

The Price-Tag on Conflict!

*A Review of Wildlife Compensation Programs
around the Globe*

Melissa Pettigrew, Tony Liu, Aili Kang, Yan Xie

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INTRODUCTION

Human-wildlife conflict is a wide spread conservation issue. Immediate action in alleviating this conflict has become a conservation priority in many countries where species have become pushed to the brink of extinction (Mishra *et al* 2003, Hussain 2000, Nature Conservation Division 2008).

The issue of human wildlife conflict however is a complex one that often involves the strategic management of human actions as well as the effective management of wildlife populations. Ultimately the management of human wildlife conflict should aim at mitigating the conflict by implementing actions that reduce human wildlife encounters altogether, or at the very least, significantly reduce the occurrence of the conflict (Morrison, *et al.* 2009).

Compensation is one initiative used to tackle human-wildlife conflict. The ultimate goal of compensation is to increase tolerance toward wildlife by alleviating the financial burden received as the result of a human-wildlife ‘conflict encounter’.

KEY COMPONENTS OF A SUCCESSFUL COMPENSATION PROGRAM

The concept that compensation mitigates human-wildlife conflict is sound but its implementation and conservation effort have resulted in mixed outcomes (Agarwala, M. *et al.* 2010; Naughton-Treves, *et al.* 2003; Rondeau and Bulte, 2007; Schwerdtner, and Gruber, 2007; Treves, 2009).

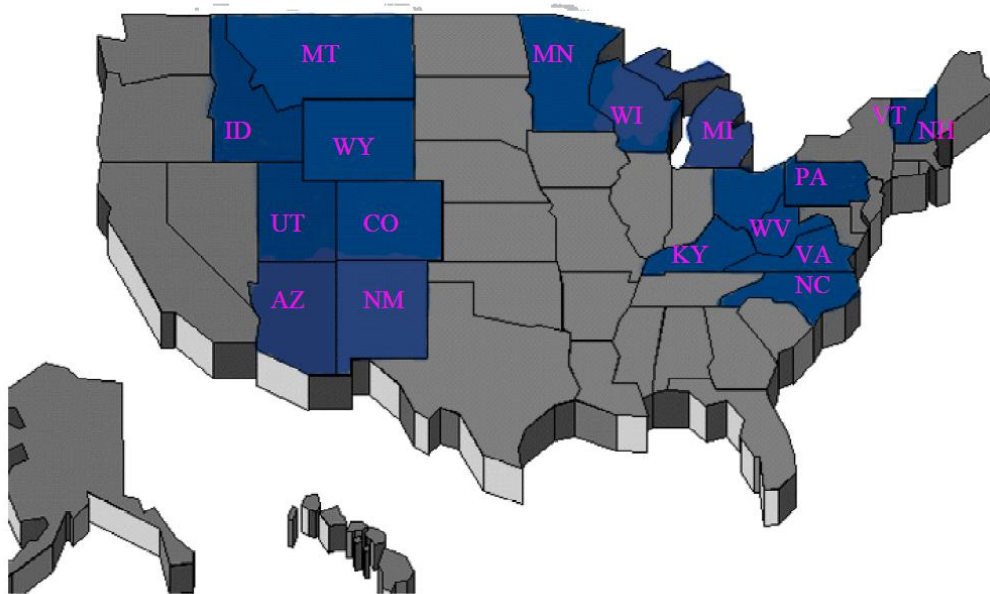
Compensation programs have been widely criticized in the literature for failing to meet their conservation goal of mitigating human wildlife conflict. The reason for failure can often be linked to the struggle to meet one or more of the key concepts that are often connected to the success of an effective program. These key concepts have been outlined by Nyhus, *et al* (2003) and are listed below in table 1:

