The Snow Leopard in Zanskar, Jammu & Kashmir, NW India

by,
Ashley Spearing
Woodlands, Higher Brooks, Street, Somerset, UK BA16 0TX
ashleyspearing@hotmail.com

Abstract
The paper summarises the alleged conflict between livestock herders and wild predators in the trans-Himalayan region of Zanskar, NW India. The snow leopard (*Uncia uncia*) is seriously threatened by this conflict, with at least thirteen killed in the last seven years in 3 of the study villages alone. Results of snow leopard sign surveys are described, revealing significant increases since the last survey (1986) consistent with alleged increases in livestock depredation. Attitudes toward wildlife and opinions on population trends are assessed. Depredation hotspots are identified and the cost of livestock predation is discussed in terms of recent developments and social changes in the Zanskar region. Illegal hunting and retaliatory killing are described, and essential programs and conservation measures are suggested. Even at this early stage, there appears scope for raising rural incomes and lifting the burden of co-existence with snow leopard and other unique mountain fauna.

The Study Area
The study was conducted across the Tsarap valley of Zanskar region (33° 0'to 33° 25' N and 77° 0' to 77° 30' E), in the state of Jammu and Kashmir, NW India. The region is trans-Himalayan in character, sharing close ecological, geographical and ethnic affiliations with Tibet. The area surveyed was 1000 km^2 area, just south of the Hemis National Park, bound by the Himalayan range to the south and the Zanskar range to the north. Its location, bordering a protected area and within a politically sensitive region, make this a vital area for conservation. The study was conducted in 121 households of the villages of Shade, Shun, Kargiak, Icha, Cha and Yugar (Phuktal) with a total head of livestock of 3237 animals. The inhabitants are semi-nomadic, mainly reliant on animal husbandry and barley farming (Crook, J and Osmaston, H. A. O., 1994).

Herd Dynamics
The general composition of herd followed a regular pattern (see *table 1.*) with sheep and goats comprising 2/3 of the herd with yak, dimo, and horse making up the remainder. A census in 2000 across the whole of Zanskar revealed that herd sizes are decreasing (LDO, Padum 2002 *personal communication*). The remote and principally livestock rearing villages of Shade and Shun are exceptions to this rule.

Table 1. Average composition of herds in the study villages.

Village	N^h	Yak	Dimo	Horse	Sheep	Goats
Shade	17	5.2	14.7	6.4	35.1	38.6
Shun	19	6.6	21.5	7.1	28.9	35.9
Kargiak	18	8.4	29.4	10.2	37	15
Icha	38	5.8	20.1	4.2	41.3	28.6
Cha	23	4.4	19.3	5.8	30.8	39.7
Yugar	6	6.2	26.5	2.7	33.6	31

N^h = number of households interviewed

Losses to carnivores

It is important to note that there are a number of factors that limit collection of accurate information in Zanskar. Livestock losses can quite innocently be overestimated when recorded twice by two households of the same family because of recent redistribution of wealth. Information taken in Shade over the last 2 years suggests that both livestock numbers and losses reported are fairly accurate, with yak losses commonly overestimated as found elsewhere in snow leopard range (Mishra, C. 1997). Last year, the 121 households surveyed had lost 419 animals: 25 yak, 10 dimo, 28 horses, and 356 sheep/goats (see *Table 2.* below). The majority were lost to snow leopard and wolves, while three incidences were down to lynx and once to a golden eagle. The unequivocal opinion in the study area was that depredation on livestock had increased over the last 5 years. Comparison with figures for 1986 in 1000 km^2 of Hemis NP (across a livestock population of similar size) of 10 yak-cow hybrids and 130 sheep and goats (Fox, J. L. 1989) seems to back this up. With the domestic ungulate population perhaps exceeding 10 times the wild ungulate population, and with over 400 head of livestock taken from 6/17 villages grazing in this area alone, it is obvious that livestock must constitute a relatively high proportion of snow leopard and wolf's diets in Zanskar as has been reported for central Ladakh (Fox, J. L. et al., 1991, Chundawat, R. S. and Rawat, G. S. 1994) and Nepal (Oli, M. et al., 1994) previously.

