FOOD HABITS AND HUMAN-JACKAL INTERACTION IN MARWAHI FOREST DIVISION, BILASPUR CHHATTISGARH

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Introduction

Increasing human-wildlife conflict in and around protected areas, managed forests and human habitation is posing a serious management problem and adversely affecting conservation efforts everywhere in India. Wild animals inflict varied types of damage problems involving human casualties, livestock killing and crop depredation (Bargali *et al.*, 2005; Chauhan, 2005a, b; Bargali, 2003; Mankadan and Rahmani, 1998; Mishra, 1997; Chandra, 1997; Rajpurohit; 1996; Saberwal *et al.*, 1994; Indrukar *et al.*, 1994; Sinha and Jha, 1994; Chauhan and Singh, 1990; Schultz, 1986). Most of the problematic species are endangered or of high conservation importance such as elephant, tiger, leopard, bears and blackbuck, and some of them have least conservation value like nilgai, wild pigs and jackal. In Marwahi Forest Division, human-sloth bear conflict has been alarming and of serious concern to field managers (Bargali *et al.*, 2005; Chauhan *et al.*, 2003; Sankar and Murthy, 1998). Recently, Asiatic jackal (*Canis aureus*) has emerged as a nuisance species; incidences of jackal attack on people are on the rise.

Asiatic jackals are widely distributed in different parts of the country and live in a wide variety of habitats. They belong to Schedule III of Indian Wildlife Protection Act (1972) and mentioned as least concern species in Red List of IUCN. In affected areas of Marwahi Forest Division, leopard, jackal, hyena and sloth bear coexist and share common habitats. Jackals den in bouldery hillocks which are interspersed by human settlement and agriculture areas. Habitat degradation and fragmentation and increasing biotic pressure force these animals to stray out of forests in to villages and agricultural areas in search of food and as a result there are more encounters with people and attack cases (Akhtar, 2004; Akhtar *et al.*, 2004; Chauhan and Sawarkar, 1989). Till 1997, human-jackal conflict was never witnessed in Marwahi area, but thereafter there were increasing cases of jackal attacks on locals. For mitigation of human-jackal conflict, investigation of this problem is necessary. This paper presents the nature, extent and temporal pattern of human-jackal conflict, circumstances of attacks and suggests mitigation strategies.

Study area

The study area is situated in one of the oldest mountain chains of India i.e. in Maikal range. The Marwahi Forest Division is a part of Bilaspur Circle and comprises of seven ranges viz. Marwahi, Pendra, Gaurela, Khodri, Belgahna, Kota,

and Ratanpur. These ranges encompass a total of 1,305 km^2 area. Available forest cover is highly degraded, fragmented and interspersed with agriculture crop fields, human settlements and small townships. Human and livestock population is more than 200,000 and 150,000 respectively. Topography of the area is undulating, interspersed with chain of hillocks and rocks. Some of the hillocks are scattered and surrounded by villages; these hillocks with big boulders provide caves (dens) to leopard, sloth bear and other species. The elevation of hillocks varies between 450-1,050 m amsl. Besides the Son river, there are seasonal streams and nullas. The area experiences three distinct seasons i.e. winter (November-February), summer (March-June) and monsoon (July-October). Temperature fluctuation in this area is significant during night time. Rainfall and temperature vary with change in altitude and topography. Maximum temperature recorded was 46.2°C. Average rainfall of this region was 1,375.68 mm.

The vegetation type of this forest division is catagorized under Eastern Deccan biogeographical zone (Rodgers and Panwar, 1988). Champion and Seth (1968) classified the forest types of the area as Dry deciduous peninsular Sal forest (5B/C1, C), Northern tropical dry Mixed deciduous forest (5B/C2) and Northern tropical secondary Moist mixed deciduous forest (3C/C3). Wild animals found here are Sloth bear (*Melursus ursinus*), Leopard (*Panthera pardus*), Spotted deer (*Cervus axis*), Hyena (*Hyena hyena*), Indian fox (*Vulpes bengalensis*), Four-horned antelope (*Tetracerus quadricornis*), Wild pig (*Sus scrofa*), Common langur (*Presbytis entellus*), Rhesus macaque (*Macaca mulatta*), Toddy cat (*Paradoxurus hermaphroditus*) and Indian porcupine (*Hystrix indica*).

