

## Sloth bear, *Melursus ursinus* Shaw, 1791 (Mammalia Ursidae), from India: conservation issues and management actions, a case study

Vikas Kumar<sup>1\*</sup>, Amit A. Revale<sup>2</sup>, Sachin K. Singh<sup>2</sup>, Maulik Amlani<sup>2</sup> & Abduladil A. Kazi<sup>2</sup>

<sup>1</sup>College of Forestry, Kerala Agricultural University, Thrissur, Kerala - 680656 India

<sup>2</sup>ACHF, Navsari Agricultural University, Navsari, Gujarat - 396450 India

\*Corresponding author, email: vkskumar49@gmail.com

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### ABSTRACT

One of the 12 mega biodiversity centres of the world, India is unique in having four of the eight bear species (Mammalia Ursidae) that are found in the world. They are brown bear (*Ursus arctos* Linnaeus, 1758 s.l.), Asiatic black bear (*Ursus thibetanus* Cuvier, 1823), sun bear (*Helarctos malayanus* Raffles, 1821) and sloth bear (*Melursus ursinus* Shaw, 1791). The abundance of sloth bear in India, which is also present in Sri Lanka with the endemic subspecies Sri Lankan sloth bear, *M. ursinus inornatus* Pucheran, 1855, is determined by its location within the global distribution range, quantum, quality and continuity of habitat available and the anthropogenic pressures the species faces. Bears in India are threatened due to poaching for bear parts, retaliatory killings to reduce conflicts and habitat loss due to degradation and fragmentation. In addition to these concerns, the rehabilitation of communities that eke out a living on dancing bears has made bear conservation a challenge in India. Deforestation and hunting are major threats to bears in India. Unless urgent conservation measures are taken and degraded forest areas are restored, we suspect that sloth bear may soon become endangered in India.

### KEY WORDS

Bear-human interactions; conservation; habitat; management; sloth bear.

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### INTRODUCTION

In the world, there are about 5,416 species of mammals distributed in about 1,229 genera, 153 families and 29 orders (Wilson & Reeder, 2005). Four hundred and twenty species of mammals (7.75 % of the world's mammals) are known from India (Nameer, 2008). Among the mammals carnivores are the most widely distributed terrestrial animals on earth (Schipper et al., 2008). Bears are mammals that belong to the family Ursidae G. Fischer de Waldheim, 1817 and represented by seven living species

that are widely distributed in a variety of habitats throughout the Northern Hemisphere (Table 1). Bears are found on the continents of North America, South America, Europe and Asia. Out of seven known species of bears, five are seen in India which includes Himalayan brown bear, Himalayan black bear, Malayan sun bear, brown bear and sloth bear. Common characteristics of modern bears include a large body with stocky legs, a long snout, shaggy hair, plantigrade paws with five non-retractile claws and a short tail. The lips are free from the gums and protrusible. Bears rely principally on their sense of

No.	Scientific name	Common name	Status
1.	<i>Ursus americanus</i> Pallas, 1780	American black bear	Least concern
2.	<i>Ursus arctos</i> Linnaeus, 1758	Brown bear	Endangered
3.	<i>Ursus thibetanus</i> Cuvier, 1823	Asiatic black bear	Vulnerable
4.	<i>Helarctos malayanus</i> Raffles, 1821	Sun bear	Vulnerable
5.	<i>Melursus ursinus</i> Shaw, 1791	Sloth bear	Vulnerable
6.	<i>Ursus maritimus</i> Phipps, 1774	Polar bear	Vulnerable
7.	<i>Tremarctos ornatus</i> (Cuvier, 1825)	Spectacled bear	Vulnerable

Table 1. Seven species of bears in the world  
(Source: I.U.C.N., 2012).

smell however the eye sight and hearing are comparatively poor (Prater, 1971). Bears are placed in the order Carnivores but, except for the largely carnivorous polar bear, bears are omnivorous, feeding mostly on plant material, insects, fish, and mammals. They are generally large, stocky, and powerful animals. All bears are plantigrade, walking on their entire foot. Their activities are mainly governed by the availability of food items and directly components within their habitat (Joshi et al., 1999b).