Table 2. ***Losses to carnivores in the study villages***

Villages	Yak	Dimo	Horse	Sheep	Goats	Total
Shun	9	4	11	40	31	95
Shade	8	5	5	58	7	83
Kargiak	1	1	5	50	8	65
Icha	6	2	4	45	53	110
Cha	3	1	2	8	42	56
Yugar	1	0	1	2	8	12
Total	28	13	28	203	139	421

Table 3. ***Average values of livestock***

Value	Yak	Dimo	Horse	Sheep	Goat
Rs	10000	9000	8000	1000	1000

Table 4. ***Losses to snow leopard and wolf***

Carnivore	Number of Households that lost livestock	% of Households that lost livestock	Total loss in Rs	Loss as % of herd	Loss as % of stockholdings
Snow leopard	50	41	307000	5.3	2.6
Wolves	61	50	465000	7.3	3.9
All	96	79	920000	12.9	7.8

Approximately 41% of the households lost livestock to snow leopard, which is lower than a recent figure for Mongolia of 46 % (Allen, P. and McCarthy, T. 2001) and higher than the 38% found in Nepal (Oli, M. et al., 1994), and the figure for wolf, 50% is again low compared to Mongolia where a startling 78% report losses. [Mongolia figures represent a 3-year period.]

The approximate economic loss per household was estimated using current market values (see *Table 3*). Annually, the 121 houses lost Rs307,000 ($653 $1=47Rs) and Rs465,000 ($989) worth of stock to snow leopard and wolf respectively (see *Table. 4*). This amounts to 2.6 % of stockholdings to snow leopard and 3.9% to wolf, with a further 0.1% being accounted for by lynx (see *Table. 4*). Again these figures are much higher than those seen in Mongolia (1% and 1%), but are very similar to that seen in the Manang area of Nepal (Oli, M. et al., 1994). The proportion of the herd taken is again significantly higher than seen in Mongolia with 5.3 and 7.3% of the herd being taken by snow leopard and wolf respectively, but comparatively lower than that reported by Mishra for the Pin valley in Spiti where 12% are taken annually.

Table 5. ***Mean losses***

Carnivore	Mean # animals lost per household	Mean value (Rs) of animals lost per household	Mean # animals lost just in households that lost livestock	Mean value (Rs) of animals just in households that lost livestock
Snow leopard	1.42	2,537	3.44	6,140
Wolves	1.93	3,843	3.83	7,623
All	3.46	7,603	4.36	9,583

Examination of the loss per household shows a different story, where mean loss to snow leopard per household per year was nearly 3 times that found in Mongolia (Allen, P. and McCarthy, T. 2001) and double that found in Nepal (Oli, M. et al., 1994). During the year 2000-01, on average 1.42 and 1.93 animals were lost per household to snow leopard and wolf respectively, along the Tsarap valley of Zanskar (see *Table. 5*). This amounts to an average cost of Rs2,537 ($54) and Rs3,843 ($82) per family/year to snow leopard and wolf respectively. More specifically, in houses that suffered losses to snow leopard, mean losses amounted to Rs6,140 ($131). When you consider that only a third of these households have a permanent source of income (government job/ pension/ camp site/ horseman, and that the average household spends Rs6,000 on essential commodities in Leh and Padum annually (Teshildar's office, Padum; *pers comm*., 2000), the alleged losses are horrific. From crude calculations of the average family income (Rs17,784 / $378), I can estimate the annual cost of predation on livestock in the area may represent as much as 54% of the average family's annual per capita income. In houses that lost livestock to snow leopard; wolf, the mean loss per family represented 34.5% and 42.9% of the average households per capita income respectively

Analysis by region

Table 6A. ***Number of animals killed by carnivores in 2001***

Village	Snow leopard	Wolf
Shun	29	66
Shade*	5	70
Kargiak	0	65
Icha	92	19
Cha**	38	17
Yugar	11	1