Methods

Data on human-jackal conflict was collected from the records of the forest department during 2006. Information was compiled and analyzed. Victims and their family members were interviewed to investigate the cases and assess the nature, extent and circumstances of conflict. Data on jackal group size and encounters were collected from the opportunistic sighting while moving in forests and village areas during 1998 to 2005. Scats were also collected to assess the food habits of jackal and understand the conflict circumstances. To assess the impact of biotic pressure on forests, 10 linear transects, 1 km each, were walked to collect information on fuel wood and timber extraction, number of felled and lopped trees and livestock grazing (dung abundance) (Akhtar, 2004). One sample Kolmogorov-Smirnow test was applied to find difference in the occurrence of human casualties in different months, whereas Paired sample T-test was used to find difference in the occurrence of casualties of males and females (Dytham, 2005).

Results

Status of jackal population : In Marwahi Forest Division, there were 61 sightings of solitary jackals and jackal packs during 1998-2005 (Table 1). Jackal packs along with solitary individuals comprised of 307 animals. Group size of jackal varied from 1 to 16. Most of the sightings were of packs comprising of 2 to 7 individuals. There were only few sighting of bigger packs, and they were seen only in the vicinity of human habitation. Out of these jackal

Table 1

Sighting of jackals and their group size in Marwahi Forest Division.

Group size	No. of sightings	No. of jackals sighted
One	15	15
Two	4	8
Three	2	6
Four	8	32
Five	9	45
Six	7	42
Seven	6	42
Eight	2	16
Nine	1	9
Ten	2	20
Thirteen	2	26
Fifteen	2	30
Sixteen	1	16
Total	61	307

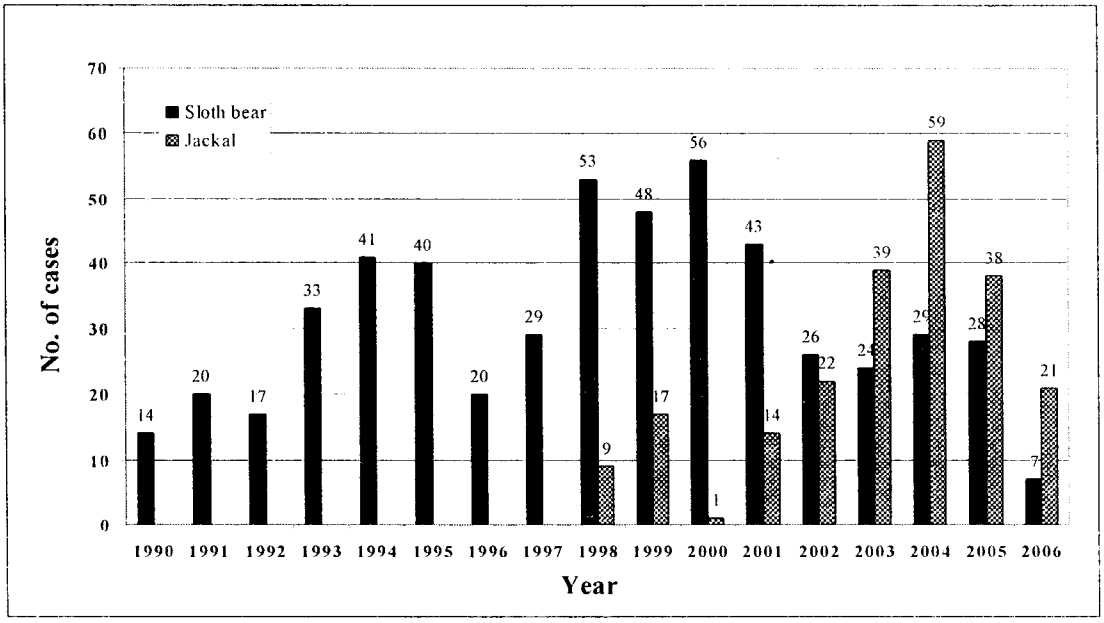
sightings, 92.2% were in and around human settlements, whereas 7.8% sightings were in forested areas. Most of the solitary jackals were found in forests.