Key Concept	Application of the concept
Speed	Allow farmers to receive compensation payment quickly
Transparency	The compensation process should be easily understandable, fair and all parties should be aware of and understand the process
Funds	Ensure adequate funding is available (keeping in mind that wildlife damage can vary from year to year)
Separate responsibilities	Involve a separate entity that deals with the verification process of the loss and another entity that is responsible for the payment
Involve experts or trained locals	Ensure verification of loss is conducted by <i>impartial</i> outside experts or trained locals. This aids trust and discourages fraudulent claims by giving farmers confidence that estimates of loss are accurate.
Clear guidelines	Ensure strong institutional support and link compensation to effective management practices
Measure Success	Be able to verify the success of the program. For example survey farmers before and after the implementation of a compensation program to investigate whether tolerance toward wildlife has increased. Additionally monitor wildlife to ensure the conservation outcome of protection is being met. For example are numbers steadily increasing? Additionally are fewer reports of retaliatory killings being made?

Table 1: Key concepts to a successful compensation program (Nyhus *et al*, 2003)

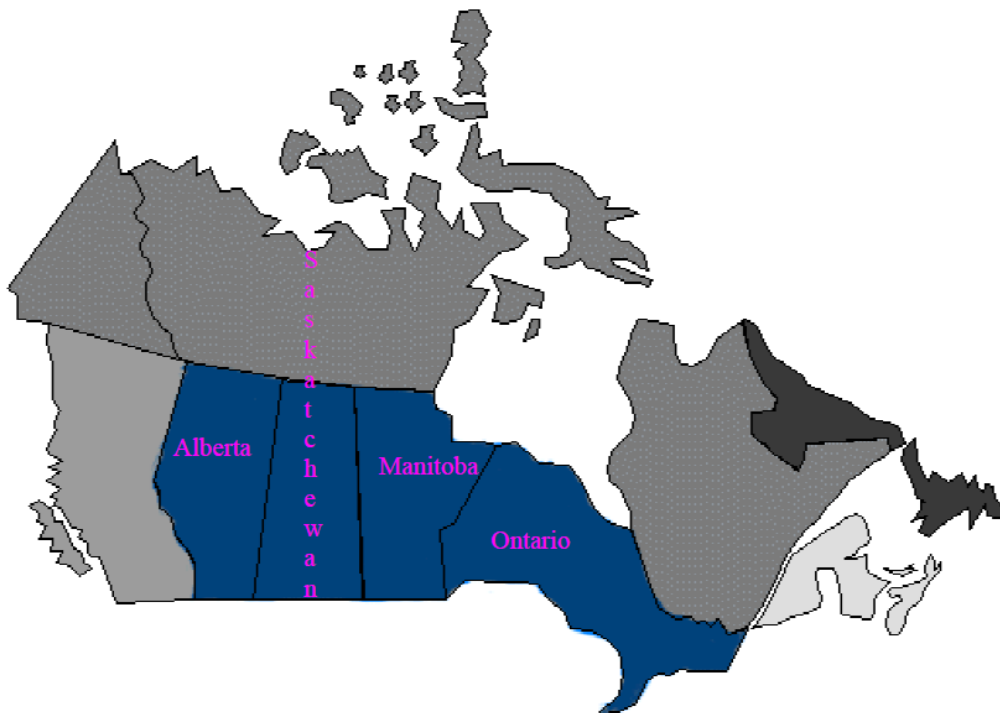
Compensation programs aimed at alleviating human-wildlife conflict can be found across the globe. Map 1-2 highlight states and provinces in the USA and Canada (respectively) that have compensation programs and Map 3 highlights European countries that have adopted compensation programs.