** 11killed by lynx*
*** 1 killed by eagle*

Table 6B. ***Percentage of herd killed by carnivores in 2001***

Village	Snow leopard	Wolf
Shun	3.20%	7.30%
Shade*	0.90%	12.30%
Kargiak	0%	16.30%
Icha	8.60%	1.80%
Cha**	5.60%	2.50%
Yugar	8.80%	0.80%

**1.90% killed by lynx*
*** 0.15% killed by eagle*

Table 6C. ***Percentage of houses that lost livestock to carnivores in 2001***

Village	Snow leopard	Wolf
Shun	26.30%	84.20%
Shade*	17.60%	88.20%
Kargiak	0	88.90%
Icha	64.90%	16.20%
Cha**	56.50%	30.40%
Yugar	50%	16.70%

** 17.60% to lynx*
** 4.30% to eagle*

Table 6D. ***Mean number of animals lost per household to carnivores in 2001***

Village	Snow leopard	Wolf
Shun	1.53	3.47
Shade*	0.06	4.12
Kargiak	0	3.61
Icha	2.49	0.51
Cha**	1.65	0.74
Yugar	1.83	0.17

** 0.65 lost to lynx*
** 0.04 lost to eagle*

Table 6E. ***Annual cost of depredation/household (Rs)***

Villages	Snow leopard	Wolf
Shun	4,105	10,895
Shade*	2,765	10,823
Kargiak	0	6,500
Icha	4,324	1,324
Cha**	1,652	2,870
Yugar	3,333	1,333

**611 to lynx*
*** 43 to eagle*

Table 6F. ***Annual cost of depredation/household (% stockholdings) in 2001***

Villages	Snow leopard	Wolf
Shun	2.50%	6.70%
Shade*	2.70%	10.60%
Kargiak	0	6.80%
Icha	4.60%	1.40%
Cha**	1.80%	3.00%
Yugar	4.30%	1.70%

** 0.6% to lynx*
*** 0.05% to eagle*

Table 7A. ***Identifying snow leopard "hotspots"***

Hotspot Criteria	Numbers killed	% Herd killed	% Stockholdings killed
Hotspot 1	Icha	Yugar	Icha
Hotspot 2	Cha	Icha	Yugar
Hotspot 3	Shun	Cha	Shade

Table 7B. ***Identifying wolf "hotspots"***

Hotspot Criteria	Numbers killed	% Herd killed	% Stockholdings killed
Hotspot 1	Shade	Kargiak	Shade
Hotspot 2	Shun	Shade	Kargiak
Hotspot 3	Kargiak	Shun	Shun

The data in *tables 6A-F* summarised in *tables 7A-B* above, clearly indicate that Icha is a snow leopard hotspot, with 92 (*table 6A*) losses to snow leopard last year, which represented 4.6% of the village stockholdings (*table 6G*). Cha, which lies just 10km east of Icha, lost 38 animals to snow leopard *(table 6A*), and when you consider that Yugar also graze their livestock on the Cha side, it becomes clear that livestock are meeting a large portion of snow leopard's dietary intake in this area. Meanwhile Shun, Shade and Kargiak are wolf hotspots. Examination of the proportion of the herd taken (*table 6B*) shows that Kargiak lost 16.3% of its herd last year to wolf, while looking at the losses as a function of the value of the stock lost shows that Shade exhibited greater losses, losing 10.6% of their stockholdings to wolf (*table 6G*). These serious losses seen for both snow leopard and wolf seem to be down to lax guarding. In Icha, it is also down to grazing livestock in high-risk areas in proximity to broken terrain, despite frequent sightings of snow leopard there; a situation similar to that seen in Nepal by Jackson (Jackson, R. M. et al., 1996). Shun, Shade and Kargiak clearly experience huge losses to wolves, and the economic loss is clearly substantially more than that to snow leopard in the Tsarap valley, particularly in Shade.