Food habits : The jackals are basically carnivore but can sustain on plant food as well for longer period. Solitary jackals and packs were found moving around in the vicinity of human settlement in search of food and were found consuming plant matter such as gular, pipal, pakri (all *Ficus* spp.), jamun (*Syzygium cumini*), bel (*Aegle marmelos*), ber (*Zizyphus* spp.) gurshakri (*Grevia* spp.), tendu (*Diospyros melanoxylon*), mango (*Mangifera indica*), sitaphal (*Anona squamosa*), mahua (*Madhuca indica*), bihi (*Psidium guazawa*), amaltas (*Cassia fistula*) and cattle carcass. Jackals were also seen feeding on agriculture crops such as sweet potato (*Ipomoea batatas*), groundnut (*Arachis hypogaea*) and maize (*Zea mays*) and many other vegetables. In Marwahi forests, jackals were also found feeding on wild fruits such as char (*Buchanania lanzan*), kusum (*Schleichera oleosa*), bhelwa (*Semecarpus anacardium*), and semel (*Bombax ceiba*) seeds. Jackals were usually found moving or resting in funeral ground, and on few occasion they were found eating un-burnt human body. In villages, chickens were lifted and eaten by jackals. More than 150 scats collected from this forest division were analysed, and more than 90% of jackal scats were containing plant matter, seeds and fruits. From these faecal samples, hairs of cattle, bear, hare, dogs and feathers of chickens and other birds were identified. Bones were also found in the faecal matter.

Human casualties by Jackal and Sloth bear

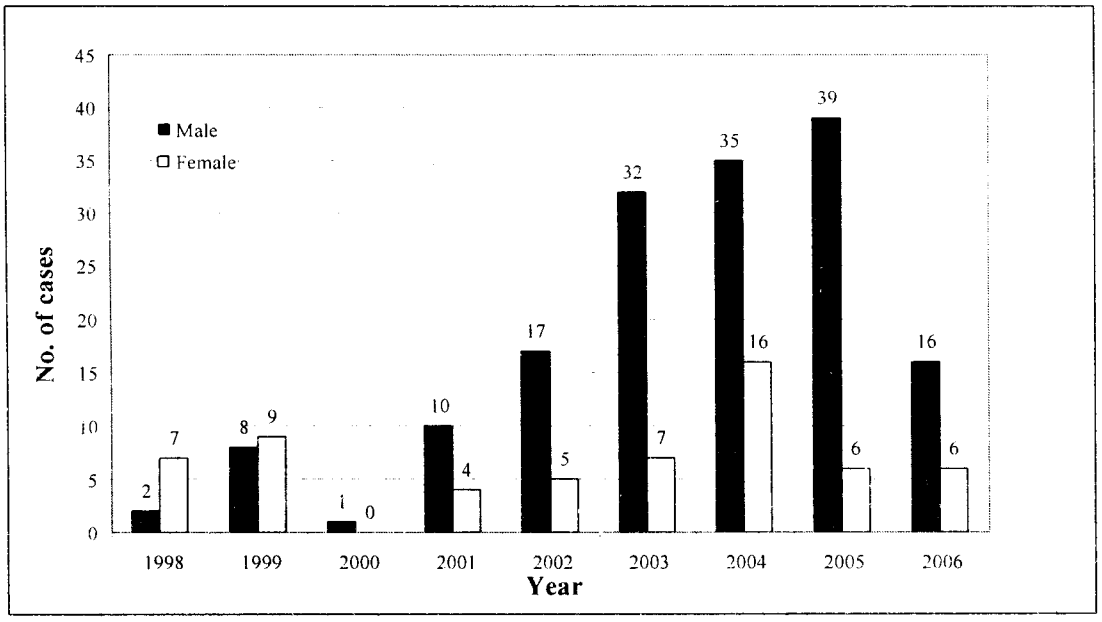
A total 801 incidences of human casualties were caused by jackal and sloth bear in Marwahi Forest Division from the year 1990 to 2006 (Fig. 1). Out of which, 220 casualties were caused by jackals. There were 12, 27 and 181 incidences of jackal attacks in Gaurela, Pendra and Marwahi ranges respectively. There used to be sporadic cases of jackal attacks on human beings in all these years, but since 2001, it showed sharp increase and maximum incidences were recorded in 2004 (n=59), followed by 39 cases in 2003 and 38 cases in 2005. On the contrary, human casualties by sloth bear showed marked decline. Victims of jackal comprised of 160 males and 60 females (Fig. 2). Jackal attacks were more on females than males in 1998 and 1999, and thereafter attacks on males were more as compared to females. Maximum attacks