Sloth bear (*Melursus ursinus*) is one of the four bear species found in India and is entirely tropical in distribution and possesses several morphological, physiological and behavioural adaptations to the tropical habitat. Most sloth bears are found in India and Sri Lanka (in this island with the endemic subspecies *inornatus* Pucheran, 1855, Sri Lankan sloth bear) but they have also been reported from Bangladesh, Nepal and Bhutan (Garshelis et al., 1999a; Johnsingh, 2003; see also <http://www.bearbiology.com>). In India, sloth bears are found from the foothills of Himalayans to the Southern end of Western Ghats (Yoganand et al., 2006). They are also found in the Brahmaputra Valley of Assam (Cowan, 1972; Krishnan, 1972; Brander, 1982). It may still occur in the wet forest regions of eastern Bangladesh (Khan, 1982; Servheen, 1990) border-

ing the Mizoram state of India, from where it has been reported (Yoganand et al., 1999). They apparently favour drier forests and have been reported to prefer areas with rocky outcrops. In India, 90% of sloth bear populations are confined in the dry and moist deciduous forests of which the former account for 50% of the sloth bear populations. Sloth bear also occur in tropical evergreen forests, scrub lands and rocky hills. The bear lives in a variety of habitat such as Teak forest and Sal forest, lowland evergreen forest and the hill country up to elevation of 1700 m and riparian forests and tall grass areas on the floodplains of Nepal (Joshi et al., 1997).

However, their relative abundance varies across these vegetation types, as indicated by their higher abundance in deciduous forests, followed by dry deciduous, scrub and evergreen forests. Recent local extirpations and population declines have also been reported from the north-western populations (in the state of Rajasthan), a few isolated forests in the northern Western Ghats and adjoining areas, along the north-western Shivalik hills (no recent record of sloth bears to the west of the river Ganga), the northern forested areas of the state of West Bengal bordering Sikkim and Bhutan, and in the north-eastern states of India (Yoganand et al., 1999). To suit the tropics, it has no underfur; however, it has a long coat that perhaps helps in defending it from insect bites and also perhaps to exaggerate its size to predators (such as tiger and leopard) or conspecifics.

The sloth bear's low metabolic rate and high thermal conductance (McNab, 1992) may be advantageous in the hot climates where it lives, in that it reduces heat production and facilitates heat loss. Sloth bears seem to also have a behavioural adaptation to avoid hot weather conditions in their habitat by reducing daytime activity.

Clutton-Brock & Harvey (1983) suggested as advantages of having large body size, we speculate that the large body size of the sloth bear might help it to conserve heat; to travel great distances in search of its dispersed, seasonal food; to enhance the ability to survive on qualitatively poorer food of insects and fruits; to enable it to break hard termite mounds and to dig deep into social insect colonies; or to help it store fat and live on it during periods of shortage and during parturition denning. The potential sloth bear distribution range in India was estimated to be about 200,000 Km<sup>2</sup> (Johnsingh,

2003; Akhtar, 2004; Chauhan, 2006). But the recent surveys indicate the distribution range to be 400,000 Km<sup>2</sup>.

Sloth bear is small bear with a shaggy coat especially over the shoulders with grey and brown hairs mixed in with the dark black coat. It has a distinctive whitish or yellowish chest patch in the shape of a wide U, or sometimes a Y if the lower part of the white hairs extends down the chest. The snout is light coloured and mobile. It is thought that the reduced hair on the muzzle may be an adaptation for coping with the defensive secretions of termites. Adult males weight 80-140 Kg and females weight 55-95 Kg (Prater, 1980; Garshelis et al., 1999b). Physical adaptations for digging and eating insects include long, slightly curved claws, a broad palate for sucking, the absence of two front upper incisors and large protrusible lips (Harris & Steudel, 1997). Its vernacular name is bhalu (Hindi), Karadi (Tamil and Malayalam). Mating generally takes place between May and July and the cubs are born between November and January (Jacobi, 1975; Laurie & Seidensticker 1977; Joshi et al., 1999b).

The actual period of pregnancy is shorter, as the fertilised egg is implanted after a period of delay (Puschmann et al., 1977). Similar to what is observed in the temperate bear species. In captivity, mating pairs come together for only one or two days during which time there may be considerable vocalizing and fighting. Gestation lasts from six to seven months. Most litters consist of either one or two cubs, but litters of three cubs have been reported. Cubs are born in earth dens and apparently do not leave them until they are two to three months old. The cubs stay with their mothers who carry them on their backs until they are nearly two or more years of age (Joshi et al., 1999b).