Wildlife numbers

72% of herders insist that predator numbers are increasing, which is consistent with the reports of increasing livestock depredation both in Zanskar (Spearing, A. et al., 2001 unpublished) and Hemis NP (Bhatnagar, Y. V. et al., 1999 ISLT) and increases in sign density in Zanksar. This maybe due to a combination of the protection offered by Hemis NP and the reduction in hunting over the last 10 years. The ubiquitous opinion in Zanskar was that this was vengeance from a wrathful deity angered at their declining faith.

Snow leopard sign surveys

Table 8A. Comparison of scrape densities conducted in 1986 and 2001.

Transect Location	August 1986 D. Mallon	October 2001 A. Spearing
	Scrapes/km	Scrapes/km
Phuktal	1.33	29.34
Shade Chu	0.33	6.33
Shun	3.56	77.31
Ralagung	4.83	5.21
Phe	0.17	0.55
Zanskar	0	1.08
Lugnak	0	7.38
Zanskar Gorge*	0.84	11.13

*Winter surveys

Scrape densities along the Shun gorge, Phuktal gorge and Zanskar gorge show a substantial rise since 1986 indicating regeneration of the snow leopard populations in these areas. This can probably be attributed to a reduction in hunting of snow leopard. Sign densities from short winter transects in Shun and Zanskar gorges ranged from 79-195 and 185-427 pieces of sign/km respectively (not included above). While along the 10km length of the Shun gorge, there were at least 150 scent sprays, over half of which had been cheek rubbed. Camera-trapping in the Shun gorge, reveal that at least 4 cats are using the RB of the Shun gorge, while the sign densities in these areas may indicate populations as high as 5-10 cats/100km^2 (Jackson, R. and Hunter, D. 1995). The Shun and Zanskar gorges are not and have never been used by livestock: hence the substantial increase in sign densities since the previous study cannot be attributed to decimation of sign by livestock traffic. Sign in the Zanskar gorge was concentrated at confluences to tributary valleys as it was in 1986, so for comparison only in the table above, I have averaged the sign over the full length of the gorge. Unbelievably, within this gorge, there was a relic scrape cluster of 35 scrapes around a boulder. Not included in the table above are winter surveys from along the Khurna River, where there has also been a dramatic increase in sign density since 1986.

Attitudes to wildlife and solutions to predator problems

Herders report no overgrazing pressures, although admit the low snowfall over the past 2 years has caused a slight problem recently. Consistent with Jackson's findings elsewhere in the snow leopard's range, herders do not consider wild ungulates a threat to their livelihoods, and insist that there is no overgrazing problem (Jackson, R. 1999). The threat wild predators pose to wild ungulates was also cited as a reason for their removal. Over 76% of households interviewed believed snow leopard, wolf, and lynx should not be protected but there should be an unlimited hunt with total eradication the only answer. Only 3.2% considered capture and relocation as an alternative, with the remaining 21% being undecided about what could be done. Similar to the situation in Nepal, snow leopard and wolf were considered the ubiquitous enemy of the people, but the wolf was considered a greater threat to their livelihoods. On asking what Hemis NP could do to help, it was revealed that only 1 man knew about its existence, having heard on a radio in Leh that it was a compensation scheme for livestock loss. The people of Zanskar have made requests in the past to the government and the army to come and irradicate wild beasts, and suggested that if the government wanted to help they should kill all the predators.