Fig. 1



Human casualties by Jackal and Sloth bear in Marwahi Forest Division

Fig. 2



Jackal attacks on males and females in Marwahi Forest Division

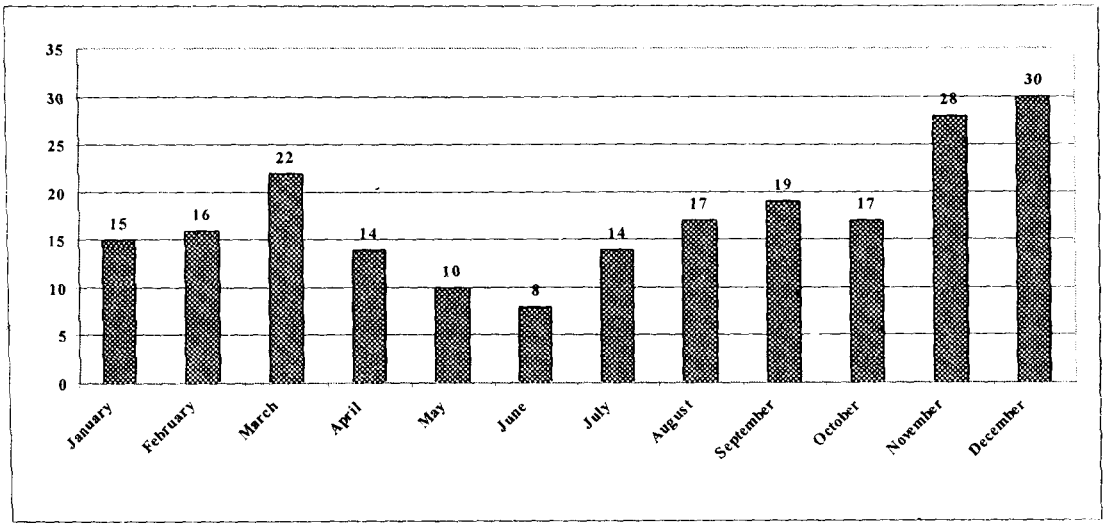
on males were during 2005 (n=39), followed by 35 cases in 2004 and 32 cases in 2003. Attack on females was highest during 2004. The paired samples T-test also show significant difference between the jackal attacks on males and females (T=2.65, df=811, p= 0.029).

Monthly variation in jackal attacks : There was marked monthly variation in the jackal attacks on human beings (Fig. 3). Incidences of jackal attacks showed steady increase from January (n=15) to March (n=22), and thereafter it declined in summer months and there were 8 attacks in June. Human casualties due to jackal attacks again showed increasing trend from July (n=14) and maximum cases were recorded during December (n=30). On average there were 18.3 ± 6.8 cases of jackal attacks per month. One sample Kolmogorov-Smirnow Test shows that incidences of jackal attacks in different months was not significantly different (Z=0.56, n=12, p=0.90).

Places of attacks : Incidences of jackal attacks on human beings occurred in forests, villages and crop fields (Fig. 4). Maximum cases of attacks took place in the vicinity of villages (60.1%), followed by forests (20.3 %) and crop fields (19.6%).

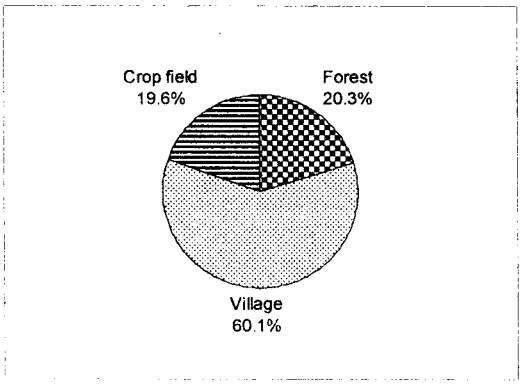
Circumstances of attacks : In the last few years, more sightings of jackals in and around human settlements and forests indicated substantial increase of jackal population in Marwahi Forest Division (Akhtar and Chauhan, 2006). As jackal population increased, sloth bear population showed a declining pattern. Apparently food resources for jackals increased due to decline in sloth bear population, which enabled jackal population to grow. Reduction in sloth bear population is also vindicated by less number of casualties caused by bears during last few years (Fig. 1). People were in habit of chasing jackals as and when they visited village area in search of food, which slowly made jackals aggressive and biting cases

Fig. 3



Occurrence of human casualties by Jackal in different months

Fig. 4



Place of Jackal attacks on humans in Marwahi Forest Division

increased. Female jackals with cubs were found to attack more than the solitary male or individual. Jackals got large part of their food from village area, so chances of encounter with people have been very high and resulted in these human casualties.

