**CONSERVATION**

**THE PROBLEM**
As human populations expand and encroach ever further into natural habitats, humans and wildlife are increasingly having to compete over living space and food. Asian big cats are suffering not only from significant habitat loss, but also from a decline in their prey species within the habitat that remains. As a result, cats are moving into more marginal areas searching for food, finding easy prey in domestic livestock and also attacking humans. Many communities in Asia are heavily dependent on their livestock for subsistence and income, and therefore when livestock predation occurs, cats are captured, killed, relaunched, or actively persecuted to prevent similar events happening in the future. These killings are a significant threat to the survival of many Asian big cat species, and a growing threat to the lives and livelihoods of local communities living alongside big cat populations.

**TIGERS**
Current tiger habitat extends through one of the most densely inhabited regions of the world, and human populations are increasing much faster than the average global rate due to the majority of this area. For example, between 1973 and 1990 India’s human population increased by over 300 million, and livestock increased by more than 100 million over the same period. As a result, conflict with humans is a significant and increasing problem for the dwindling number of tigers left in the wild, particularly in the Russian Far East, Malaysia, Nepal, Bangladesh, Sumatra (Indonesia), and India. Methods used to kill tigers include shooting, trapping, or baiting the livestock carcasses in order to poison the tiger when it returns to its kill.

Tiger attacks on humans are also increasing. Between 1975 and 1989 in India’s Sunderbans region, tiger attacks caused 554 deaths, in 2003 more than 20 people were killed by tigers and leopards in the Terai region of Nepal and India. Occasionally, tiger poachers can seriously injure but not kill an animal and thus increase the likelihood that the tiger will attack humans. For example, in the Sundar Banjari area of Malaysia, illegal hunters wounded a tiger leaving it unable to hunt and it went on to kill two people from the area.

**ASIAN LEOPARDS**
Like tigers, Asian leopards are rapidly losing their habitat and prey species. Wild sheep and goats, the natural prey of species such as the snow leopard, have been hunted out of many areas in the central Asian mountains, and growing human and livestock populations are putting increasing pressure on the remaining leopards and their prey.

For example, domestic livestock in Mongolia have increased from 20,500 in the past 10 years, squeezing out wild sheep and goats. The habitat of the Central Asian leopard has declined from several million hectares in the mountains of Turkmenistan, southern Uzbekistan, southwestern Tajikistan, and parts of the Caucasus to less than 600,000 - 800,000 hectares. Today, increased livestock and a decrease in natural habitat has inevitably resulted in livestock predation by leopards, and subsequent retaliation by herders. In the summer of 2003 in Mongolia, snow leopard predation caused the death of 20 horses (worth an average of US$100-150 each) in a WWF project area. Between 1996 and 2002 at least 16 snow leopards were reported killed in Zostar in northern India, eight in one village alone.

The Amur leopard is particularly vulnerable in the Russian Far East, where farmers raise captive deer for human consumption and to produce meat for the Asian medicinal market. Deer are the natural prey of leopards, and in the absence of wild prey, leopards venture into the deer farms in search of food. Owners of these farms are quick to protect their investment by eliminating leopards attacking their stock. Presently, the Amur leopard’s most immediate threat comes from such retaliatory or preventative killing.

In many countries, conflict between livestock and the trade in big cat parts go hand in hand; the bones and pelts of leopards killed primarily due to retaliation for livestock losses also enter illegal trade.

**THE SOLUTION**
A wide range of different projects to mitigate human-big cat conflicts have been implemented. A main focus is to train wild animal handlers to train wild animals to be captured and brought into captivity. The most common big cat kept as pets is the tiger, which are becoming more of a problem. Tigers and leopards are wild animals and should remain wild. A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
The snow leopard, has been hunted out of many areas in the central Asian mountain range. Conservation action, and their efficacy can be consistently increased when they are supported by complementary work schemes such as:

1. Programmes aimed at improving the livelihoods of affected communities, thus providing a clear incentive for local communities to support conservation and find ways to live alongside wildlife. (See Box 1 for an example.)

2. Programmes that raise awareness and support for Asian big cat conservation amongst affected local communities and the surrounding populace.

3. Programmes that will improve the knowledge and quantity of Asian big cat habitat and the abundance of their prey species.

The effectiveness of work in progress throughout Asia to mitigate human-wildlife conflicts, and this article is written to be a comprehensive list of everything that is taking place. Rather, this article is designed to highlight a selection of case studies and example projects, looking at a range of innovative solutions to this pressing conservation problem.

Six separate techniques are outlined here. In many cases, two or more of the methods are incorporated into a larger programme of work which is tailored to suit the specific needs and requirements of the region.