Hunting and Retaliatory Killing in Zanskar

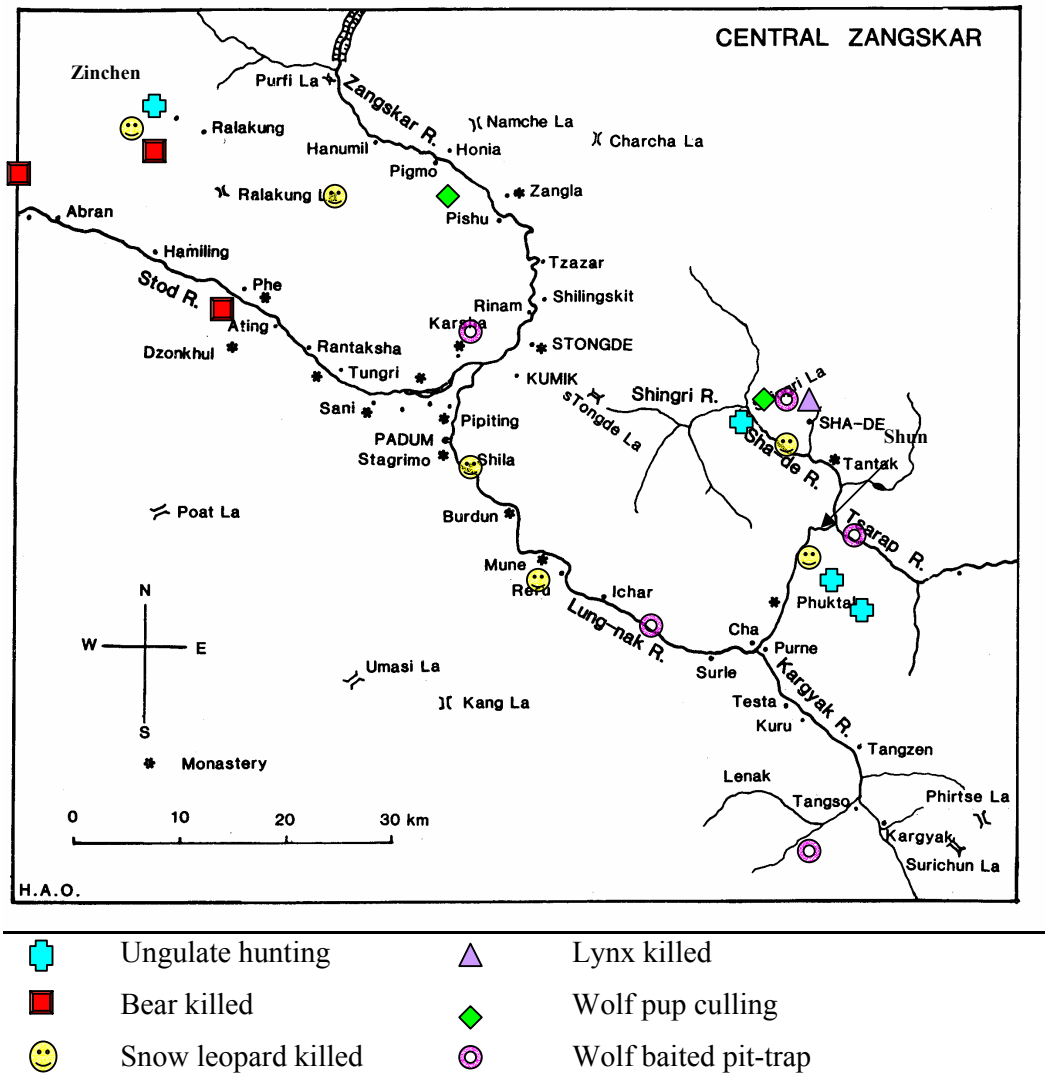

Figure 9. Map of Hunting & Retaliatory Killing (Map adapted from (Crook, J and Osmaston, H. A. O., 1994)

Ungulates: While most populations remain undisturbed and unharmed, in some of the more remote areas, hunting with dog and gun still continues. This was particularly apparent in Shun (and the villages of Ralagung and Zinchen outside of the Tsarap valley study area) where the author was confronted with fierce hunting dogs.

Wolf: The headman of Shun said up until 1 decade ago both snow leopard and wolf were hunted, and although hunting of carnivores has undoubtedly declined in Zanskar, this is probably more applicable to snow leopard. The wolf is still heavily persecuted, with wolf traps in operation all over Zanskar. Wolf-baited pit traps were seen in Kargiak, Shade, Shun and Cha. As an indicator, the village of Kargiak have killed between 30 - 50 wolf in the past 10 years, while last year the 5 villages surveyed killed 3 wolves and 1 lynx in baited pit traps. The Shade wolf-trap kills at least one wolf per year. Wolf pup culling still seems to be a common practice, with the villages of Zangla and Shade known to have captured 9 and 4 pups respectively in spring 2001 in planned den hunts.