Extent of biotic pressure : In Marwahi Forest Division, biotic pressure has increased in recent years on account of collection of non-timber forest produce, livestock grazing and encroachment of forests etc. There were 83.5±12.3 felled and 129.2±15.3 lopped trees per hectare. Grazing pressure was also very high i.e. 95.6±18.2 per hectare. People were found to collect 42 items of non-timber forest produce from the forests and many of these food items were used by jackals and sloth bears (Akhtar, 2004). However, extraction of stones from bear den sites has considerably increased. The jackal den sites at Masurikhar, Barbasan, Silpahri, Lityasarai, Tauli, Marakot and Karangra are at grave danger of elimination due to intensive stone extraction. Non-timber forest produce and tendu leaves collection has been still going on which involved large number of people. Ground fire during summer was found hazardous to available habitats.

Discussion

Straying of wild animals into human settlement is quite common due to many reasons e.g. fragmentation of forests, expansion of agricultural fields, habitat loss, depletion of food resource, and availability of preferred agricultural crops outside. In Marwahi forest division, jackals were found consuming variety of plant matter, seeds and foods. Atkinson *et al.* (2002) has reported 24 species of fruits in the diet of jackals in Zimbabwe; they were also dependent more on plant food. Consumption of plant material by jackals has also been reported at Bharatpur and Sariska National Parks as well (Sankar, 1988).

In Marwahi range, there were 181 cases of jackal attacks, whereas there were 12 and 27 cases of attacks in Gaurela and Pendra ranges respectively. Occurrence of very high incidences of jackal attacks in Marwahi forest division might be correlated with high fragmentation of forests and low forest cover. The Gaurela and Pendra ranges have comparatively good forest cover than Marwahi range. Moreover, human settlement and agriculture fields were not much scattered in Pendra and Gaurela ranges as compared to Marwahi range. Whereas most of the villages in Marwahi range were surrounded by forests or vice versa and due to this reason, people of Marwahi range were more susceptible to jackal attacks. There were more cases of attacks on males by jackals than females. Nearly 2/3 of victims were found males and 1/3 victims

were females. The jackal-human conflict is surprisingly new in this division and first time reported in 1998 and seemingly high in recent time. During January to April and July to December, there were more cases of jackal attacks on people. This could be related to less availability of food resources in forests, and perhaps more dependency of jackals on village areas, and so more encounters. During May to July, there were less number of jackal attacks, which might be due to good availability of food in the forests because most of the wild fruits eg. bhelwa, bel, ber and mahua, ripe only during this period. But in last two years, jackals invariably attacked on humans in all months. In these years, sloth bear population declined by 42.9% in Marwahi Forest Division (Akhtar, 2004), and whereas the jackal population increased. Decline in sloth bear population has occurred due to loss of habitat, less food availability and poaching.

Maximum cases of jackal attacks on human beings occurred in villages and comparatively less number of cases occurred in crop fields and forests. This could be again due to availability of more food resources in the vicinity of villages. Jackals were also attracted to agricultural crops for food requirement. It is quite clear that Marwahi Forest Division is under severe biotic pressure. Dependency of people on forests for collection of non timber forest produce has been very high, and which has led to reduced food availability in the forests for jackal and other animals. As such no management practices have been done for the restoration of habitats and check in deforestation. Bouldery hillocks not only provided shelter to sloth bear but also to other animals such as jackal, hyena and leopard. Stone extraction in and around many denning sites eg., Silpahri, Tauli, Barbasan, and Lityasarai, has become serious threat to these animals.

For conservation of jackal population and to reduce human-jackal conflict, following measures can be taken up :

1. Jackal is a source of rabies virus so rabies vaccine should be made available in all jackal affected village dispensaries to check human casualties due to rabies.

2. People should walk in group while moving in forests to avoid attacks. They should also make noise while moving in forests for cattle grazing.

3. People need to be educated for the ecology, feeding habits, and behaviour of jackal.

4. Regulation on collection of food items from forests that are consumed by jackals and bears.

5. People should be educated not to cut trees from denning sites.

6. Stone extraction from bouldery hillocks and forests should be immediately stopped to protect crucial habitats.

7. Restoration of sloth bear and jackal habitats by planting of fruiting species such as *Zizyphus* and *Ficus* spp. in forest areas is necessary.

