Progress Report of the Research Project funded by Rufford's Small Grants Foundation

Evaluating habitat and human bear conflict in north Gujarat, India, to seek solution for human-bear coexistence:

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Background

Bears are members of the family Ursidae. According to Prater (1948), the family Ursidae's home is distributed largely in the northern hemisphere, where every region has its characteristic species. The Arctic is the home of the polar bear (*Ursus maritimus*). The temperate zone, south of the Arctic, is the typical habitat for brown bear (*U. arctos*) and the black bear (*U. americanus* and *U. thibetanus*). South of the temperate zone, forests of India and south-eastern Asia are the home of two tropical bear species, the sloth bear (*Melursus ursinus*) and the sun bear (*Helarctos malayanus*). The one species of bear found only in the southern hemisphere is the spectacled bear *Tremarctos ornatus*, a native of the Andes (Prater 1948).

Sloth bears are found widely in the Indian subcontinent; the species is reported in Sri Lanka, Nepal, India, Bangladesh and Bhutan. The bear lives in a variety of habitat such as teak forest and Sal forest, lowland evergreen forest, and less commonly in the hill country up to elevations of 1700 meter (Cowan 1972, Krishnan 1972, Brander 1982). They are also found in river side forest and tall grass areas on the floodplains of Nepal, and in Brahmaputra valley of Assam (Cowan 1972, Krishnan 1972, Brander 1982). Until the early 1800s, sloth bears may have occurred in most non-arid, low-altitude forests of India. They were reported to be abundant during mid-1800s but declined severely due to hunting and habitat loss from late 1800s until the 1950s (Gilbert 1887, Dunbar-Brander 1923, Prater 1948, Phythia-Adams 1950 and Krishnan 1972). A similar or accelerated habitat loss continued even after 1950, until about the 1980s, primarily due to conversion of forest for agriculture (FSI, 1987). As a result of the continued habitat destruction and degradation, the sloth bear population has declined, become fragmented, and have become locally extirpated in some areas (Krishnan, 1972, Garshelis *et al*. 1999 and Singh 2001). Sloth bears are found residing in the forest patches where there is sufficient forest to provide food, and favor places where outcropping of rock and tumbled boulders offer them shelter during the hot weather and the rains (Prater 1948).

According to IUCN, the sloth bear is reported as Vulnerable and as Schedule – I in Wildlife Protection Act (WPA, 1972) India. Globally, only two species of bear are not endangered, the rest are persecuted for their meat and gall bladder (so called traditional medicinal value) and face the constant pressure of a shrinking habitat (Menon, 2003).

Although widely distributed, many populations are declining due to habitat loss and deterioration (Johnsingh, 1986).

The population of sloth bears in Gujarat is now fragmented in several parts viz. forest patches of Aravalli mountain range, including adjoining areas of Rajasthan, forests of Ratanmahel, Jambughoda and Shulpaneshwar. The forests in the Aravallis are progressively being fragmented due to progress of cultivation and human settlement.

The estimated population of sloth bears in Gujarat state is around 200 (State forest department census 1996). There may be marginal increase during last five years and their number may be in the range of 200 – 220 in Gujarat at the close of the millennium (Singh, 2001). Human activity and encroachment both within and outside PAs results in high frequencies of human-sloth bear conflict and restricted movement of sloth bears and other wild animals among patches of suitable habitat. As an effort between staff of the Hem. North Gujarat University and members of the village community, the present study was planned to assess the status and distribution of bear populations and bear-human conflicts in northeast Gujarat, with the goal of finding solutions that will benefit both people and wildlife. The present research work started with the following objectives in one of the districts of North Gujarat where high densities of sloth bears have been reported (citations needed). The work will be extended in the next years to cover the entire region to assess the current distribution of bears, habitat conditions, and human-bear conflicts.

Objectives

The followings are the main objectives of the research:

- To study the status and distribution of sloth bear in Banaskantha District (Study Area),
- To assess the nature and frequency of human bear conflicts in the study area and
- To find out the solution to minimize conflicts that will benefit both people and wildlife.

Study Area:

Our research to date has been carried out in the forest patches of Banaskantha district in north Gujarat where sloth bears are frequently reported, but very little is known about their status, distribution and occurrence.

The area of Banaskantha district is 10754.7 km^2 out of which 1605.64 km^2 area is covered by forest; these can be further classified into Reserved Forest (970.84 km^2), Protected Forest (18.74 km^2) and un-classified forest (616.06 km^2). Geographically the district's land is sandy plain at some places, rolling sand hills and valleys of black clay in between. Climate shows clearly three seasons as monsoon lasting with occasional short breaks, from July to the mid September; winter extends from October to February and summer from March to the end of June.

