

Mortality in the Protected Leopard's Population, Uttarakhand, North India: A Free-Ranging Wildlife Species in Threat

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Abstract Large cats are vulnerable to local extinction in fragmented landscapes mainly due to large scope developmental and anthropogenic activities. Present study highlights the mortality of protected leopard's population in Uttarakhand state, north-west India. In between January 2009 to October 2010, 78 leopards have died due to various reasons accounted primarily for unnatural deaths. Maximum deaths occurred in between February 2009 & April 2010 and notably 37 leopards died since January, 2010. The mortality rate for females was significantly higher than for males. Notably, 11 leopards were found dead scrambled in trap and some deaths occurred while providing treatment after rescuing the animal. In addition, 21 cases of leopard's poaching (illegal wildlife trade) were also documented in between January 2009 to March 2010 in which 35 leopard's skins were recovered, which highlighted that poaching is also ongoing in some remote areas. Status of man-animal conflict in Uttarakhand is severely increasing; in between November 2000 to December 2008, 180 people died in leopard's attack, whereas 343 were injured during encounters and leopard's attacks. On the other hand, 394 leopards died due to other reasons during the said period and 50 were declared as man-eater, which were shot dead or translocated to other protected habitat. Here, we report on the mortality in protected leopard population of Uttarakhand state and conservation status. Such reports are highly required to know the status and our competence in illustrating success and failures of wildlife rescue operations besides in conservation of an endangered wildlife.

Keywords Conservation, Leopard, Mortality, Protected Habitat, Threat, Uttarakhand

1. Introduction

Leopard (*Panthera pardus*) is widely distributed wild big cat and listed as an endangered species in IUCN Red List of Threatened Mammals and categorized under Schedule 1 of "Wildlife Protection Act 1972". In between January 2009 to October 2010, this species has dwindled drastically in Uttarakhand state and its existing populations are at high risk (Figure 1). One of the main reasons for this decline is the degradation of the habitat and loss of connectivity among different protected habitats. In Uttarakhand, Rajaji–Corbett wildlife corridor is the strong hold of leopards with a population of 608 (census 2005, Figure 5 A&B), which also includes the population in Rajaji National Park, Corbett Tiger Reserve (including Sonanadi Wildlife Sanctuary and Kalagarh Tiger Reserve), Lansdowne, Dehradun, Haridwar, Ramnagar, Terai East, Terai West, Terai Central and

Haldwani forests divisions. Remarkably, in between January 2009 and April 11, 2010, 78 leopards have died at different locations of Uttarakhand state and most of the deaths occurred in protected habitats (Table 1).

2. Causes of Mortality

The specific reason of maximum number of leopard's deaths was not clearly known because of old carcass found. This has accounted for 30 leopards (38.4 %), which were found dead at different locations of the state (Figure 5 C&D). Ground data revealed that 24.3 % (19) leopards died due to poaching / captured in trap (in some cases died during care after rescued from trap, Figure 5 E) whereas 20.5% (16) leopards were declared as man-eater and had been shot dead. Road accidental deaths accounted for 6.4 % (05), killed by villager in self-defense accounted for 3.9 % (03) and train accidental deaths accounted for 1.3 % (01). A total of 3.9 % (03) animal had been died in internal fight whereas 1.3 % (01) killed in wildfires (Table 1, Figure 2, 5 F&G). However, it was said in some cases that leopard died because of disease/ illness, but we assumed all these cases under unknown

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category. It is quite difficult to find out accurate reason of death especially when any old carcass is found, even after the post-mortem; it is very difficult to trace accurate death rea-

sons. However, exact death reason could be known tentatively by investigating the field evidences.

