons	Animal categories
1	Winter	Wild boar, Hoolock gibbon, Phayre' s leaf monkey, Assamese macaque, Capped langur, Serow, Barking deer, Porcupine
2	Summer	Barking deer, Hoolock gibbon, Phayre's leaf monkey, Assamese macaque, Capped langur, Bear
3	Monsoon	Sambar, Bear, Wild boar, Barking deer

Therapeutic uses of animals

9 species of mammals, 3 species of reptiles and 1 species of birds were utilized widely for various therapeutic purposes. Body organs/ body parts used in different ailments are gall bladder, bones, brain, blood, tooth, fat, nails, liver, stomach and intestine. Details of therapeutic activities, process and mode of use of different body part of animals is given in Table 4.

Table 2. Numbers of species extracted in each village in last thirty years

Name of animals	Name of the villages around the Dampa National Park						
	Phuldungsei	W.Phaileng	Saithah	Lallen	Teirei	Damparengpui	Kawnmawi
Mammals							
1. Tiger	5	4	0	1	0	0	0
2. Elephant	7	6	0	1	0	0	0
3. Gaur	4	4	0	1	0	0	0
4. Leopard	38	45	7	20	7	10	8
5. Clouded leopard	27	32	6	17	6	12	6
6. Wild boar	284	462	37	68	30	32	25
7. Asiatic Black Bear	76	112	11	34	18	15	14
8. Malayan Sun Bear	64	87	13	28	21	17	18
9. Sambar	85	255	32	57	27	28	20
10. Barking deer	145	393	30	60	25	26	22
11. Porcupine	54	107	12	36	18	17	15
12. Serow	130	212	15	54	26	25	24
13. Hoolock Gibbon	67	124	20	72	25	32	21
14. Phayre's leaf monkey	79	158	28	64	24	28	24
15. Assamese macaque	103	206	32	80	27	35	28
16. Capped langur	94	142	25	65	25	24	20
17. Small Indian Civet	44	72	17	51	16	32	21
18. Indian Pangolin	38	63	10	34	10	12	7
19. Wild dog	20	33	7	14	7	8	7
Reptiles							
20. Python	46	68	12	22	15	13	9
21. Turtle	32	64	16	18	9	15	10
Bird							
22. Hornbill	78	114	27	39	22	28	18

Table 4. Therapeutic uses of body parts of animals, processing technique and mode of use

S.N.	Name of animal	Class	Part of body	Purpose of use	Process and mode of use
1	Hoolock gibbon *(Hoolock hoolock)*	Mammalia	Gall bladder	Stomach ache, dysentery, diarrhea, cholera, malaria, epilepsy	Dried, aqueous decoction is consumed. Raw is also eaten
			Blood	Treatment of malaria and as Vitamin supplement	Consumed mixing with alcohol.
			Bone of hand	Facilitate labor pain	Rubbed on belly of pregnant females
			Bone	Strengthening of bones	Tied as wrist band or anklets
			Brain	Stunted growth in infants	Aqueous decoction is consumed
			Liver	Cure of malaria	Aqueous decoction is consumed
			Tooth	To protect body from evil soul	Tied around neck or other body part
2	Assamese macaque *(Macaca assamensis)*	Mammalia	Brain	Stunted growth in infants	Aqueous decoction is consumed
3	Stump tailed macaque *(Macaca arctoides)*	Mammalia	Brain	Stunted growth in infants	Aqueous decoction is consumed
					Tooth grounded into paste and applied on decayed tooth
4	Tiger *(Panthera tigris)*	Mammalia	Tooth	Tooth decay	
5	Small Indian Civet *(Viver riculaindica)*	Mammalia	Meat	Control high blood pressure and asthma	Fried and eaten
6	Himalayan black bear *(Ursus tibetanus)*	Mammalia	Gall bladder	Epilepsy, convulsion, malaria, stomach ache and dysentery	Smoked, Aqueous decoction is consumed
7	Malayan sun bear *(Helarctos malayanus)*			Birth control	Dried, crushed and eaten. Raw may also be eaten.
			Fat	Improve quality of hairs	Warmed fat applied on head
				Itching	Applied raw over affected area
8	Barking deer *(Muntia cusmuntjac)*	Mammalia	Nail	Kidney problem	Dried, crushed and consumed
9	Porcupine *(Hystrix indica)*	Mammalia	Stomach	Stomach ache, tooth decay	Boiled/smoked and eaten for stomach ache. Apply on affected tooth to prevent tooth decay
			Vulva	Facilitate labor pain	Consumed smoked/boil/roasted
			Gall bladder	Malaria	Smoked and consume. Some time mix with water and consume
			Quill	Epilepsy, convulsions	Ashe of quill mixed with water and consume
			Intestine	Stomach ache	Aqueous decoction consumed
10	Indian Pangolin *(Manis crassicaudata)*	Mammalia	Scales	Diabetes	Wear around waist/ Burn, crush and consumed.
				Pneumonia	Ties scales around neck of children or scales are burnt/ roasted on fire and consumed
				Burning of skin	Powder applied on affected area
11	Common monitor lizard *(Varanus bengalensis)*	Reptilia	Gall bladder	Malaria, dysentery, cholera, diarrhoea	Smoked and consume. Sometime aqueous decoction consumed
12	Python *(Python molurus)*	Reptilia	Gall bladder	Malaria, dysentery, cholera, diarrhea, stomach ache	Smoked and consume. Sometime aqueous decoction consumed
			Fat	Burning of skin	Raw fat applied on affected area
				Betterment of hair	Raw fat directly applied on hairs
				Cough	Raw fat is rubbed on chest and throat region
				Facilitate labor pain	Raw fat applied on abdomen. Sometimes consumed raw
			Meat	Meat prevents arson in house and also used to cure malaria	Raw meat/ smoked meat
13	Turtle	Reptilia	Gall bladder	Asthma	Consumed raw
14	Wreathed hornbill *(Aceros undulatus)*	Aves	Fat	Pneumonia	Raw fat is applied on the chest