Map 1: Map of States with Compensation Programs in United States



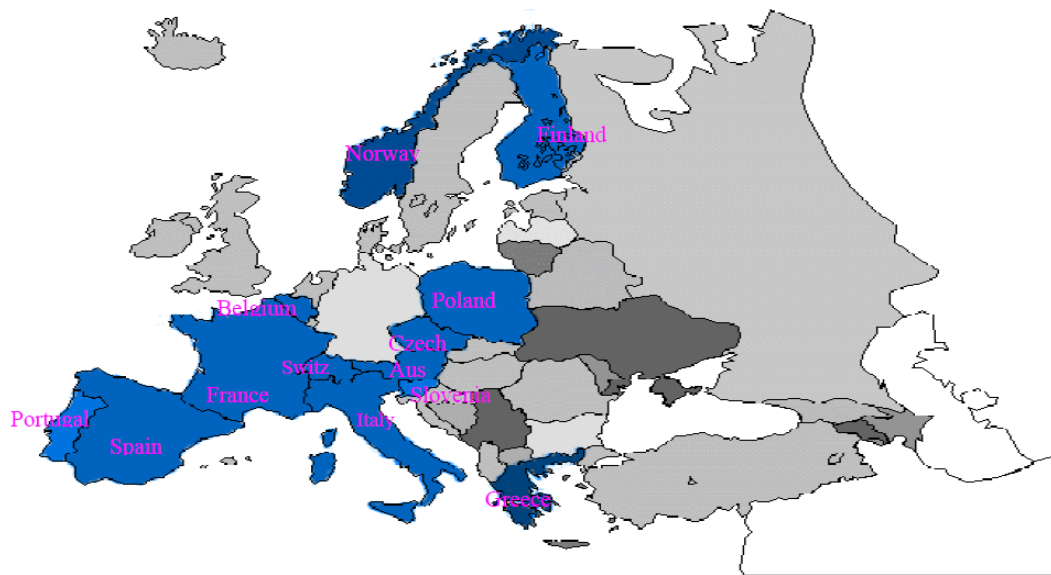
Map source: Montag and Patterson 2001

Map 2: Map of Provinces with Compensation Programs in Canada



Map source: Montag and Patterson 2001

Map 3: European Countries with Compensation Programs



Map source: Montag and Patterson 2001

Between 2000 and 2001 depredation events caused by wildlife in the USA alone come at a substantial financial burden (Montag and Patterson). Table 2 highlights the total number of livestock lost in 12 states in the USA and the corresponding total financial cost in US dollars.

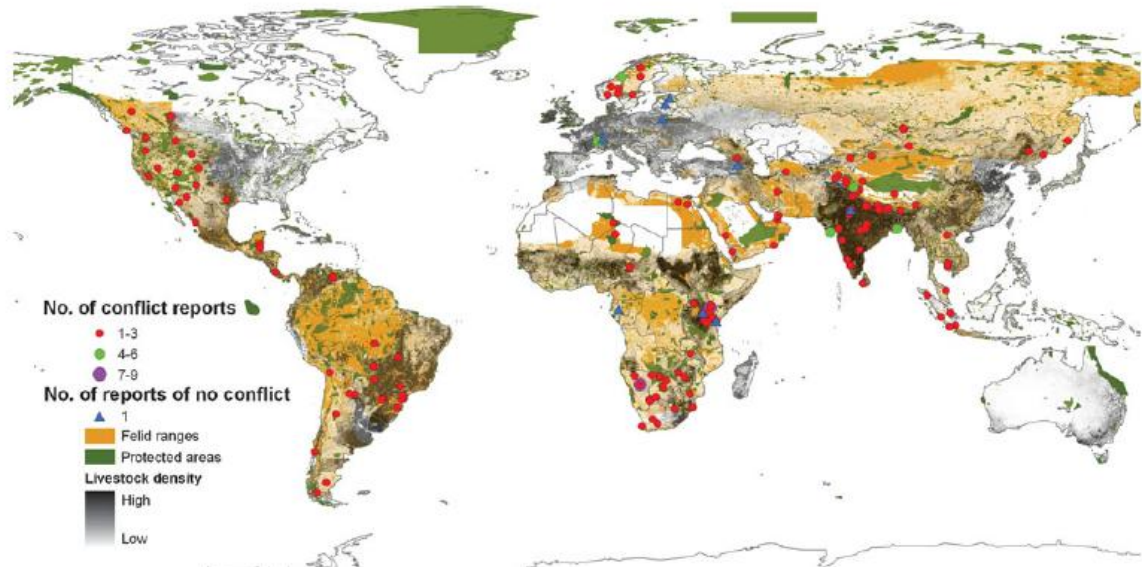
State	Cattle	Calves	Sheep	Lambs	Total
<i>Colorado</i>	500 \$376,000	3000 \$945,000	3000 \$297,000	9000 \$603,000	15,500 \$2,221,000
<i>Idaho</i>	300 \$212,000	2,300 \$632,000	2,800 \$283,000	7400 \$311,000	12,800 \$1,438,000
<i>Michigan</i>	-	300 \$92,000	200 \$25,000	1,300 \$53,000	1,800 \$170,000
<i>Minnesota</i>	100 \$72,000	1100 \$313,000	1700 \$158,000	2,300 \$101,000	5,200 \$644,000
<i>Montana</i>	600 \$477,000	3200 \$989,000	3800 \$334,000	12600 \$592,000	20,200 \$2,392,000
<i>Ohio</i>	-	600 \$170,000	700 \$99,000	1200 \$53,000	2,500 \$322,000
<i>Pennsylvania</i>	-	-	400 \$46,000	900 \$44,000	1,300 \$90,000
<i>Utah</i>	400 \$288,000	2100 \$623,000	6600 \$680,000	18,700 \$860,000	27,800 \$2,451,000
<i>Virginia</i>	600 \$377,000	2,300 \$690,000	900 \$100,000	2500 \$113,000	6,300 \$1,280,000
<i>West Virginia</i>	-	900 \$236,000	800 \$71,000	2,800 \$123,000	4,500 \$430,000
<i>Wisconsin</i>	200 \$140,000	1200 \$457,000	400 \$40,000	500 \$21,000	2,300 \$658,000
<i>Wyoming</i>	300 \$234,000	3,600 \$1,156,000	6,000 \$528,000	22,000 \$1,012,000	31,900 \$2,930
TOTAL	21,000 \$13,524,000	126,000 \$38,113,000	77,000 \$7,448,000	196,000 \$9,054,000	420,000 \$68,139,000