Table 1. Leopard's mortality in Uttarakhand since January 2009

1.	January 01, 2009	Terai West Forest Division	-	Found injured, died during care
2.	January 22, 2009	Pokhaal, Kotdwar, Lansdowne Forest Division	Female, 03 years	Shot-dead, declared as man-eater
3.	February 03, 2009	Rajawala, Selaqui, Dehradun Forest Division	-	Found dead
4.	February 06, 2009	Almora Forest Division	-	Internal Fight
5.	February 08, 2009	Almora Forest Division	Male,	Found dead, Unknown
6.	February 13, 2009	Gopeshwar-Chamoli Route, Nanda Devi Biosphere Reserve	-	Trapped in clutch wire, rescued, died during care
7.	February 16, 2009	Almora Forest Division	-, Cub	Found Dead, Unknown
8.	February 16, 2009	Nainital Forest Division	-, Cub	Found Dead, Unknown
9.	February 17, 2009	Ghamandpur, Ranipokhri, Barkot Range, Dehradun, Forest Division	Male, -	Found dead
10.	February 18, 2009	Paathisain area, Dhumakot, Pauri Forest Division	Male, -	Found dead
11.	February 18, 2009	Paathisain area, Dhumakot, Pauri Forest Division	Female, -	Found dead
12.	February 19, 2009	Pokhaal, Pauri Forest	-	Shot-dead by shooter; declared as man-eater
13.	February 19, 2009	Gairsain, Chamoli Forest	-	Shot-dead by shooter; declared as man-eater
14.	February 19, 2009	Khatima-Banbasa Route, Banbasa Forest	Female, -	Road accident
15.	March 05, 2009	Kholiagaon, Bageshwar Forest	-	Shot-dead, declared as man-eater
16.	April 12, 2009	Gairsain, Chamoli Forest	Female, -	Shot-dead, declared as man-eater
17.	April 26, 2009	Gadgadga Range, Haldwani Forest Division	-	Found dead
18.	May 13, 2009	Chopra, Raipur Range, Mussoorie Forest Division	Female, -	Shot-dead by shooter, declared as man-eater
19.	May 20, 2009	Haridwar-Roorkee route, near to Pathri rau, Haridwar Forest Division	-	Road accident
20.	June 09, 2009	Tol village, Devprayag	Female, 08 years	Shot dead, declared as man-eater
21.	June 28, 2009	Devprayag	-	Shot dead, declared as man-eater
22.	June ..., 2009	Sikroda, Khanpur Range, Haridwar Forest Division	-	Found dead
23.	July 01, 2009	Premnagar, Dehradun Forest Division	Female, -	Shot dead, declared as man-eater
24.	July 14, 2009	Bharpur patti, Devprayag, Tehri	-	Killed by shooter (declared as man-eater)
25.	July 15, 2009	Kudkawala, Haridwar Forest Division	Male, 05 years	Found dead, Poaching (bullets were found over to body)
26.	July 16, 2009	Kumrada village, Chinyalisaur, Uttarkashi	Female, 04 years	Killed by villager during attack/self-defence

27.	July 17, 2009	Khandah, Pauri	-	Brutally killed by villagers
28.	July 23, 2009	Nainital Zoo	Female, 04 years	Shifted from Birla Forest, rescued, finally died
29.	July 27, 2009	Gairsain area, Chamoli Forest	-	Shot dead, declared as man-eater
30.	August 16, 2009	East Jhandi chaur, Kotdwar Forest	-	Found injured, died during care
31.	August 19, 2009	Chiniyalisaur, Uttarkashi	-	Found injured, died during rescue
32.	August 21, 2009	Gopeshwar, Chamoli Forest Division	-	Found injured, died during rescue operation
33.	August 21, 2009	Gairsain, Chamoli Forest	Male, 05 years	Shot dead, declared as man-eater
34.	October 07, 2009	Motasal area, Sonanadi Wildlife Sanctuary Kalagarh Tiger Reserve	Female, -	Found dead
35.	October 13, 2009	Chaukhutia Block, Almora Forest Division	-	Shot dead, declared as man-eater
36.	October 15, 2009	Yamkeshwar Block, Pauri Forest Division	Male, -	Shot dead, declared as man-eater
37.	October 23, 2009	Kaladhungi Range, Ramnager Forest Division	-	Found dead, internal fight
38.	November 07, 2009	Bharda area, Jakholi Bl., Rudraprayag Forest Division	Female, -	Shot dead, declared as man-eater
39.	November 12, 2009	Kansrao, Rajaji National Park	Female, -	Train accident
40.	November 20, 2009	Chini Forest, Khatima Range, Terai East, Forest Division	Male, -	Found dead, carcass found in a nallah; Haemorrhage of intestine/bleeding?
41.	December 24, 2009	Chauharpura Range, Barwa village, Dehradun Forest Division	-	Found dead; 03 nails missing
42.	January 06, 2010	Chaukuni Forest, Champawat Forest Division	Female, 02 years	Found dead, Unknown
43.	January 07, 2010	Rishikesh Forest, Dehradun Forest Division	Female, 02 years	Road accident
44.	January 12, 2010	Patrampur, south Jaspur, Terai West Forest Division	Female, 04 years	Found Dead, Unknown
45.	January 15, 2010	Forest near to Buggawala village, Khanpur Forest, Haridwar Forest Division	-	Found Dead, Unknown (post-mortem report - Disease)
46.	January 21, 2010	Haldwani Forest, Terai Central Forest Division	-, 03 years	Road accident
47.	January 22, 2010	Jhajra Forest, Dehradun Forest Division	-	Shooting down [declared as man-eater]
48.	January 24, 2010	Forest near to Bosaan village, Chakrata Forest Division	-	Found dead, unknown
49.	January 27, 2010	Kota Forest, Ramnagar Forest Division (Paatkot village)	Male, 06 years	Found dead, Internal fight
50.	January 29, 2010	Bakhli village, Chaukhutia, Almora	-, 01 year	Found dead, unknown
51.	January 29, 2010	Malsi Deer Park, Dehradun	-, 01 year	Disease, Brutally rescued from Survey of India campus
52.	February 07, 2010	Gaulapaar area, near to Kalichaur river, Chakrata Range, Ratighat Compt., Haldwani Forest Division	Male, 05 years	Found dead
53.	February 07, 2010	Hempur forest, Aampokhra Range, Terai west Forest Division	-	Captured in fencing, rescued during night of 06 th but finally died; fencing of agriculture farm of Remount training school & depot [poacher has laid the trap of clutch wire]
54.	February 11, 2010	Kirada-Lava Route (near Lava village), Devprayag	-	Found dead, Trapped in fence