8. Human-jackal conflict is just new in this area so there is urgent need to assess the status and distribution of

jackal population, nature and extent of conflict, food habits and movement pattern, so that mitigation strategies can be appropriately developed.

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SUMMARY

Asiatic jackal (*Canis aureus*) is found to coexist with leopard and sloth bear in Marwahi Forest Division, Bilaspur (Chhattisgarh). Jackals were found to be omnivorous in this area; they consumed plant material, seeds and fruits. Jackals are creating considerable nuisance due to increasing biting cases to local people in Marwahi Forest Division. In total there were 220 cases of jackal attacks on people during 1998-2005. In Marwahi range, there were 181 cases of jackal attacks, whereas there were 12 and 27 cases of attacks in Gaurela and Pendra ranges respectively. Attacks on males (n=160) were more than females (n=60). No human death occurred so far due to jackal attack but rabies infection might be possible. Most of the jackal biting cases occurred in villages, followed by forests and crop fields. Marwahi range with less forest cover was found most affected (n=181) from jackal attacks. Occurrence of attack cases could be correlated with high jackal activity in human habitations for food requirement and movement of people in forest areas for collection of non-timber forest produce and grazing livestock. Recommendations for management of jackal population and mitigation of human-jackal conflict have been made.

Key words **: Human-Jackal interaction, *Canis aureus*, Food habits, Marwahi Forest Division, Chhattisgarh.**

मरवाही वन मण्डल, बिलासपुर, छत्तीसगढ़ में सियारों की भोजन आदतें और मानव–सियार अन्तर्क्रियाएं

नईम अख्तर व एन०पी० एस० चौहान

सारांश

एशियाई सियार (*कैन्निस औरियस*) मरवाही वन मण्डल में तेन्दुओं और मन्द ऋक्षों को साथ रहता पाया जाता है। इस क्षेत्र में सियार सर्वभक्षी रहते पाए गए उन्होंने पादप सामग्री बीज और फल भी भक्षण किए। मरवाही वन मण्डल में स्थानीय लोगों को काट खाने की घटनाएं बढ़ती जाने से सियार काफी बखेड़ा मचा रहे हैं। 1998–2005 के दौरान लोगों पर सियारों के आक्रमण करने की 220 घटनाएं हो चुकी है। मरवाही वन मण्डल में ही सियारों के आक्रमण की 181 घटनाए हुई हैं जबकि गौरेला और पेण्ड्रा परिक्षेत्रो में क्रमशः 12 और 27 घटनाएं हुई है। स्त्रियों पर आक्रमण (n=60) होने की तुलना में पुरुषों पर इनके आक्रमण ज्यादा (n=160) हुए हैं। सियारों द्वारा काट खाए जाने की अधिकांश घटनाएं गांवों में हुई है जिनके पश्चात वन और खड़ी फसलों वाले खेत आते हैं। मरवाही परिक्षेत्र, जहां वन क्षेत्र कम ही रह गया है, सियार आक्रमणों से सर्वाधिक कुप्रभावित होता पाया गया (n=181)। आक्रमण होने की इन घटनाओं की अधिकता को मानव बस्तियों में भोजन जरूरते पूरी करने के तथा प्रकाष्ठता वनोपत्र संग्रहण करने के लिए लोगों की वन क्षेत्रों में आवाजाही तथा पशुओं की चराई से सहसम्बन्धित किया जा सकता है। सियारो की संख्या का समुचित प्रबन्ध करने तथा मानव–सियार भिड़न्त को कम करने की सिफारिशें भी की गई हैं।

References

Akhtar N., H.S. Bargali and N.P.S. Chauhan (2004). Sloth bear habitat use in a disturbed and unprotected areas of Madhya Pradesh, India. *Ursus,* **15**(2): 203-211.

Akhtar, N. (2004). Habitat use, ranging pattern and management of Sloth bear (*Melursus ursinus*) in North Bilaspur Forest Division, Madhya Pradesh. *Ph.D. Thesis*, Wildlife Institute of India, Dehra Dun.

Akhtar, N. and N.P.S. Chauhan (2006). Status of human-wildlife animal conflict in Marwahi Forest Division, Chhattisgarh (in press).

Atkinson, R.P.D., D.W. MacDonald, and R. Kamizola (2002). Dietary opportunism inside Striped jackals (*Canis adustus*). *J. Zool.* (London), **257**:129-149.