Table 2: Livestock loss and their financial cost in 12 states in the USA (source: Montag and Patterson 2001)

However, the rate of occurrence and financial burden that occurs as a result of human wildlife conflict is not limited to the USA. Human wildlife conflict is an issue that crosses the globe (Aust, *et al* 2009; Gurung, *et al*, 2008; Hoare, 2000; Kloskowski, 2011; Lamarque, *et al* 2009;

Liu, *et al* 2011; Nhyus and Tilson, 2004; Nugraha and Sugardijito, 2009; Sangay and Vernes, 2008) . Map 4 shows the distribution of human-felid conflict. Although the map is limited to felines and to those that have been reported in the literature, it does demonstrates the wide spread nature of the issue.

At a more local level, in Hunchun, Jilin Province China, fig 1 shows the number of tiger depredation events that have occurred during 2001-2010. Additionally, Fig 2 (Zhang and Wang 2003) show the growing trend over the period of 1996-2000 of the cost of damage caused to crops by elephant raiding in Simao, Yunnan Province, China.



Map 4: Source - Inskip and Zimmermann (2009)

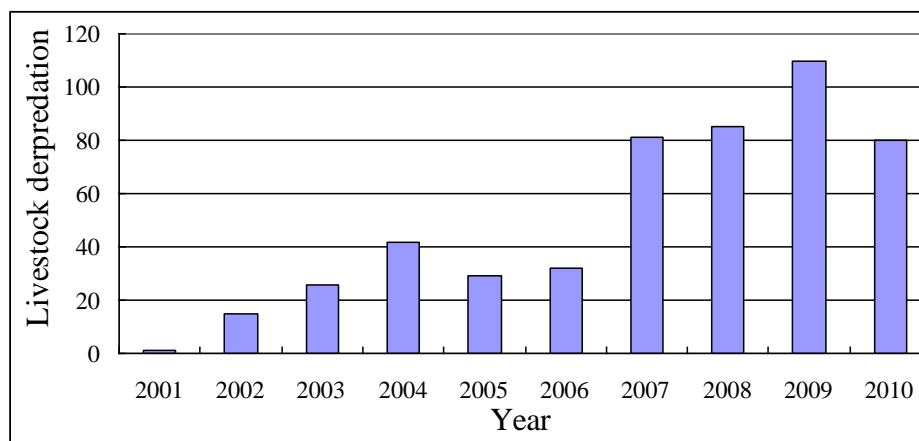


Fig 1: Map of livestock depredation events caused by tiger in Hunchun Nature Reserve, Jilin Province, China.