55.	February 12, 2010	Jhajhra Forest (Majhaun), Dehradun Forest Division (200 meters away from Birodi village)	Male, 07 years	Found hanged in a tree in break-wire
56.	February 12, 2010	Aasarodi Forest Range, Dehradun Forest Division Near to Badowala barrier (in private farm house)	Female, 06 years	Found dead, brutally captured in a trap (all four legs were detached from body)
57.	February 15, 2010	Rausaal village, Bhilangna Range, Terai Forest Div.	Female, 02 years	Found dead; died two days before
58.	February 15, 2010	Chaka, Ludiyaanaam Tok, Ghansorapaka Forest	-	Found dead, unknown
59.	February 16, 2010	Langha Forest, Kalsi Forest Division	Male, 05 years	Found dead; trap marks in neck portion, Nails missing from three feet
60.	February 17, 2010	Beribara Forest, Rajaji National Park	Male, 01 year	Found dead
61.	February 19, 2010	Back portion of IMA campus, Dehradun attached	Female, -	Captured in trap, rescued very late & bring To with Tons river Aasarodi but finally died [trap was placed for army training purpose]
62.	February 23, 2010	Rikhrikhal Block, Pauri district	-	Found dead, Natural death?
63.	February 25, 2010	Ganja village, Bhimtal, Nainital	Female, -	Found injured; rescued & shifted to Nai Natal Zoo but finally died
64.	March 01, 2010	Kotdwar Range, Lansdowne Forest Division	- cub	Found dead; old carcass
65.	March 08, 2010	Near to Gaula river by-pass bridge, Haldwani Forest Division	Male, 02 years	Found dead; three claws were missing & neck bone was found fractured [looking like snow leopard]
66.	March 12, 2010	Belani, Near to Vidya Mandir, Rudraprayag	Female, 01 month	Found dead; masticated spots found over To lower neck portion
67.	March 16, 2010	Mandal Range, Jmeria Beat, Kalagarh Tiger	Female, 02 years	Found dead; Injured marks at neck, belly & head
68.	March 20, 2010	Saterakhal, Rudraprayag	Female, 02 years	Found dead; Poaching case [seriously Injured & nails missing]
69.	March 21, 2010	Khanpur, Haridwar Forest Division	-	Found dead
70.	March 21, 2010	Pantnagar Veterinary College, Pantnagar Shifted from Malsi Deer Park for treatment	Male, 05 years	Found trapped in a snare at Majri village, rescued & shifted to Malsi Deer Park, after that shifted to Pantnagar Veterinary Col Lege for treatment; serious injury in neck Portion and infection, finally died
71.	March 21, 2010	Badowala, Dehradun Forest Division	-	Found trapped in snare at Badowala vil lege, Badowala village near Shimla bypass road Shimla bypass road; leopard was captured during day hours [chest portion was seriously injured] rescued & shifted; finally died
72.	March 27, 2010	Kotawali forest, Chiriapur Range, Haridwar Forest Division	Female, 02 years	Road accident, Haridwar – Bijnor National Highway No. 74
73.	March 28, 2010	Nirada/Mathana village, Pithoragarh Forest Division	Male, 06 month	Found dead
74.	March 28, 2010	Nirada/Mathana village, Pithoragarh Forest Division	Female, 08 months	Found dead
75.	April 05, 2010	Bohra village, Near Bhujaan, Civil forest, Ranikhet Almora Forest Division	Female, -	Found dead
76.	April 10, 2010	Ramgarh Range, Rajaji National Park	-	Found dead, burnt in fire
77.	April 10, 2010	Sauni Forest, near to Pant gaon, Ranikhet, Almora	Male, -	Found Dead, Unknown
78.	April 11, 2010	Almora Forest Division	-	Brutally killed by villagers