Bears are usually solitary with the exception of courting individuals and mothers with their cubs. They are generally diurnal, but may also be crepuscular or nocturnal, particularly in and around human habitations. Bears have excellent sense of smell and are good climbers and swimmers. Many bears of northern regions go into a period of dormancy during winters colloquially called hibernation. Sloth bears are one of the largest termite-eater among mammals. A significant portion of their diet consists of ants and termites (Schaller, 1969; Eisenberg & Lockhart, 1972; Laurie & Seidensticker, 1977; Joshi et al., 1999a) and hence the sloth bear is con-

sidered as the only myrmecophagous among Ursidae. Since some Ursids disperse seeds they are considered to be important seed dispersers for many tropical plant species where fruits form major part of their diet (Baskaran, 1990; Willson, 1993; Farley & Robbins, 1995; Welch et al., 1997; Auger et al., 2002; Kitamura et al., 2002; Sreekumar & Balakrishnan, 2002; Koike et al., 2008). Around the world, bears and humans have co-existed for centuries as evident from the references of bears in ancient art, culture, folklore, epics, religion and literature. Bears are good indicators of habitat quality as they occupy the position of an apex predator in a few ecosystems. They are unique in the sense that they could feed on plants, prey on other species as well as scavenge dead animals.

Sloth bears feed extensively on termites and have special adaptations for doing this. The naked lips are capable of protruding and the inner pair of upper incisors is missing and the inner pair of lower incisors is missing, which forms a gap through which termites can be sucked. The sucking noises made by feeding in this manner can apparently be heard from over 100 meters away. They also eat eggs, other insects, honey combs, carrion and various kinds of vegetation including fruits (Gokula et al., 1995; Joshi et al., 1997). The sloth bears consume plant species included *Cassia fistula* L., *Zizyphus oenoplia* (L.) Mill., *Glycosmis pentaphylla* (Retz.) DC., *Holigarna arnottiana* Wall. ex Hook. f., *Ficus* spp., *Syzygium cumini* (L.) Skeels., *Grewia tilifolia* Vahl, *Mangifera indica* L., *Bridelia retusa* (L.) A. Juss. and *Cardia dichotoma* G.Forst. (Sajeev, 2013).

As a result of the continued habitat destruction and degradation, sloth bear populations have declined or become fragmented all over and as a result, they have become locally extirpated in some areas (Cowan, 1972; Krishnan, 1972; Servheen, 1990; Murthy & Sankar, 1995; Garshelis et al., 1999a; Singh 2001; Johnsing, 2003). Sloth bear is included in Schedule I of India Wildlife Protection Act-1972 and Appendix I of the Convention on International Trade in Endangered Species of Wild Flora and Fauna (C.I.T.E.S.).

## POPULATION STATUS AND HABITAT

The Central Zoo Authority (C.Z.A.) is statutory Ministry of Environment & Forests, Government of

India established in 1992 to oversee the functioning of zoos in India and provide technical assistance. There are 70 Zoos and five Rescue Centers housing a total number of 795 individual (as on 31st March, 2012) bears in captivity for the purpose of conservation, education to the public and for their lifetime care (Table 2). The distribution and details of the bear species housed in various Indian Zoos & Rescue Centers are shown in figure 1 and Table 3.

## CONSERVATION ISSUES

### I. Threats to the species

Sloth bear is protected by inclusion in Schedule 1 of the wildlife (Protection) Act 1972. The sloth bear population in India is threatened largely by poaching (Garshelis et al., 1999b). Bears have been poached for gall bladder and other parts, which are often exported to South-East Asian countries as an ingredient to Traditional Chinese Medicines. In the last five years, poaching and hunting has become uncommon as reported by the Government of India. Incidence of sloth bears getting killed by road and railway hits and electrocution were also noted. In

Odisha, based on only the recorded cases by the forest department, the total number of sloth bears killed is over 30 in last five years.