According to Champion and Seth (1968), this region supports Southern Dry Mixed Deciduous forests, which is further classified in to subgroups: 5 Hilltops support *Boswellia* and *Lannea* forests; Acacia dominates the middle of the hills, and the foot hills

are dominated by *Anogeissus* forests. Apart from these species, the Ambaji range supports abundant teak trees (*Tectona grandis*), and bamboo species.

Methodology

We surveyed the area for sloth bear signs such as tracks, scats, land scratching, etc. to identify areas regularly frequented by sloth bears. To analyze bear-human conflicts, interviews of villagers as well as victimized persons of sloth bear attack were conducted using a standard questionnaire. On the basis of the village surveys, key findings of habitat utilization and food preference, a strategy will be prepared and recommended through which some possible measures can be taken for minimizing the conflicts and fostering human-bear coexistence in the region. The methodology can be further divided into the following steps.

- Map bear range in Banaskantha district in 2008 using survey that use indigenous knowledge combined with records of sloth bear sign.
- Conduct a field survey to detect sloth bear sign and interview local inhabitants that regularly use forest in their locality.
- Data on presence/absence of sloth bear will be used with existing digital landscape characteristics \ to identify key predictors of sloth bear occupancy, and to subsequently identify other areas likely to be occupied by sloth bear in the region.
- Interview individuals that have had conflict with sloth bears, identify characteristics of sites with high frequency of human-sloth bear conflicts, and analyses the context of conflicts.
- Collect information on the location, nature and circumstances of each incident so that ways of enhancing human safety can be identified

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We divided the study area into grids of 5x5 km using a 1:50000 map. The grids were extensively surveyed by visiting villages and interviewed villagers and individuals who were familiar with the forests in their area., We interviewed victims of bear attacks as well. To the presence/absence of bear in the area we did sign survey in the area, followed by the grid-based survey of the forest. Apart from the grids, we have also followed the distribution of the forest according to the State Forest Department. According to this the entire forest area of Banaskantha Division is further divided in several ranges; eg. Danta East Range, Danta West Range, Ambaji North Range, Ambaji South Range and Balaram range. During the present work, Danta East, West and Ambaji South Ranges have been covered under which **32** Grids were surveyed. Within these grids, total 108 villages were surveyed by conducting interviews of **131** villagers out of them **23** were victims (best to our knowledge) of bear attack from **15** villages (Figure 1, Plate 1).

The interviews of the local villagers show the presence of sloth bear in the forest and in the vicinity. The people also reported that bears sometimes visited the villages and farms leading to crop damage.

Economic loss to the farmers was also reported during the study and appeared to be mainly due to crop damage in agricultural fields. Farmers also complained about the loss

of some of select crops like Groundnut (*Archis* spp.) and Maize (*Zea maize*). These were followed in the Caster and Tuver (*Cajanus cajan*) crop trampled by sloth bear.

We documented sloth bear attack on 5 villagers within the space of 48 hours 9/10th May 2008. All five victims were interviewed. The bear entered the village Danta, and was found moving in the streets of the village it first injured two people who were sleeping outside their house. The other three encountered the bear in the early morning when they were returning from their farm and routine activity (Plate 2).

Table: 1 Various activity carried out during the field work

Activity	**Carried out till July 2008**
Grids surveyed	**32** grids (5x5 km)
Villages Survey	**108**
Villagers Interviewed	**131**
Victims Interviewed	**23** from **15** villages
Habitat Survey for Bear Sign	**12** grid, **71.28** Km survey
Scat Collection	**91**
Analysis of Scats	**52**

Table: 2 Bear sign survey

No. of Grid Surveyed	**Evidence of Sloth Bear Occurrence in Grids**				
	Direct Encounters	**Scats**	**Trails, footprints**	**Attacks**	**Other**
12	02	10	10	04	--