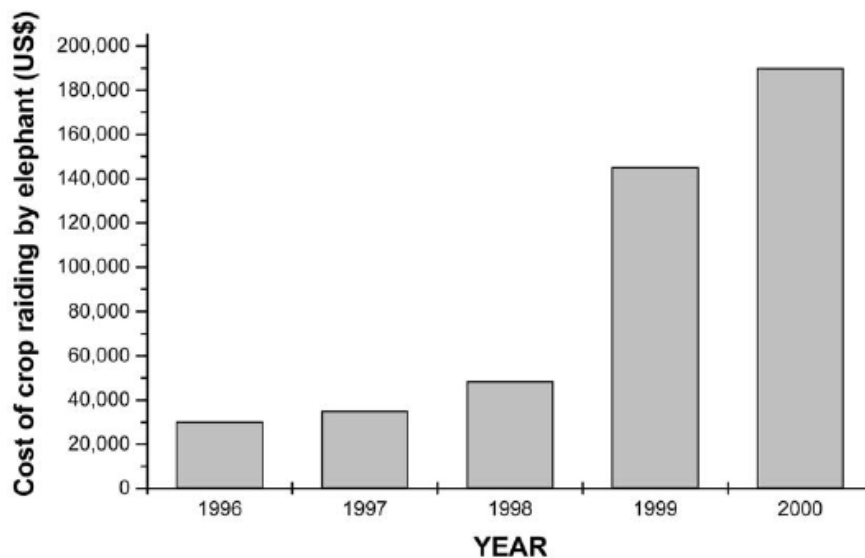


Fig 2 Cost of crop raiding caused by elephants in Simao region, Yunnan Province, China (Source: Zhang and Wang 2003)

Compensation schemes aimed at mitigating this very conflict vary dramatically between not only countries but within states and provinces. Therefore there is no ‘*one size fits all*’ compensation scheme that can completely alleviate human wildlife conflict. Rather compensation schemes need to be moulded to fit the conflict in question and the location of its occurrence. Lessons and examples of success and failures from around the globe can be used to guide and improve compensation programs to better meet the goal of mitigating human wildlife conflict.

THE FUNDING PROCESS

Human wildlife conflict can vary from year to year. Ensuring access to adequate funding is a never ending battle for the success of compensation programs worldwide. In the majority of cases compensation programs are run by public authorities who generally utilise one of three systems to fund compensation payments (Montag and Patterson 2001).

1. Direct Compensation
2. Insurance
3. Compensation Funds

Alternatively, compensation programs can also be funded by community-based insurance schemes and by funding provided by NGOs

DIRECT COMPENSATION

Direct compensation is likely the most common and funds come from an allocated budget line from a specific administration. This method is used in Algeria, Salzburg, the

Autonomous communities of Aragon, Finland and Norway. Problems arising from direct compensation are that (as mentioned above) wildlife damage can vary from year to year which means that if the budget does not meet the number of claims for compensation then it can easily run out of funds and fail to mitigate conflict (Klemm, 1996).

In order to overcome this problem some compensation bodies have adopted a 'compensation in advance' payment program. This concept allows public authorities to budget a set amount of money each year to go toward payments for damage caused by wildlife. This set budget is then distributed once a year to the farmers or farming community regardless of whether wildlife damage has occurred. After this payment however farmers are no longer eligible to apply for compensation. This not only ensures that public authorities can manage and maintain compensation funds as they are aware and agree upon a set budget each year. It also encourages farmers to take extra preventative measures to protect their livestock in order to turn the compensation 'payout' into direct income. Compensation in advance programs can be found in Sweden and Germany to compensate for damage caused by bears, wolves and lynx in Sweden and damage by otters in Germany (Fourli, 1999 and Schwedtner and Gruber 2007).