A number of sloth bears (n=8) died in the state due to road and train accidents in last five years as recorded by the forest department. It is also reported that the bears might be poached/hunted in some areas but access to these areas is limited due to security issues. Trade of live bear cub and bear body parts poses a direct threat to the animal and its future survival in the state. With adjoining state like Chhattisgarh, Maharashtra and Odisha reporting presence of illegal trade routes, the trade is likely to exist in Madhya Pradesh as well. Sidhi, Shivpuri and Shahdol districts of Madhya Pradesh are considered sloth bear cub poaching hot spots. The reasons for the lack of information on illegal trade can be attributed to:

- Infrequent poaching of sloth bears in the region.
- Strong networking among the defaulters that help them got by unnoticed by the authorities.
- Because reporting poaching is considered a disgrace.

The sloth bear has the most widely recorded

SL. No.	Species of Bear	Male	Female	Un-known Sex	Total	No. in Zoos	No. on Rescue Centers	No. of Zoos	No. of Rescue Centers
1	Sloth bear <i>Melursus ursinus ursinus</i> Shaw, 1791	292	267	3	562	251	311	40	3
2	Himalayan black bear <i>Ursus thibetanus laniger</i> (Pocock, 1932)	106	95	22	223	211	12	53	2
3	Himalayan brown bear <i>Ursus arctos isabellinus</i> Horsfield, 1826	3	1	1	5	5	0	1	0
4	Malayan sun bear <i>Helarctos malayanus malayanus</i> Raffles, 1821	1	3	0	4	4	0	2	0
5	European brown bear <i>Ursus arctos arctos</i> Linnaeus, 1758	1	0	0	1	1	0	1	1
	<b>TOTAL</b>	<b>403</b>	<b>366</b>	<b>26</b>	<b>795</b>	<b>472</b>	<b>323</b>	<b>97 (70)</b>	<b>6 (5)</b>

Table 2. Statuses of bears in Indian Zoos (as on 31st March, 2012).

distribution range than any of large carnivore in Central India (Jhala et al., 2011). The erstwhile state of Madhya Pradesh (undivided Madhya Pradesh including Chhattisgarh) had largest sloth bear population in this country with the bear inhabiting an area of 135,395 Km<sup>2</sup> of the forest (Rajpurohit & Krausman, 2000).

In Central India, sloth bear is locally considered as one of the most feared and dangerous wild animals (Bargali et al., 2005). Sloth bear seem to have a very low tolerance toward humans. Majority of the HBC cases have occurred either when the human enters sloth bear habitat or when the sloth bear enters kitchen gardens in the village homesteads. Maximum conflict cases have occurred in the month of March and early April, which coincides with Mahua, *Madhuca indica* (J. König) J.F. Macbr., season when both bears and human compete for the same resource. The conflict intensity may raise up to 2.23 cases per day during this period, while in other months; it comes down to 1.4 cases/day (Sarkar, 2006).

In Maharashtra, however, bear-human conflict especially in district of Chandrapur, Gondia, Gadchiroli, Bhabdara, Akola and Amravati in the Vidarbha region is on the rise. In Tamil Nadu, only one poaching case was recorded across the state during the past five years in Gudalur Forest Division. Apart from this, two more bears were killed possibly due to conflict in 2010-2011. A total of 20 cases of conflict have been recorded in the state in the last five years (2006-2011) including 19 cases of human injuries and one case of human death. However, much information on human-bear conflict is lacking from this state.

Other edibles valued by bear as well as humans are Jamun, *Syzygium cumini* (L.) Skeels., Bair, *Zizyphus* spp., Tendu, *Diospyros melanoxylon* Roxb, Bel, *Aegle marmalos*, (L.) Corrêa, Chironji, *Buchanania lanzan* Spreng., and honey. Therefore, when both human and bear share the same space and depend on the same resources, the conflict (human injuries and human death) becomes inevitable. Because of such negative interaction, attrition levels among the locals rise, often leading to considerable number of bears being persecuted and killed in retaliation. No poaching of bear or incident of trade in bear or bear parts has been recorded by the forest department of Gujarat in last five years.

## II. Threats to the habitats

Implementation of Schedules Tribes and Forests Dwellers Act, 2006 will also have an impact on bear converted into arable land. Change in cropping pattern is also harming the bear food availability in the area. Due to fragmentation of forests, sloth bears often enter villages to ride agriculture and forage on wild figs and horticultural produce being processed (Mango, Anona, Mahua, Ground nut, Maize and Sweet potato). Some villagers are now resorting to alternate crops that do not attract bears. Large source of bear food is being removed from around villages intentionally which ultimately will have a bearing on sloth bear population in Chhattisgarh (Akhtar et al., 2006a).