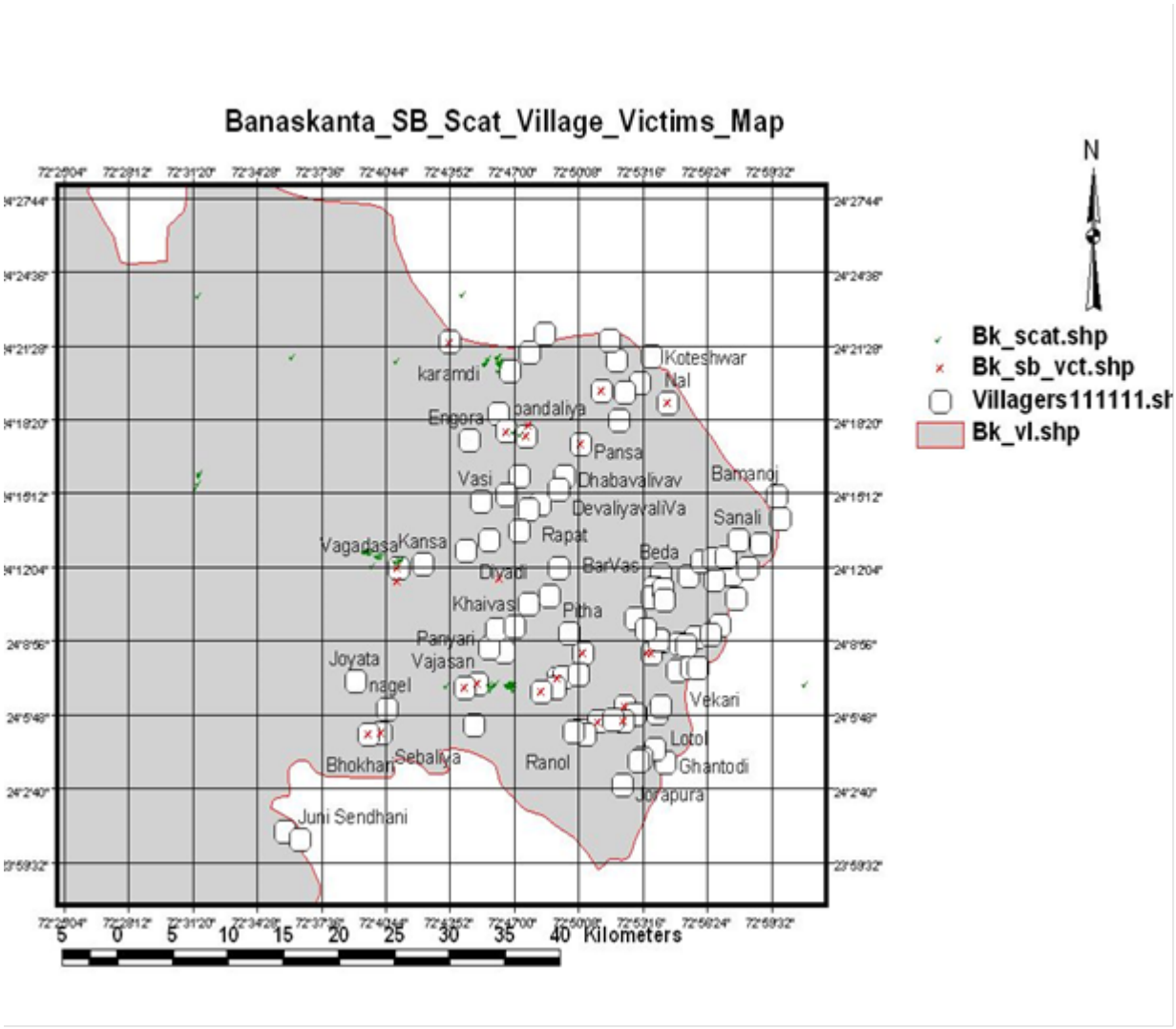

Figure: 1 Map showing the data collected in 5x5 km grid and the victim, villages which all surveyed and the scat sampled collected from the field

Work to be done

- As per working design the remaining grids will be surveyed,
- The villages and the victims will be interviewed in the remaining parts;
- Sign survey / transect will be laid to study occurrence and distribution of bears in the study area,
- Data analysis and preparation of final report

Acknowledgements

We are thankful to the Rufford's Small Grants Foundation, London for the financial support. Thanks, are also due to the Conservator of Forest, Gandhinagar, DCF, Banaskantha Division, Range forest officers of respective ranges and all the forest staff for permission and all the necessary support during the fieldwork. We extremely thank Dr. K.K. Shah, Vice Chancellor, Hemchandracharya North Gujarat University for his constant encouragement and all support. We are also grateful to the Head, Department of

Life Sciences for providing laboratory facilities. Finally, we thank our field assistants and guards without whom the fieldwork may not be completed.

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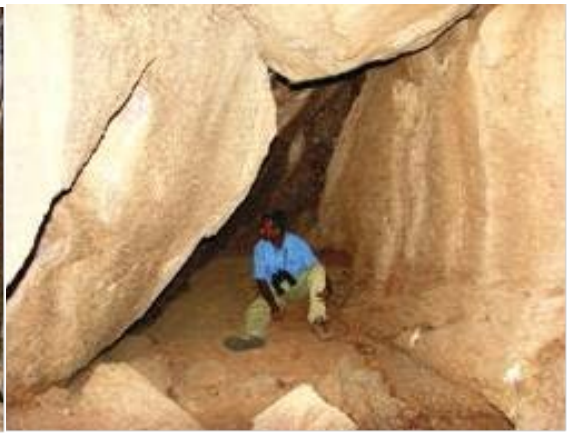
Plate 1: Bear Habitat and indirect evidences of bear presence

a: Bear Habitat



b: Identified Den of Sloth Bear

c: Bear Trail

d: Scat of Sloth Bear

e: Collection of Scat

Plate 2: Victims of Bear Attack and their interviews