INSURANCE

A second method to fund compensation can involve public authorities taking out insurance in order to cover their liability toward human-wildlife conflict (Klemm, 1996). This method has been adopted in parts of Italy and Switzerland (Fourli, 1999). However in Yunnan Province a pilot study revealed that commercial insurance in this region was shown to be non-profitable for the insurance companies and therefore would likely be difficult to implement.

COMPENSATION FUND

Lastly, the third method is a compensation fund financed by the state budget. There are however not many funds that are financed solely by a state budget and are largely limited to Norway and the Flemish community in Belgium. In Belgium the state budget funds compensation payments for damage caused by protected species. In Norway the state budget provides funds for damage payments caused by deer (Klemm, 1996).

COMMUNITY-BASED INSURANCE SCHEMES AND FUNDING BY NGOS

An alternative to funding sources coming from public authorities is the use of community self-financed insurance schemes. Such schemes can be found in Pakistan and India and we will elaborate further on these in the following section (Hussain, 2000 and Mishra, *et al* 2003). Alternatively some compensation programs can be funded by NGOs.

Most NGO's will take on compensation payment programs where they are faced with a situation where there is little intervention conducted by the government to mitigate human-wildlife conflict (Klemms, 1996). For example in Namibia an NGO in collaboration with 9 other conservancies have established an insurance scheme to fund compensation payments to livestock owners that suffer a loss (Lamargue, *et al* 2008 and Morrison, *et al* 2009).

Additionally WWF assist with compensation payments for damage cause by bears in Austria (Fourli, 1999) and the Tigris Foundation assist with payments for livestock loss by the Amur tiger and Amur leopard in Far-East Russia (Hotte and Bereznik 2001). Concerns for NGO's that run such compensation programs is that in most cases NGOs rely heavily on external grant money to run and compensation programs can become financially draining and often do not have criteria in place to ensure that the program meets the desired conservation goal of the NGO (Miquelle *et al* 2005).

CRITERIA FOR COMPENSATION

Funding is often a never ending battle for compensation programs regardless of the funding method (public authorities or NGOs). One of the biggest criticisms for compensation is the handing over of money with no accountability to take measures to prevent a depredation event from occurring. This results in compensation programs becoming financially unsustainable particularly if the predator numbers increase and consequently the conflict incidents increase. Additionally if compensation payments are doing nothing to change attitude or tolerance toward wildlife, as has been argued in the literature (Agarwala *et al* 2010; Naughton-Treves *et al* 2010; Rondeau and Bulte E. 2007) it begs the question of whether compensation programs are really contributing to conservation?

Additionally many authors have argued that compensation programs could inadvertently be in fact promoting the expansion of agriculture. Bulte and Rondeau (2005) put forward the theory that compensation programs may affect the exit rates of people from the rural sector. They speculated that in low income countries many young people are leaving the agricultural industry for the appeal of other alternatives that could potentially be found in more urban areas. Therefore they suggest that by providing compensation this could result in agriculture being seen as a profitable option and thus encourage young people to stay. Consequently this would maintain or potentially increase the level of conflict. Additionally Bulte and Rondeau (2005) and Schwerdwertner and Grubes (2007) also argued that if farmers are getting compensated for loss without any liability for husbandry or protection of their livestock what incentives are there to better improve their husbandry and reduce conflict if they get compensated regardless?

This very question brings about the need to incorporate restrictions and criteria for eligibility for compensation payments in order to reduce the rate of conflict and to encourage more sustainable use of compensation funds. Additionally investigation into alternative methods to fund compensation such as a self-financed community based insurance scheme can help to alleviate the financial burden of compensation programs.