Discussion

Biodiversity and human beings have had a close and mutual relationship for thousands of years. The biological resources upon which people depend are renewable which are needed to be managed. The convention on biological diversity recognizes the role of indigenous people in conservation and management of biodiversity through application of indigenous knowledge (Kumar *et al.*, 2015). But the availability of biological sources and richness of biodiversity depend upon the ways the society use the resource, their productivity and ecological values. Cultural and religious back ground of tribal groups mediate hunting that has larger impacts on biodiversity (Velho and Laurence, 2013). Extraction of 525 animals/year indicates direct impact on loss of animal biodiversity. 86% of animals extracted are mammals; of them, 21% are primates and 26.3% ungulates who directly contribute in dispersal seeds and mineral cycling which enables ecosystem functioning and regeneration of forest in tropics. Therefore, extracting animals from natural system has compounding effect on degradation/ loss of biodiversity. Specific age group (40-50 years) of people are intensively involved in hunting and extraction of animals. They have acquired knowledge about availability, distribution and general ecology and behavior of animals and hunting skill in course of time and they use that for the purpose. This might be a reason that persons of 30 years of age did not participate in hunting. Time of hunting (day/night) was not specified because thirty years before legislation for wild life hunting were not implied in letter and spirit in the region.

Zoo-therapy should be viewed within its cultural dimensions. Conformity of ethno-zoology has no scientific evidences. Almost all the body parts of the animals were utilized for therapeutic activities; different mode of process and application is mentioned in Table 4. The communities around the protected areas often face a high disease burden and practically do not access affordable health care. Chapman *et al.* (2014) advocated for developing proper health care system to areas adjacent to the reserves to reduce disease burden. It will also change local perceptions on zoo therapy and shall reduce illegal extractions.Therapeutic uses, meat consumption and economic subsistence are some reasons of exploitation of wild animals. Since people have been using animals for a long time, suppression of use will not save animals from extinction. Wildlife management plans and policies should focus on the species that are vulnerable due to over harvest with an emphasis on conservation priority. Local communities should also involve in wildlife management plans and provision of benefit sharing from protected/reserved area.

Tribals in and around the DTR are predominantly meat eaters. Villagers also rear chicken, pig, and utilize cows for meat; they still prefer bush meat simply to aid delicacy in the taste with no additional cost. This mind set of the people need to be changed and aware the society to adopt other available alternatives. Livelihood alternatives may be (i) by sharing the benefits of the reserve with the communities, (ii) effective implementation of Government of India policies and programmes for rural people, namely Mahatma Gandhi National Rural Employment Guarantee Act (MNREGA), (iii) skill development schemes. These alternatives should be broadly and effectively enforced as a viable alternative of livelihood for the peoples inhabiting around the protected areas. This will engage the people in income generation and reduce the illegal activities. These options to peoples of 30-50 years of age group who are involved in hunting could easily divert them for non-hunting activities and engage in social and developmental works. Traditional knowledge is depleting in younger generations (Kumar *et al.*, 2015). Persons of < 30 years shall need to bring under such schemes so that they could restrain for hunting and rehabilitation of wilderness may take place. Seasonal pattern found to be very important and distinct. Monsoon is the lean period for hunting as well as for community works. This period could be utilized to aware hunter groups about the role and contribution of wild flora and fauna in functioning of nature and human dependence on goods and services provided by nature.

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