1) Livestock compensation schemes

The most immediate solution to human-wildlife conflicts is the provision of compensation to the herder/farmer. However, compensation efforts to provide compensation have historically been problematic. In India, government compensation is much lower than the full market value of the animal killed, and lengthy governmental procedures mean that in most cases, compensation does not materialize early enough to avoid retaliatory action towards tigers by the livestock owner. Finally, payment often arrives incrementally, making it difficult for the livestock owner to reinvest in new stock. In order to combat these problems, WWF India initiated a cattle compensation scheme in 1997 around several tiger reserves and wildlife sanctuaries where the threat to the livestock was high. WWF provided funds to the livestock owner equivalent to the difference between a near market rate and the compensation provided by government. The funds were routed through local NGOs and compensation was usually paid within 24-48 hours of kill. One thousand and fifty cases were compensated between January 1998 to September 1999 at a cost of Rs. 5,30,902 (~US$20,000). lumbermen of cattle kills were paid a reward, pre-inspection visits were made necessary, and cattle carcasses were disposed of by burial or burning after inspection to prevent the proliferation of carcasses. In addition, WWF-India has made provisions to provide payments to the kin of humans killed in tiger attacks, in order to help with the costs of the funeral and other formalities. There are several problems with this method however. It requires a high level of donor input that must be maintained indefinitely unless other methods are used to reduce the frequency of livestock predation, and it may not be feasible for use in remote areas where predation levels are particularly high. For example, a livestock compensation scheme in Haril National Park in Ladakh, India, sponsored by the Ladakh Wildlife Department, failed to be effective primarily due to high costs involved. The rate of predation on cattle was 7.5% (a survey in the area indicated that over a 54 month period, the average household lost six animals, valued at almost USD300, with snow leopards responsible for 55% of these kills). The Wildlife Department needed to spend 60% of its annual budget on the scheme, although payments received by herders were only 20-30% of the market value of the animal killed. The remote locations of many herders also caused problems. Some herders had to walk for up to three days to report their losses and wildlife rangers had to verify the claims before approving any case for the scheme. The wildlife department has taken steps to improve the programme and address some of these issues. A slightly different method has been employed in the Kost Dagi mountains of Turkmenistan which holds the most important leopard population of Southwest Asia (approximately 70 individuals in 1999, up to 85 in 2004). However, a reduction in leopard prey species caused by poaching has led to an increase in leopard predation on livestock over the last 5 years. WWF’s Central Asian Programme (c/o WWF-Asia) has built up a compensation scheme based on live animal replacement rather than compensation funds. WWF funds were used to buy a pack of sheep that could be used to reimburse livestock owners who lost animals to leopards. A council of local community representatives was elected to manage the newly formed flock and two experts within the community were chosen to investigate cases of supposed leopard attacks. Ranchers who lost livestock are given a set period of time to register the attack with one of the experts who would determine not only whether or not it was a leopard that had killed the animal, but also whether the rancher’s herd was being properly managed at the time of the kill. For example, if the herd had been killed unattended for a long period of time, or if it was grazing in a reserve, compensation would not be provided. Once a flock has increased to around 650-700 sheep, it becomes self-sustaining and generates enough income to cover the costs of shepherds and veterinary care. 2) Livestock insurance schemes

Close related to the above schemes, livestock insurance schemes provide compensation for losses through a fund generated by the community. Project Snow Leopard (PSL) has set up an insurance scheme combined with ecotourism for snow leopards in Pakistan. Farmers pay insurance premiums on a head of livestock into a fund managed and administered by the...
Community compensation for livestock losses due to snow leopard predation is creating incentives for farmers to keep their cats, while additional income through eco-tourism provides farmers with a positive incentive to conserve the local snow leopard population. Surveys in the area show that the snow leopard population is stable and perhaps increasing. A new component was added to PSL in 2003 when the village's collective was made predator proof by erecting barbed wire around it. It is hoped that this will substantially reduce livestock predation rates, thus decreasing the intensity of the conflict and the number of claims made to the insurance scheme. In 2004, with the help Snow Leopard Conservancy Project, a Snow Leopard Leupard set up remote camera traps at the project site in order to monitor the snow leopard population. Villagers in 25 villages along the periphery of the Khunjrab National Park are monitoring snow leopards and other wildlife using the camera traps, and the knowledge of individual snow leopards that this monitoring provides is helping the conservation of the species among interested households in the local community.