Bear: The bear poses a real danger to livestock and humans alike, with an attack on a shepherd reported recently in Abran along the Stod valley. The village of Ralagung frequently encounter the bear along the Oma Chu, and many people carry guns as a means of protection. In the last 2 years, there have been reports of Bear being dynamited upon a "loaded" horse carcass in Ralagung, shot in Phe, and dug up along the Stod. While in Abran, a Bear was shot having sought refuge in a chapel. Despite the military presence in Padum and along the Suru valley, it is during winter after they have vacated the area that most incidences of such illegal killing are occurring. With numbers already low, and people become increasingly concerned for their own safety, the Bear in Zanskar is in grave danger unless a solution can be found.

Lynx: Mallon could recall only 3 reports of Lynx in central Ladakh during his 6 years of fieldwork between 1980-86. The only lynx report in Zanskar recently was of a dead one, caught in a Jigsaw trap within a wolf-baited pit-trap in Shade. For fear of persecution the carcass and hide were buried.

Pallas cat: There was evidence of Pallas cat in the area around Parfi la, and despite stories of its yearly raids on food stores in Hanumil, there were no reports of its persecution.

Snow leopard: On the subject of hunting snow leopard, people knew that snow leopards are protected and for fear of prosecution, were reluctant to talk about past or present hunts. Repetition of sign surveys conducted by Mallon in 1985-6, along with the alleged surge in livestock depredation would suggest that hunting of snow leopard has decreased and numbers are increasing. Unfortunately, some killing still goes on but every recent incident I was told of was a retaliatory act for livestock depredation. As an indicator, the village of Shade killed 5 snow leopards in 1 year 7 years ago. Since then, they have become aware of its protected status and have killed substantially less- 3 in the 7 years since. I must stress however, these retaliatory killings were after catastrophic corral incidents where 75 animals were lost in 3 attacks. This Tantak corral seems to be a common target for livestock raids, with Mallon reporting an incident in 1981 (Mallon, D. P. 1986). The snow leopard's tendency to remain at the site of the kill, seemingly drunk and unwilling to give them up, led to the leopard being canned to death in 2 instances and shot through the roof with a primitive gun in the other. Following death of the leopard, I quote an interview in 2000 "the hide was filled with grass and then paraded around the village, the hero was rewarded with gifts for removing another problem leopard. Later the hide and bones were sold in Kargil and Chang Thang respectively". Another such catastrophic attack was in Icha where 25 sheep and goats were killed last year. A sub-adult caught in a grass store in Icha this year, was killed partly out of retaliation for the single owner's loss the previous year, and the pelt was simply kept. 2 years ago a pair were shut in a den in the cliffs above Icha village. In Shun 4 years ago two cats were killed in the same year. One snow leopard was killed after entering a house in Yurshun village, while another snow leopard caught attacking a goat was chased to a cliff by fierce hunting dogs, where cornered, it was shot of the cliff with a primitive gun. Pelts and bones still remain in the village today. In Shilla last year, a snow leopard was chased away from the livestock in the village, and after getting cornered in a cave it was killed with dynamite. In Pidmu spring 2001, a group of 12 men hunted a menacing leopard after a livestock kill near the village. The pelt was sold to a travel agent in Leh for 3000 Rs. In Ralagung, a leopard was shot 6 years ago.

Conclusion

The wolf is a habitual livestock depredator in Zanskar, and is a real menace in the Shun, Shade and Kargiak areas. The snow leopard is absent in the Kargiak area, with no recent depredation incident or sign recorded. Examination of the average cost of depredation by carnivores, shows

that lost to wolf in these 3 villages is considerably higher than elsewhere, with Shun showing a large loss to snow leopard also. Meanwhile, examination of the rather crude "numbers killed" table (*table 6A*), indicates Icha has a serious snow leopard problem with snow leopard killing 92 animals over the last year. These findings are consistent with sign surveys conducted in Shun, but are not consistent with high sign density near Icha along the Lugnak- clearly there is no simple relationship between cat numbers and depredation rates. To examine this relationship further it will be important to collect information on number of attacks on livestock (and whether the carcass was eaten by the predator) rather than just the number killed which can be biased by instances of mass killing.