Source: Self observations / news published in national level newspapers / official records.



Figure 1. Protected habitats in Uttarakhand state (source: State Forest Department)

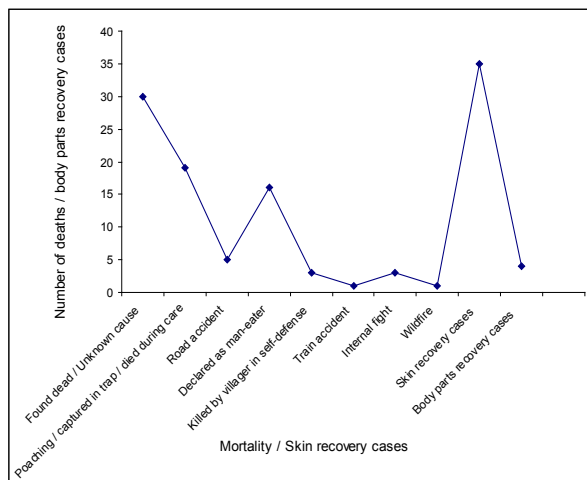


Figure 2. Mortality in protected leopard's population and skin recovery cases in Uttarakhand during January 2009 to April 11, 2010

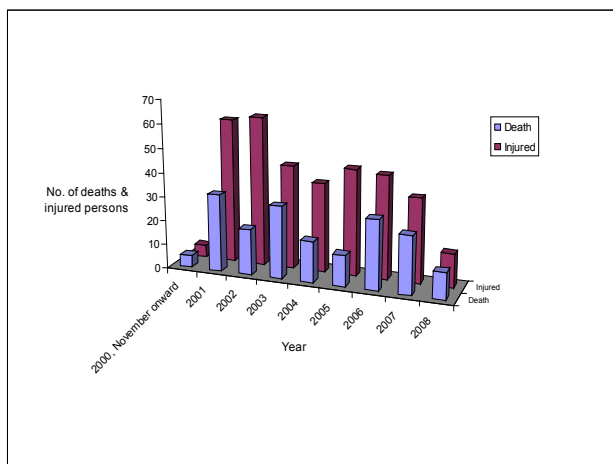


Figure 3. Number of human deaths and injured person in leopard's attack in Uttarakhand between November 2000 to December 2008 (Source: Data of Forest Department)

Leopard's mortality rate was significantly influenced by on-going poaching activities (trap knotting and poisoning for skin and body parts). During last two years, clutch-wire

made snares were frequently found by the officials being used by the poachers, which also don't enable the animal to liberate out from trap. Notably, maximum number of deaths occurred during February 2009 & 2010 (12) and March 2010 (11) followed by January 2010 (10). As most of the protected habitats are adjacent to villages and leopards used to move frequently in buffer zones and sometimes near to boundary of villages, therefore, instances of poaching cases are commonly observed from time to time (Figure 2).

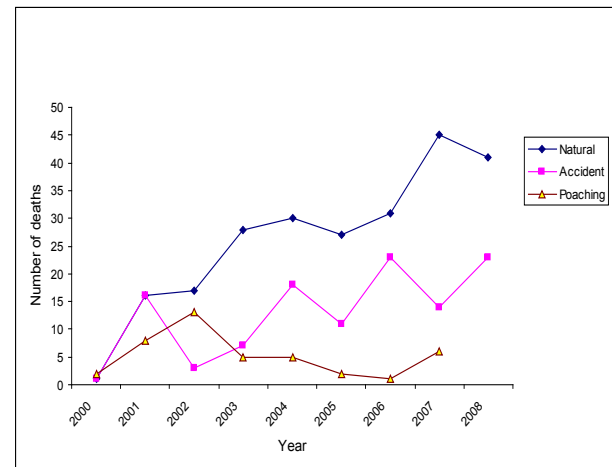


Figure 4. Leopard's death through various reasons at different parts of Uttarakhand during 2000 – 2008 (Source: Data of Forest Department)