CRITERIA AND RESTRICTIONS FOR PAYMENT

Placing restrictions on compensation payment is one such method to improve the compensation program. For example in Finland compensation payments can be refused altogether or substantially decreased if the claimant is perceived to have been negligent in his care of his animals. Additionally they can also be refused payment if their animals were found to have been kept in a restricted area without authorisation (Klemm 1996). This ensures compensation payments are not paid out to people who are being negligent or violating rules, such as allowing livestock to graze in restricted areas.

PREVENTATIVE MEASURES

Enforcement of the adoption of preventative measures to reduce the incidence of human-wildlife conflict has been emphasized in the literature by many authors as an important aspect of improving the conservation benefit of compensation programs (Ogra and Badola 2007; Fiourli, 1999). Guarding livestock, guard dogs, bringing in livestock at night, providing fencing, etc are just some examples of preventative measures utilised as criteria for eligibility of compensation payments (Fourli, 1999; Appendix A).

SELF-FINANCED COMMUNITY INSURANCE SCHEME

Self-financed community insurance schemes to date have been adopted in only a small number of programs as a way to assist farmers to self-protect against wildlife damage and thus relieve the financial burden related to compensation payments (Hussain, 2000 and Mishra, *et al* 2003). The initial success of these programs warrants future research. In Pakistan a self-finance community based insurance scheme coupled with an eco-tourism fund has been developed to combat the growing conflict between farmers and the snow leopard. In Pakistan the snow leopard is responsible for the loss of large numbers of livestock and as a result retaliatory killings are threatening snow leopard populations (Hussain, 2000).

In selected villages where conflict was identified households pay a 1% premium/per year for each goat they own. The premium is based on the current market value. This money goes into a self-financed insurance fund. The villagers nominate a village insurance committee who are responsible for verifying a loss and making recommendations for the compensation amount. Payment for compensation comes out of the insurance fund. However if the money in the insurance fund is not enough the ecotourism fund is used to cover any remaining cost.

An initiative of this particular program is if the funds continue to grow past a particular threshold then the surplus income can be distributed evenly among villagers. Therefore there is a strong incentive to let the funds grow so the interest increases allowing them to receive a bonus payout. Subsequently this encourages many of the villagers to take preventive measures to protect their stock and thus turn the 'bonus payout' into direct income.

In most cases the loss of livestock is a random risk. However if the 'risk' is evenly distributed amongst a village then it leads to a good argument for collective coverage of individual risks. The concept of community self-financed insurance schemes warrants further research to see if it can be adapted to other human-wildlife conflict situations.

A BRIEF OVERVIEW OF THE CURRENT HUMAN-WILDLIFE CONFLICT AND WILDLIFE COMPENSATION SITUATION IN CHINA

It was estimated that in China by the end of 2010 there were over 6,000 compensation cases for wildlife damage (Li 2011). Recently, human-wildlife conflicts in China have mainly occurred in Yunnan, Tibet, Shaanxi, Guangxi, Xinjiang Province (Autonomous Region) (Zhou et al 2011). Species of concern are tigers, elephants, wild boars, takins, bears, wolves, migrating birds and snow leopards. Conflicts mainly occur in nature reserves and remote poor mountainous areas. Depredation events are mainly focussed on humans, domestic animals,

and crops. Based on a survey conducted by Cai (2011) table 3 summaries the wildlife conflict situation in China.