The Snow Leopard Conservancy, India, working with several government agencies, has implemented an insurance program for large-bodied livestock like yaks, which is funded by India's national livestock insurance program. This project also increases the crop insurance rate, which reduces the risk of livestock coming into contact with people. In India, the National Park in Ladakh, the Snow Leopard Conservancy is collaborating with farmers to decrease human-lion conflict resulting from livestock predation by snow leopards and wolves. Building on a programme initiated in Markha (the village with the highest predation rate in the state) by the International Snow Leopard Trust and the Mountain Institute, existing corrals were predator proofed using wire mesh, poles, and secure wooden doors, together with locally available stones and mud. Labour was contributed by local villagers themselves. In exchange for the programme's help, herders agree to protect snow leopards and livestock by using methods such as fencing or changes in livestock management practices which reduce the risk of livestock coming into contact with people.

In Indonesia, the National Park in Lombok, the Snow Leopard Conservancy (SSL) is collaborating with farmers to decrease human-wildlife conflict resulting from livestock predation by snow leopards and wolves. Building on a programme initiated in Markha (the village with the highest predation rate in the state) by the International Snow Leopard Trust and the Mountain Institute, existing corrals were predator proofed using wire mesh, poles, and secure wooden doors, together with locally available stones and mud. Labour was contributed by local villagers themselves. In exchange for the programme's help, herders agree to protect snow leopards and livestock by using methods such as fencing or changes in livestock management practices which reduce the risk of livestock coming into contact with people.

4) Improving livestock husbandry

Improving livestock husbandry can reduce the significance of livestock losses due to predation by reducing livestock losses from other causes such as disease. It is particularly effective when livestock losses due to disease are greater than those due to predation. The cost of veterinary care is provided in return for a commitment from local farmers to stop Academy's killing of Asian big cats.

WWF-Pakistan has established a network of Livestock Health and Husbandry Workers (LHWs) to provide animal health care to herders on a regular basis in the project area. A two-part programme has been developed.

Animal Health and Disease Control: This process started as a result of a demand from the community for livestock vaccinations. Teams, health, and veterinary Partnership were hired with the community in which the community contributed a smaller percentage of the vaccination cost.

Good Animal Husbandry: Herders are encouraged to focus on keeping a few quality animals rather than many poor quality, low producing livestock in terms of milk and meat. In this way the numbers of livestock can be decreased and their value

(Box 1) - Royal Chitwan National Park

In the area surrounding the Royal Chitwan National Park in Nepal, efforts to reduce human-tiger conflicts have been complemented by projects aimed at decreasing the dependence of local people on forest resources. Many villagers from communities surrounding the Park are dependent on the adjacent forests for fuelwood, fodder, and timber. However, by entering the park they are increasing the likelihood of tiger attacks and also degrading the habitats of tigers and their prey. WWF, in collaboration with the Park, King Mahendra Trust for Nature Conservation and the Buffer Zone User Groups, created timber and fuelwood plantations in a buffer zone area surrounding the park that was leased from the government as a degradational project. The project was expanded to include a community-based ecotourism programme. When the plantations were six years old, they were thinned to yield firewood for the community and $3,800 was raised from the sale of saplings. The plantations will provide a future income after natural increasing. This will reduce pressure on forests and create more space to encourage ungulate growth, providing a larger natural prey base for the snow leopard and therefore helping to minimize snow leopard attacks on livestock and subsequent retaliatory killings.

Relocation

In Sumatra, tigers still pose a considerable threat to both livestock and people. The Indonesian government has had a long-standing policy of live-trapping problem tigers and removing them from the wild, normally for zoos. However, the extent of human contact that the animals are exposed to in a zoo means that successful reintroduction back into the wild is not always possible.

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The site is not feasible, and zoos throughout Sumatra were becoming full. Therefore, in 2003, efforts were made by the government, in collaboration with the Sumatra Tiger Conservation Programme, to translocate problem tigers to other blocks of habitat far from human habitation or interference. After a particularly bad spate of tiger attacks on humans and livestock in Riau province (between 2006-2007, tigers killed at least six and possibly as many as 30 people), the mayor of Dumai suspended logging concessions in a 600,000-hectare region of the Sumpa Sembilan district, and the area was formally declared as the Seninjo Tiger Conservation Area. Further tiger attacks to livestock resulted in the translocation of two adult tigers to the Conservation Area. The tigers are monitored by camera traps set up in the area, and a management plan is being developed with plans to incorporate radiocollaring to better monitor the movements and fate of translocated problem tigers.

4) Alternative income generation schemes with specific links to Asian big cat human conflict mitigation

These programmes aim to address conflicts between humans and Asian big cats by offering herders and others an opportunity to increase their household income for a commitment to protect Asian big cats and their natural prey.

WWF-Pakistan is involved in a project that was initiated in response to requests by the herders and rural communities to help them develop alternative sources of income to compensate their livestock losses to the snow leopard. Herders and livestock owners are given training that modifies their existing skills base to enable them to produce materials that are in demand in both the national and international markets. In return, villagers commit to: land-use planning, monitoring, and poaching of snow leopards.