Figure 5A. Leopard in the Rajaji National Park

3. Skin Recovery Cases

Despite mortality cases, 35 leopard's skin were also recovered / seized by forest officials, civil police and special force at different locations of Uttarakhand during January 2009 to March 2010 (Table 2). Additionally, 04 other cases of recovering body parts (bones, nails & teeth) were noted during said period. To control this, state forest department is conducting extensive patrolling and joint raid operations in sensitive areas besides, Task Forces are being constituted to check the illegal wildlife trade. Based on available figures, it can be said that poaching activities in Uttarakhand is effective and still ongoing (Figure 5 H&I).

Table 2. Cases of leopard's skin recovery in Uttarakhand since January 2009

S.No.	Date	Area	Case details
1.	February 08, 2009	Haldwani	Bones of leopard recovered b Forest staff from Nepali person
2.	February 14, 2009	Banbasa, Nepal Border	03 skins were recovered by Seema Shastra Bal force from Nepal border; 03 people are rested
3.	February 23, 2009	DakPathar are, Dehradun	A skin was recovered by Special Task Force and Wildlife Protection Society of India
4.	March 18, 2009	Pokhri, Chamoli	02 skins were recovered by Special Task Force and WPSI from Dehradun
5.	March 23, 2009	Haridwar	Bones and Teeth of leopard were recovered by Haridwar Forest Division
6.	April 25, 2009	Champawat	A skin was recovered by Special Operation Group at Champawat
7.	May 07, 2009	Champawat	02 skins were recovered by Champawat civil police
8.	June 20, 2009	Badrinath area, Chamoli	A skin was recovered by Badrinath Forest staff
9.	June 29, 2009	Haldwani	Bones were recovered from Fatehpur, Haldwani/Ramnagar by Terai west forest staff & WPSI
10.	July 08, 2009	Haridwar	01 skin was recovered by Haridwar police & forest division at Haridwar
11.	July 26, 2009	Hailang, Birhi	03 skins were recovered by Forest department in Chamoli district
12.	September 04, 2009	Nandprayag, Chamoli	02 skins were recovered b Special Task Force & WPSI; Poison/Poaching case
13.	September 12, 2009	Ghat, Chamoli	01 skin was recovered by forest staff & WPSI
14.	September 14, 2009	Jakholi, Rudraprayag	01 skin was recovered b forest staff
15.	October 11, 2009	Kalsi, Vikas nagar, Dehradun	02 skins were recovered b STF & forest staff
16.	November 11, 2009	Almora	01 skin was recovered by Almora civil police
17.	December 21, 2009	Haridwar	05 skins were recovered by civil police of Haridwar
18.	January 07, 2010	Rishikesh city area	03 skins of leopard were recovered by Special Task Force of Rishikesh, Dehradun
19.	January 17, 2010	Muni ki Reti (Tehri)	01 skin of leopard was recovered by Special Operation Group, Rishikesh
20.	February 03, 2010	Lohaghat, Pithoragarh village (Rawatgarah).	Bones, tooth and nails of leopard were recovered by Seema Shastra Bal (SSB) near Sail Nicotine <i>Ganja</i> was also recovered by poachers.
21.	February 13, 2010	Dineshpur More, Rudrapur	One leopard skin was recovered from poachers by SIDCUL Police & SOG, Rudrapur, U S Nagar [as per poachers they bring skin from Nepal and are going to Haldwani for selling skin]

Source: self observations / news published in national newspapers / official records

Leopard's deaths during January 2009 – April 2010

Found dead, unknown cause	30
Poaching / captured in trap (died during rescue / care)	19
Road accident	05
Declared as man-eater	16
Killed by villager in self-defense	03
Train accident	01
Internal fight	03
Wildfire	01

Sex – ratio

Out of 78 deaths, 24 were females whereas 15 were males and for other 39 the exact sex was not known to us. Looking into the data it comes out that the death ratio of male: female is almost equal and this will not affect the sex ratio of species but will bring this mammalian carnivore to threat.