Outside the protected areas, sloth bear habitat in territorial forest divisions is facing habitat degradation due to various activities including anthropological pressures from local communities, quarrying of granite and sandstone, diversion of forest land for non-forestry purposes and illegal cultivation by local communities. Due to habitat fragmentation, Sloth bear populations are getting encircled by agriculture activity around foothills of hillocks whereby they get confined to hill portions like in Jaffarghat Fort and Warangal District in Andhra Pradesh. The sloth bear habitat between India and Nepal is connected through northern Bihar (Terai Arc Landscape) and the sloth bear population in central and eastern Indian landscape are connected through southern Bihar. These sloth bear occupied areas under threat due to various anthropogenic reasons, which needs special management emphasis (Gupta et al., 2007).

The potential sloth bear habitat range in Arunachal Pradesh is about 1500 Km<sup>2</sup>. Here, sloth bear habitat is threatened due to slash and burn or jhum cultivation, deforestation and encroachment. Construction of roads and infrastructure development, tea plantation and development of human settlements in foothills and adjacent plains have also threatened the potential sloth bear habitat, leading to habitat loss and degradation (Choudhury, 2011).

The sloth bear habitat in Gujarat mostly occurs in terminating mountain ranges of Arawalis, Sapuda and Sahiyadri with dry deciduous to moist forest types. Fruits and other parts of more than 35 plant species have been reported from here, which is consumed by sloth bears (Mewada, 2011).