The study revealed that at least 16 snow leopards had been killed in Zanskar over the last 7 years, with 8 in one village alone. Despite this, it is believed that the snow leopard population has increased since 1986. This is consistent with 1. the tremendous increases in sign density across the study area and the rest of Zanskar; 2. the alleged increase in livestock depredation and; 3. statements that the level of snow leopard hunting is lower than the past. The wolf population is still controlled with baited-pit traps and planned den hunts. The bear is being persecuted in western Zanskar because of the direct threat it is now posing to man, while ungulates are being hunted savagely in the Shun and Ralagung areas with dog and gun. Snow leopard sign density in the Ralagung area has remained approximately constant since the 1986 study possibly because of hunting in the remote Oma Chu gorge.

The alleged cost of livestock depredation in the Tsarap valley is extremely high, with 2.6% and 3.9% of stockholdings being lost per year to snow leopard and wolf respectively. In households that suffer snow leopard attacks, the mean loss per family is approximately equivalent to their annual expenditure. With current disputes over land tenure rights, and the new economic demands on households (the *kangchung* in particular), I am in no doubt that tempers will be short fused, and that retaliatory kills will be more than just the exception to the rule. The re-emergence of the lynx in the Shade area, which is very rare in southern Ladakh, also makes this a critical time for conservation in Zanskar. Immediate action is needed. The government "has not reached Shun and Shade yet", and it is these principally livestock rearing villages which are in most need of attention. They have suffered most from the Kargil-Padum road. The shift from the traditional barter system, along with the break down of polyandry (resulting in splitting of land, building of new houses and the need to provide for more people) has hit them hard. They have lost their monopoly on sale of high quality dairy products with cheaper government subsidised products now available in Padum, and have greater expenditure (clothes, glass windows, new houses, varied diet). Today, they are critically dependent on livestock sale; and in what is now a cash-flow based society, livestock depredators are expensive neighbours (Spearing et al., 2001 unpublished). An alternative source of income is obviously needed. All Zanskari men weave yak wool carpets and blankets, and in Shun women weave also. Last year the village of Shun produced 12 yak wool blankets, and 9 yak wool carpets- selling none, while Shun and Shade also sold a total of 41 kg of pashmina for a meagre return. So it appears that there is already a sound basis for an *irbis* enterprise style scheme (Allen and McCarthy, 1999), and whereas in Mongolia people were trained, in Shun and Shade the skills are already there, but there has been little demand for the finished products so these are simply kept for personal use. The Shade corral at Tantak seems a common target, with eight snow leopards killed there in the past seven years and reports of incidents dating back to 1981. Corral predator proofing would be a relatively simple measure to reduce the conflict here, and with sign surveys in the nearby Shun area indicating as many as 5-10 cats in the area, without it, retaliatory killing will certainly continue. Conservation education could play an important role in reducing ungulate hunting in Shun, and further secure this seemingly dense snow leopard population. Losses to wolves in Shade, Shun, and Kargiak are presently at an unacceptable level. If other wild predators such as

the snow leopard, lynx or dhole are ever to be tolerated, this is a major, if vexing, issue that needs to be dealt with before wildlife conservation can even begin to operate successfully in Zanskar. Without reducing depredation by wolf, we would be simply taking one step forward and two steps back. The Snow Leopard Conservancy have suggested fencing at wolf hotspots (Jackson, R., *pers comm*). Outside of the study area itself, I strongly urge wildlife protection agencies to implement a bear protection program in the Ralagung – Abran area. The village of Icha lost 92 animals to snow leopard last year and over the last 2 years has been responsible for 3 retaliatory killings. It is famed throughout Zanskar for having a big snow leopard problem. It is the most suitable site for a pilot conservation program in Zanskar in that it is an accessible and approachable village that would not be averse to such a scheme. Despite being on the trekking route, it is often bypassed, so benefits very little from tourism. The village does however boast an excellent government English medium school, which runs the whole year around and even attracts the odd tourist. Here, there exists an excellent opportunity to introduce conservation education to children, parents and tourists alike.