4. Status of Rescued Leopards

Rescuing wild animal is a very sensitive and challenging task and needs very responsive treatment. Wild animals are very sensitive to human beings and proximity with them makes animal unconscious and furious. Besides, our efforts to rescue the leopards are not based on scientific protocol and that is one of the reason, which prolong deaths after rescue operations or during treatment. Out of 78 deaths, 12 were found trapped in snare and injured and shifted to some other safe areas but eventually all the leopards finally died. In addition, against to this, we have two examples in which leopards have been successfully rescued and translocated to

some other places.

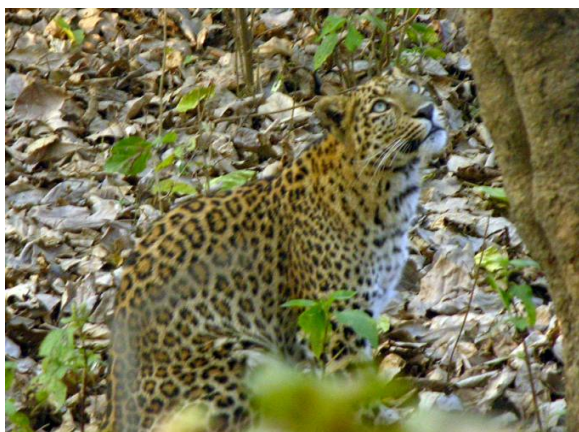


Figure 5B. Leopard about to climb the tree in Rajaji National Park

During January 2006, a male leopard was declared as man-eater in Badrinath forest division (Chamoli district) and after capturing him successfully from Budhadhang village, was released to Khara forest (Mitthawali area) of the Rajaji National Park. One such case had happened during 2008 in which a male leopard was translocated to Malsi Deer Park after being rescued from Dehradun–Mussoorie highway (Figure 5 J). Man-eater leopards were captured from time to time through setting up of baited traps effectively but as far as on-spot rescue and treatment is concerned our efforts are unequipped to save wildlife.



Figure 5C. Leopard's cub was found dead at Haridwar forest division



Figure 5D. Leopard brutally shot dead by poachers at Khanpur forest, Haridwar forest division during 2009



Figure 5E. Seriously injured male leopard at Malsi Deer Park after being rescued from Resam Mazri village, Dehradun during 2010; the neck portion was badly abraded due to caught in an illegal snare

5. Rescue Center

In an initiative to protect the state's endangered wildlife; state government initiated a project for care of rescued wild animals during 2010 especially for man-eater leopards. Under this project a rescue center has been established over an area of 25 hectares in Kotawali forest of the Haridwar forest division. Just after establishment four problem leopards were shifted to this centre from different locations of Garhwal Himalaya and are being providing treatment under supervision of experts. This initiative can be considered as a favourable step in wildlife conservation in north India. However, translocation of big cats is a controversial subject among various workers. In the event of a leopard problem, the most common management strategy followed throughout India is the setting up of baited traps, capture of an individual (not necessarily the problem causing individual) and its subsequent translocation into the nearest suitable natural habitat[1,2]. This is also recommended by the Indian Wildlife Protection Act[3] through an amendment made in 2002. However, this strategy is not recommended by scientists for managing problem animals because of the strong homing instincts exhibited by a wide range of carnivore families and the potential for movement of conflict with the individuals [1-4].

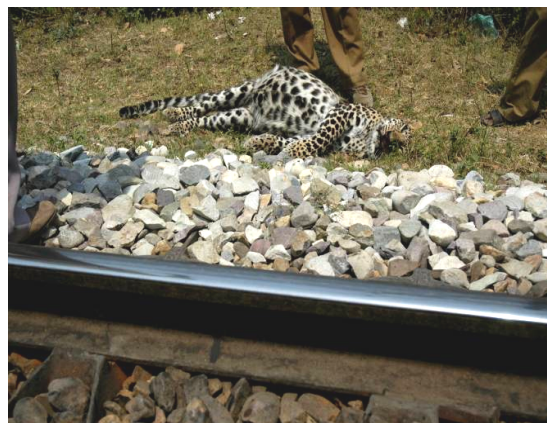


Figure 5F. Leopard died due to collision with train in Haridwar-Dehradun railway track at Motichur forest



Figure 5G. Leopard died in a road accident at Haridwar–Bijnor National Highway No. 74, which is passing in between different forest zones



Figure 5H. Wildlife crime: Leopard's skins were recovered by civil police of Vikas Nagar, Dehradun during 2008