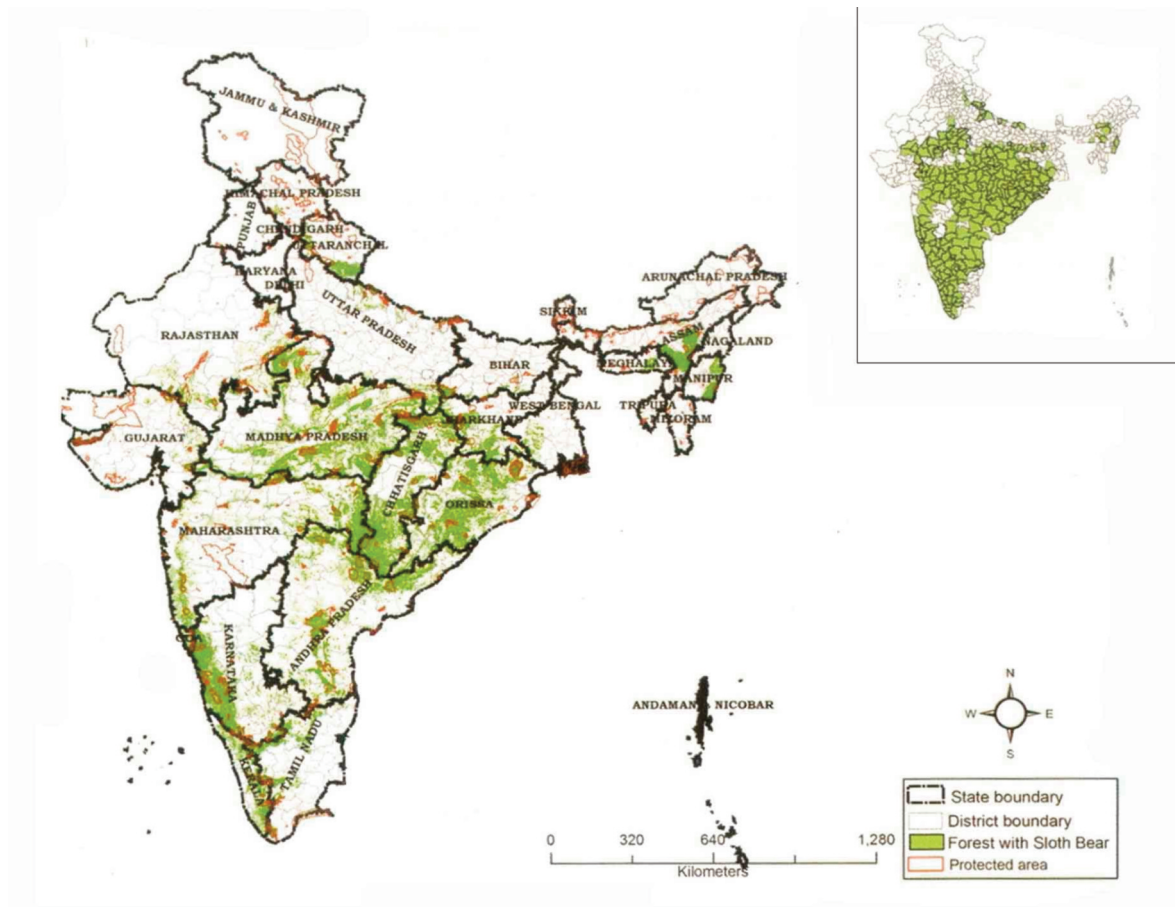


Figure 1. Sloth bear, *Melursus ursinus ursinus*, distribution in India.

The main issues with the available bear habitat in the state are pressure on the habitats by livestock grazing, tourism and developmental activities and mining, which are reported as major factors leading to habitat degradation and fragmentation of forest patches. Out of seven forest divisions with sloth bear population in this state, forest patches in four divisions are unprotected and not declared as sanctuaries.

## MANAGEMENT ACTION

Stakeholder involvement in various aspects of wildlife management can yield many benefits (Chase et al., 2000). The specific conservation recommendations for minimizing bear-human conflicts and bear habitat conservation are as following.

### I. *Protection to the species*

The sloth bear is listed in Schedule I of the Indian Wild Life (Protection) Act (Govt. of India, 1972; Govt. of India, 2003), Vulnerable (I.U.C.N., 2012). Special powers accorded to the forest staff in Assam have enabled them to patrol the protected areas more effectively than other parts of the country. However, in areas outside the protected areas, lack of and inadequately trained staff hampers protection measures.

There is no specific strategy for protection of sloth bear in Bihar (Govt. of Bihar, 2012), Haryana and Gujarat. However, being found in the protected areas of the state, the species gets the highest degree of legal safeguard. Lack of reliable information network restricts intelligence-based enforcement to control poaching and illegal trade. Majority of bear habitats fall outside the jurisdic-

tion of protected area network of the state, they lack protection equipments, trained man power and local rescue team. In Andhra Pradesh, the sloth bear is listed in Vulnerable (A2 cd+4cd; C1) category of I.U.C.N. Red List of threatened species (Garshelis et al., 2008).

## II. *Habitat management*

The development projects such as roads, irrigation dams, hydro-electric project in the wildlife sanctuaries are the major threats to bear habitat in the state of Kerala, Tamil Nadu and Karnataka. The impact of such developmental activities on sloth bear status and distribution is not known and often is ignored. In Gujarat, forest field staffs manage habitats in almost all the forest divisions, which include regular monitoring, plantation programs, often with committee's involvement. Eco development committees, village development committees, stakeholders groups are formed in each forest division to carry out habitat restoration and improvement programs. Community forestry programs, wherein local people learn the value of planting and protecting trees, could expand habitat for sloth bears, and could also reduce the bear-human interactions. The strength of this approach is that it is instigated from the bottom up (i.e., people do it because it benefits them, rather than because it is mandated), but it also must be supported from the top down (Poffenberger, 1990).

## III. *Management of bear-human interactions*

No specific management actions have been taken for sloth bear human interaction in many of the states such as Arunachal Pradesh, Assam, Bihar, Jharkhand, Gujarat, Rajasthan, Meghalaya, Nagaland and Uttarakhand. In Chhattisgarh, there is a policy for compensation by financial reimbursement in case of human mauling or killing by wild animals but not for crop depredation; in Maharashtra, Madhya Pradesh, Uttar Pradesh, West Bengal and Goa state there is a policy for ex-gratia for crop damage or human casualties due to bear of Rs 1,00,000/-, and up to Rs 75,000/- for permanent disability due to bear attacks. In addition to the reimbursement of medical expenses, forest department also provides compensation for the loss of man days incurred by the victim as a welfare scheme.