With schemes in Kibber Wildlife Sanctuary, Spiti, India, already proving successful, and a program under way in the Markha valley of central Ladakh there is renewed hope for the snow leopard in Zanskar and the trans-Himalaya. Hopefully this study will go some way to initiating appropriate pilot schemes for trial in Zanskar in the near future.

Acknowledgements

The participatory work and semi-structured interviews were conducted in Shade village by the author in summer 2000 and sign surveys with the invaluable assistance of Dorjey Gyalpo in October 2001 and Tsewang Namgail in 2002. Sincere thanks to Sam Turley and Tim Myatt of St-Anne's college, Oxford University, for assistance with participatory techniques in 2000. Thank you also to Dr David Mallon for initial discussions in the planning of the project in 1999. Many thanks must go to Rinchen Wangchuk for his logistical support; Dr Rodney Jackson of the Snow leopard Conservancy and Dr Vash Veer Bhatnagar of WII for advice at the outset of the project; and Dr Tom McCarthy and Priscilla Allen of the International Snow Leopard Trust for advice on writing such a document.

This study was conducted as part of the Ladakh 2000 and Zanskar 2002 Winter expeditions. These projects were funded by Oxford University, the Royal Geographical Society, the People's Trust for Endangered Species, the Gilchrist Educational Trust, the Albert Reckitt Trust, and the Oxford society.

References:

Allen, P. and McCarthy, T. 2001, *Herders and Predators in Western Mongolia- Preliminary Report*.

Allen, P. and McCarthy, T. 1999, *Knitting for Snow Leopards*, Cat News No. 30 Spring 1999, pp. 24-25.

Bhatanagar, Y. V., Wangchuk, R., and Jackson, R. 1999. *A survey of depredation and related wildlife-human conflicts in Hemis National Park, Ladakh, Jammu and Kashmir, India.* Unpublished Report, International Snow leopard Trust. 20 pages.

Chundawat, R. S. and Rawat, G. S. (1994) *Food habits of snow leopard in Ladakh*. Proceedings of the seventh international snow leopard symposium. Edited by J. L. Fox and D. Jizeng.

Crook, J. and Osmaston, H. A. O. 1994, *Himalayan Buddhist Villages*. Bristol University. UK.

Fox, J. L. (1989) *A review of the status and ecology of the snow leopard* (Panthera uncia). International Snow Leopard trust.

Fox, J. L., Sinha, S. P., Chundawat, R. S. and Das, P. K. (1991) *Status of the snow leopard Panthera uncia in Northwest India.* Biol. Conserv. 55: 283-298

Jackson, R. and Hunter, D. (1995) *Snow leopard survey and conservation handbook*. International Snow Leopard trust, U. S. Geological Survey and Biological Resources Division.

Jackson, R. M., Ahlborn, G., Gurung, M., and Ale, S. (1996). *Reducing livestock depredation losses in the Nepalese Himalaya*. Proceedings Vertebrate Pest Conference 17: 241-247.

Jackson, R. (1999). *Snow Leopard in Nepal*, WWF-Nepal program. Department of National Parks and Wildlife Conservation Nepal and the International Snow leopard Trust.

Mallon, D. P. 1986, *Ecological survey of the snow leopard in Ladakh*, Msc Thesis, Manchester University, UK.

Mishra, C. 1997, *Livestock depredation by large carnivores in the Indian trans-Himalaya: conflict perceptions and conservation prospects*, Environmental Conservation 24: 4: pp. 338-343.

Oli, M. and Taylor, I. and Rogers, M. 1994. *Snow Leopard predation of livestock: an assessment of local perceptions in the Annapurna Conservation Area Nepal,* Biological Conservation 68, pp. 63-68

Spearing, A. G., Myatt, T. and Turley, S. 2001, *Ladakh 2000 Report for the Royal Geographical Society*, UK (unpublished report).