Forego protecting their domestic livestock and in certain areas to man

land for the snow leopard’s natural prey base. This programme was established at a demonstration site in Kajuu, Chitral. The strong existing skills base in embroidery was developed by a trainer to enable the women to produce embroidered napkins which can be produced affordably and for which there is an international demand. The products are then sold to environmentally conscious companies who will continue buying the products on the condition that the community abides by its commitment to snow leopard-friendly herding practices, and that the snow leopards and their natural prey species flourish at the demonstration site.

In Mongolia, Snow Leopard Enterprises (formerly Ibis Enterprises), a programme of the International Snow Leopard Trust, also offers herders alternative income generation schemes. In return for signing contracts in which they agree not to kill snow leopards or their natural prey. If herders comply with the contract and no snow leopards are killed, they are provided with a bonus, but this benefit is withdrawn from the whole community if just one incident of poaching occurs. In return for these agreements, herders are trained to produce handmade wool and handicrafts which are marketed by the project both within Mongolia and internationally. The products are sold via the internet and in zoos in the UK and the US.

WWF-Mongolia precedes its alternative income projects in the Altai Khukh Mountains with project proposal development training for local herders to ensure that they have the capacity to develop proposals and generate funding themselves for alternative income generation schemes. WWF has so far conducted several small-scale pilot projects such as milk-crown production for marketing in the provincial centres, hand-made carpet production for local consumers, and braided leather rope production intended for sale to international tourists.

The development of eco-tourism ventures can provide significant alternative income for local communities, particularly in areas that are not overly remote and already have a moderate tourist visitation rate. For example, WWF-Mongolia conducted a training workshop on horse and camel guiding to provide local communities living in snow leopard habitat areas with the skills required to organise local tours using available resources without damaging their environment. Traditional homestay type ecotourism has also proved successful in Ladakh, India, the Snow Leopard Conservancy runs a women-managed initiative whereby trekkers can stay in a rural Ladhaki home and have a unique cultural experience that generates substantial household and community income. Homesty providers put a percentage of their revenues into a community conservation fund, while using the net to educate their children and improve their standard of living. The program, known as Himalayan Homestays, has been expanded to other parts of India, including Sikkim and Sikkim. These initiatives have transformed local perceptions of the snow leopard from a dangerous animal that attacks livestock to one whose presence draws tourists and provides important economic opportunities. The product is a model of a self-sustaining and profitable conservation program.

CONCLUSION

Human wildlife conflict is fast becoming one of the most pressing threats to big cats in Asia, and an increasing threat to the livelihoods of people living alongside wildlife. As human populations increase and encroach further into wildlife habitat, conflicts between humans and wildlife are set to increase in both frequency and geographic spread. Unless large scale and cohesive programmes are established to mitigate these conflicts, the future of many Asian big cats looks uncertain.

It is clear from just a preliminary review that there are a wide range of methods currently being used to mitigate conflicts between Asian big cats and humans, and that many methods that are currently fairly localized specifically could also be implemented with success elsewhere in Asia, and indeed in other regions of the world. Greater effort to share best practices and successful approaches needs to be fostered, through increased collaboration and cooperation of range state governments, donor governments and aid agencies, NGOs, IGOs, and others working on big cat conservation.

In addition, the necessary enabling environment for human wildlife conflict to be significantly reduced in the long term needs to be established. This includes better transparency within the government agencies dealing with conflicts, and stronger involvement of the communities affected by conflicts in the decision-making process. Furthermore, sustainable financing needs to be secured to scale up and replicate successful programmes throughout Asian big cat range.

As well as mitigating human wildlife conflict where it currently occurs, the potential for causing human wildlife conflict in new areas must be considered in all future land use planning for Asian big cat range states. Poor land-use planning that causes or exacerbates human wildlife conflict must be prevented. This includes the development of agriculture attractive to big cats (such as large scale livestock herding) near big cat habitat or, the weakening of essential big cat corridors that will force big cats into human populated areas. Effective land-use planning that considers human wildlife conflict from the outset will not only benefit wildlife, but will also ensure more successful and sustainable agriculture development that will not suffer from losses attributable to wildlife.

An integrated approach to land use planning from a full range of governance sectors (i.e., agriculture, development and financial sectors in addition to the environmental sector), and a heightened prioritization of human wildlife conflict in all these sectors, is necessary in order to successfully stem the increase of conflicts throughout Asia.

Last but not least, range states should start working together to ensure that the conservation community need to ramp up their efforts to tackle the root causes of human wildlife conflict.