In Maharashtra, sloth bear is known for its aggressiveness, both towards humans and towards other large mammals. The survey conducted by Wildlife Trust of India indicates that between 2006 to 2011, Gondia has reported the maximum number of human sloth bear conflict cases (65) followed by Chadrapur (36) and Bhandara (26). Desai et al. (1997) reported that bear-human interactions are very common issue in all districts of Gujarat except Panchmahal district. The Gujarat states recorded 127 human sloth bear interaction cases in the last five years, of which 95 were cases of human injuries with one casualty (Mewada, 2011). Seshamani & Satyanarayan (1997) have reported that Jharkhand has a long history of the human-bear conflict but the State does not have effective strategy to deal with the human-bear conflict. According to Karnataka Forest Department records, the bear-human conflicts are severe in five districts namely Chamrajnagar, Chickmagalur, Tumkur (maximum), Chitradurga and Bellary. In Kerala the forest department has provided proper guidance to villagers living around bear-bearing areas such as Periyar Tiger Reserve and Parambikulam Tiger Reserve on how to avoid interaction with sloth bear. The questionnaire survey results shows that in only five out of 34 forest divisions recorded sloth bear-human conflict namely Kannur, Wayanad, Palghat, Ernakulam and Kollam. Incident of poaching, confiscation and retaliatory killings seem to be few in the Odisha and Tamil Nadu states (Baskaran et al., 1997). Other measures to mitigate human bear conflict include promotion of awareness through various awareness programmes and hoarding on sloth bear conservation. In addition in few states forest departments have provided drums and crackers to villagers to chase bears away from villages. Andhra Pradesh Forest Department has made a provision to have a Conflict Management Team at the Circle level. In the recent years remote drug delivery devices (tranquilizing equipments) have been purchased in Valmiki Tiger Reserve (Govt. of Bihar).

## IV. *Research and Information*

Scientific information on sloth bear is restricted to a few status surveys, conflict surveys and short studies (Gopal, 1991; Johnsingh, 2003; Chauhan & Rajpurohit, 2006; Dharaiya & Ratnayeke, 2009; Dharaiya, 2010; Choudhury, 2011).

SL. NO.	ZOO NAME	MALE	FEMALE	UNSEX	TOTAL
1	Agra Bear Rescue Facility, Agra	139	129	0	268
2	Alipore Zoological Garden, Kolkata	1	2	0	3
3	Amtes Animal Ark, Wardha	1	2	0	3
4	Arignar Anna Zoological Park, Vandalur, Chennai	4	4	0	8
5	Aurangabad Municipal Zoo, Aurangabad	1	1	0	2
6	Bhagwan Birsa Biological Park, Ranchi	5	3	0	8
7	Bondla Zoo, Usgao	2	2	0	4
8	Children Park & Zoo, Gadag	1	0	0	1
9	Dr. K. Shivarma Karanth Pilikula Biological Park, Mangalore	0	1	0	1
10	Dr. Shyamaprasad Mukharjee Zoological Garden, Surat	2	2	0	4
11	Gandhi Zoological Park, Gwalior	0	1	0	1
12	Indira Gandhi Park Zoo, Rourkela	1	1	0	2
13	Indira Gandhi Zoological Park, Visakhapatnam	2	6	0	8
14	Indira Priyadarshini Sangrahalaya, Anagodu, Davangere Taluk	0	1	0	1
15	Jaipur Zoo, Jaipur	3	1	0	4
16	Jhargram Zoo, Jhargram	0	4	0	4
17	Kamla Nehru Prani Sanghralhalaya Zoo, Indore	1	1	0	2
18	Kamla Nehru Zoological Garden, Ahmedabad	1	0	0	1
19	Kanan Pandari Zoo, Bilaspur	4	3	0	7
20	Kanpur Zoological Park, Kanpur	1	1	0	2
21	Karuna Society For Animals and Nature-Rescue Centre, Dist. Anantapuram	2	2	0	4
22	Lucknow zoological Park, Lucknow	1	2		3
23	Maharajbag Zoo, Nagpur	1	1	0	2
24	Mahendra Chaudhury Zoological Park, Chhatbir, Chandigarh	3	2	0	5
25	Maitri Baagh Zoo, Bhilai	2	1	0	3
26	Mini Zoo A. M. Gudi Balvana, Chitradurga	0	2	0	2
27	Nandankanan Biological Park, Bhubaneshwar	4	3	0	7
28	National Park, Bannerghatta Zoological Garden, Bangalore	59	45	0	104

Table 3. Records of sloth bear, *Melursus ursinus ursinus*, in India zoos (continued).