6. Future of the Leopard's Population in Uttarakhand State

Uttarakhand is rapidly losing its leopard wealth and therefore needs a very transparent attention and conservation actions. During November 2000 to December 2008, 180 people were killed by leopards and 343 were injured in leopard's attack (Figure 3). Notably, 394 leopards died due to various causes (236–natural, 116–accident and 42–poaching; Figure 4). On the other hand 50 leopards were declared as man-eater during November 2000 to December 2008 and most of them were shot down while some were shifted to other protected habitat (zoo, protected habitat & zoological park). But maximum deaths accounted for shot due to fierce nature and demand of local people.

Maximum number of man-eaters were declared during 2009 (14) followed by 2006 and 2007 (11) and 2003 (09) whereas least number were declared during 2004 and 2005 (02). Historical literature revealed that 140 people succumbing to leopard attacks between 1988 and 2000 while 93 leopards were killed in the same period[5]. Since 2009, man-leopard conflict has been enhanced to two folds and today the situation in some places is very severe especially in

rural areas.

Figures indicated that man–leopard conflict is increasing day-by-day mainly because of competition for resources and space. Most of the villages are situated in between the forest area and adjoining to protected habitats and wild animals (leopard, wild boar, bear, Himalayan yellow throated marten and several species of deer) used to move extensively near to these areas because of presence of water and palatable crops. Besides, traditionally villagers also used to enter nearby forests to collect fuel-wood and fodder year round and thus encounter rate is increasing. In this critical situation more effective action-oriented and scientific protocol based strategies are required for conservation of this endangered species, which should primarily involve the participation of local people at every level, like formulation of policies, government meetings, awareness programmes and research activities.

Uttarakhand has a long history of leopard problem especially man-eater, for which the world famous conservationist Jim Corbett is known. This problem is more common in hilly areas where leopard's movement is commonly observed adjoining to villages and currently its population is only safe in protected areas that don't consist of human habitation. Mammalian carnivores are vulnerable to local extinction in fragmented landscapes mainly due to their low densities, large ranges and inevitable conflict with humans[6,7].

Outside protected areas, accidental or intentional killing by people drives local extinction of large carnivores or reduces their numbers, and it is a matter of fact that many human-dominated landscapes will always be unsuitable for some large carnivores[8]. Animal-vehicle collisions have the potential to impact the viability of wildlife populations. Several studies have been carried out on mortality of wild animals[8-11].



Figure 5I. Snare and other tools recovered by forest staff from poachers during a raid at Sonanadi Range, Kalagarh Tiger Reserve during 2009

Today, wildlife in several parts of India does not exist in isolation. Most wildlife populations live outside protected areas, often along side humans. Dogs, pigs and goats form an important part of leopards diet across many sites (Himachal

Pradesh, Uttarakhand, Gujarat and Maharashtra) indicating that the feral animals and livestock are probably important prey of leopards living outside protected areas in India [12,13].

In India, most of the national highways and railway tracks are also running across the potential protected wildlife habitats, which impede the frequent movement of animals within their home range. In this situation there is further need to conduct more scientific studies on the unnatural deaths of wildlife to address the requirements of both humans and wild fauna.

7. Recommendations

1. Proper census should be carried out at potential sites especially in buffer zones, where leopard's movement is very common and at risk.

2. At some places locals use to place snare / trap during night near to boundaries of the protected areas, therefore night patrolling of adjoining villages will be beneficial to know the status of poaching activities.



Figure 5J. Towards conservation: A translocated leopard–Raja, rescued from Dehradun–Mussoorie highway and released into Malsi Deer Park, Dehradun

3. As most of the villagers are living adjacent to the protected habitats traditionally and their indigenous knowledge about the forest resources and wildlife conservation is important to be addressed, therefore if we incorporate their opinions in making conservation policy that will be immensely helpful in conservation of wildlife wealth.

4. Community participation should be ensured besides; involvement of local people, government organisation, NGOs and subject experts is highly required.

5 Affected regions should be monitored sharply and movement of other wild animals (herbivores) should be ensured. It will be helpful in knowing the specific status of poaching of wildlife.

6 Death reason should be explored properly so that we should know the accurate death reason and be cautious in future about that.

7 Radio-telemetric studies are required on leopards, which were released / translocated to protected habitat. This will be

helpful in knowing the adaptation status of species and on the basis of which some recommendations could be given.

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