Bargali H.S., N. Akhtar, and N.P.S. Chauhan (2005). Characteristics of Sloth bear attacks in North Bilaspur Forest Division. *Ursus,* **16**(2): 263-267.

Bargali, H.S. (2003). The ecology of the problematic Sloth bear (*Melursus urcinus*) and mitigation of human-bear conflicts in Bilaspur Forest Division, Madhya Pradesh. *Ph.D. Thesis*, Wildlife Institute of India, Dehra Dun.

Champion, H.B. and S.K. Seth (1968). *A revised survey of forest types of India.* Manager of Publications, GoI, Delhi.

Chandra, J. (1997). Crop damage caused by blackbucks (*Antilope cervicapra*) at Karera Great Indian Bustard Sanctuary, and possible remedial solution. *Tigerpaper*, **24**(3):26-32.

Chauhan N.P.S., H.S. Bargali and N. Akhtar (2003). *Ecology and Management of problematic Sloth Bear (Melursus ursinus) in the North Bilaspur Forest Division, Madhya Pradesh.* Wildlife Institute of India, Dehra Dun.

Chauhan, N.P.S. (2005a). Human casualties by tiger in Katerniaghat Wildlife sanctuary, Uttar Pradesh and mitigation strategies. *Indian Forester*, **131**(10):1347-1352.

Chauhan, N.P.S. (2005b). Livestock depredation by tiger in and around Dudhwa National Park, Uttar Pradesh and mitigation strategies. *Indian Forester*, **131**(10):1319-1328.

Chauhan, N.P.S. and Ramveer Singh (1990). Crop damage by over abundant populations of Nilgai and Black buck in Hariyana (India) and its management. *Proc. 14th Vertebrate Pest Conference,* University of California, Davis. pp. 218-220.

Chauhan, N.P.S. and V.B. Sawarkar (1989). Problems of over abundant populations of Nilgai and Blackbuck in Haryana and Madhya Pradesh and their management. *Indian Forester*, **115** (7): 488-493.

Dytham, C. (2005). *Choosing and using statistics.* Blackwell Publishing, Australia.

Indrukar, R.N., D.K. Tyagi, S.M. Gujar and V.B. Patil (1994). The Blackbuck-farmer interface in Ahmadnagar and Sholapur districts of Maharastra. *Proc. Workshop on Wildlife Damage Problems and Control*, 2-7 February, WII, Dehra Dun.

Manakadan, R. and A.R. Rahmani (1998). Crop damage by blackbuck *Antilope cervicapra* at Rollapadu Wildlife Sanctuary, Andhra Pradesh. *J. Bombay Nat. Hist. Soc.*, **95**(3): 408-417.

Mishra, C. (1997). Livestock depredation by large carnivore in the Indian trans-Himalaya: Conflict perception and conservation prospects. *Environmental conservation*, **24**(4):338-343.

Rajpurohit, K.S. (1996). Study of wild animal damage problems in and around protected areas and managed forests in India. Phase-1, Madhya Pradesh, Bihar and Orissa. *Report*, WII, Dehra Dun.

Rodgers, W.A. and H.S Panwar, (1988). *Planning a wildlife protected area network in India.* Wildlife Institute of India, Dehra Dun (1&2): 83-116.

Saberwal, V.K., J.P. Gibbs, R.Chellam and A.J.T. Johnsingh (1994). Lion-human conflict in Gir forest, India. *Conservation Biology,* **8**(2):501-7.

Sankar, K. (1998). Some observations on food habits of jackals (*Canis aureus*) in Keoladev National Park, Bharatpur as shown by scat analysis. *J. Bombay Nat. Hist. Soc.*, **85**:185-186.

Sankar, K. and R.S. Murthy (1995). Assessment of bear-man conflict in North Bilaspur Forest Division, Bilaspur, Madhya Pradesh. *Report,* Wildlife Institute of India, Dehra Dun.

Schultz, B.O. (1986). The management of crop damage by wild animals. *Indian Forester*, **112** (10): 891-899.

Sinha, V.K. and M. Jha (1994). Effectiveness of change in cropping pattern in resolving human-wildlife conflict in context of wildlife degradation on cultivated crops in Amravati. *Proc. Workshop on Wildlife Damage Problems and Control*, 2-7 Feb. Wildlife Institute of India, Dehra Dun.