SL. NO.	ZOO NAME	MALE	FEMALE	UNSEX	TOTAL
29	National Zoological Park, Delhi	2	2	0	4
30	Nehru Zoological Park, Hyderabad	5	4	0	9
31	Pt. Govind Ballabh Pant High Altitude Zoo, Nainital	0	0	0	0
32	Rajiv Gandhi Zoological Park and Wildlife Research Center, Pune	3	1	0	4
33	Ramnabagan Mini Zoo, Burdwan	1	1	0	2
34	Sakkarbaug Zoo, Junagarh	3	2	0	5
35	Sanjay Gandhi Biological Park, Patna	4	2	0	6
36	Sri Chamarajendra Zoological Gardens, Mysore	5	5	0	10
37	Sri Venkateswara Zoological Park, Tirupati	3	2	0	5
38	Tata Steel Zoological Park, Jamshedpur	1	2	0	3
39	Thiruvananthapuram Zoo, Thiruvananthapuram	1	1	1	3
40	Tiger & Lion Safari, Shimoga	1	1	0	2
41	Van Vihar National Park, Bhopal	19	17	0	36
42	Vanavigyan Kendra, Hunter Road, Hanamkonda, Warangal	1	1	2	4
43	Wild Animal Conservation Centre, Mothijharan, Sambalpur	2	3	0	5
	<b>TOTAL</b>	<b>292</b>	<b>267</b>	<b>3</b>	<b>562</b>

Table 3 (continued). Records of sloth bear, *Melursus ursinus ursinus*, in India zoos.

A few intensive studies on sloth bear ecology were carried out in Panna National Parks (Yoganand et al., 2005) and North Bilaspur Forest Division (Akhtar & Chauhan, 2000; Akhtar, 2004; Bargali, 2004; Akhtar, 2006; Akhtar et al., 2008; Mewada, 2011). However, there is lack of even basic information on sloth bear presence/ absence for many areas in North-Eastern states. Information on population estimates, relative abundance and monitoring are wanting.

#### V. Capacity Building

Apart from some wildlife managers and front-line staff, most of the field managers and staff require capacity building. Other stakeholders require sensitization and training in order to help

protection on sloth bear, its habitat and reducing sloth bear-human conflict.

#### VI. Awareness Campaign

The majority of the local people are uneducated as they are primitive tribes of the region and still attached with their ancient culture. Education should be provides not only for the necessity of protecting forest habitats in order to ensure the survival of sloth bear, but also for highlighting the benefits to people in protecting and managing valuable resources. Sloth bear must be included as a key species in ongoing awareness campaigns. Local people, Joint Forest Management Committees, Eco-Development Committees, Eco-Clubs and school children should be sensitized about sloth bear

conservation. Policy makers, judiciary and enforcement agencies may be sensitized on Wildlife crime and law enforcement. Good quality audio-visual materials and collaterals (posters, brochures, stickers, etc.) in local language may be produced and distributed. Awareness campaign should focus on highlighting damagers in collecting the minor forest produce from the areas where bears have their dens.

### VII. *Legislation and Policy*

Apart from the awareness and involvement of local people, the administrative reforms are also required for effective conservation of bears and habitat. Despite an array of Policies and Legislation, conservation efforts for sloth bear and its habitat have faced limitations due to want of site specific policies or flexibility in adaptation of existing policies.

### CONCLUSION

Some of the recommendations proposed by stake holders to control poaching/hunting of bears included: (i) creating awareness and using local communities to curb bear hunting/poaching for the illegal trade in bear parts or live cub trade; and (ii) strengthening existing network of informers, and various law enforcing agencies, including monitoring of wildlife crimes at Inter-State check posts and international borders. To reduce bear-human interactions, the following were recommended: (i) awareness creation on bear behaviour and the philosophy of co-existence in addition to strengthening of indigenous conflict reduction measures to reduce crop and livestock depredation by bears; and (ii) strengthening the conflict management teams with equipment, training, and capacity building and improvement in the current mechanism of assessment of economic losses of crop /livestock depredation by bear and other wildlife. For bear habitat management the recommendations were to: (i) continue protection to bear habitats and prevent habitat loss due to conversion for agriculture/ horticulture and developmental projects; (ii) restore degraded bear habitats through existing government programmes using local communities; and (iii) identify critical bear habitats and corridors outside PA network and manage them as Community or Conservation

Reserves with approval and support from local communities. Similarly, recommendations for research, capacity building, conservation educate and legislation and policy have been made.

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