Province	Durati on	Number of cases	Loss in RMB (million)	Annual loss in RMB (million)	Wildlife cause conflict
Yunnan Province	2000- 2004	-	176,13	35,226	Asian elephant (<i>Elephas maximus</i>), Black bear (<i>Selenarctos thibetanus</i>), Guar (<i>Bos frontalis</i>), Brown bear (<i>Ursus arctos</i>), Cloud leopard (<i>Neofelis nebulosa</i>), Macaca (<i>Macaca mulatta</i>), Dhole (<i>Cuon alpinus</i>), Wolf (<i>Canis Lupus</i>), Wild boar (<i>Sus scrofa</i>), Black necked crane (<i>Crus nigricollis</i>)
	2005- 2009	-	258,663	51,736	
	2009			55,142	
Jilin Province	2007- 2009	7040	18,748	6,249	Amur tiger (<i>Panthera tigris altaica</i>), Wild boar, Black bear and migrating birds
	2007	-	-	2,276	
	2009	-	-	8,106	
Shaanxi Province	2005- 2009	11,118	11,960	2,392	Takin (<i>Budorcas taxicolor</i>), Black bear, Chinese serow (<i>Capricornis milneedwardsii</i>), Common leopard (<i>Panthera pardus</i>), Crested ibis (<i>Nipponia nippon</i>), Rhesus macaque (<i>Macaca mulatta</i>), Wild boar, Wild rabbit (Leporidae), Reeve`s Muntjac (<i>Muntiacus reevesi</i>), Hog badger (<i>Arctonyx collaris</i>) and Brown hawk owl (<i>Ninox scutulata</i>)
	2005	-	-	1,112	
	2009	-	-	3,570	
Tibet Autonomo us Region	2008	-	-	8,093	Brown bear, Black bear, Snow leopard (<i>Uncia uncia</i>), Lynx (<i>Felis lynx</i>), Dhole, Wolf and Eagle (Accipitridae);
	2009	-	-	8,805	

Table 3: Wildlife Conflict Situation in China (Cai et al. 2011)

A study conducted by WCS in Hunchun Jilin Province of 107 households at risk of human-wildlife conflict revealed that 75% of these households had experienced an economic loss caused by wildlife damage (Berger 2011). Of these wildlife damage cases approximately 28% went unreported (Berger 2011) suggesting that the rate of wildlife damage cases could in fact be severely underestimated.

According to Li (2011), article XIV of the *Wildlife Protection Act of the People's Republic of China* states that the “damage to personal life, property or other resulting from the protection of national or local important wild animals should be compensated by the local governments”. China has identified four provinces as wildlife compensation demonstration areas; they are Tibet, Shaanxi, Yunnan and Jilin. In 1998 Yunnan province was the first to pass a law for ‘compensatory approach for damage of life and property caused by important protected terrestrial wild animals in Yunnan Province’ (Li 2011). Shortly after this, this law was adopted in Shaanxi, Jilin Province and Tibet Autonomous Region.

However there is no real legal component or implementation that is found that makes this law adequate. Furthermore as highlighted in a paper by Li (2011), *China's Wild Animal Protection Law* stipulates that the ‘local government’ should provide compensation for damage to crops and other caused by national and local wildlife’. However as identified by Li

(2011) according to '*China's Wild Animal Protection Law*' wildlife resources actually belong to the state, therefore theoretically the local government are not the 'true owners' of the wild 'resources' of the local region. Therefore with this legal contradiction confusion becomes apparent and the question is asked of whether it is fair that the 'local peoples government' who are not the 'true owners' of the wildlife should be required to pay the cost of the damages? Cai et al (2011) also recommended that central and provincial government bodies should invest more into compensation and reduce the portion of payment from prefectural and county level finances.

In addition to this it is the lack of understanding of the definition of 'local' government (Li 2011). Not having clearly stipulated if local government refers to provincial government, municipal government or county/township government can result in compensation not being owned by any government body, leaving victims of damage disadvantaged or worse yet, uncompensated (Li, 2011)

Aside from the confusing legal wording that surrounds the laws and regulations of compensation is the never ending problem of financing it. Similar too many compensation programs around the world, funding payments are also a problem in China.

Chinese government agencies at all levels have had an increase in financial expenses for compensation. From 2000 to 2004, the direct compensation cost in Yunnan was 24,280,000 yuan, this accounted for 13.79% of loss. From 2005 to 2009, the compensation payment for China national and Yunnan provincial government was raised to 60,660,000 yuan, this accounted for 23.45% of loss; this was an 80% increase in compensation for human depredation and more than 60% for crop and livestock compensation (Cai et al 2011). In Jilin Province, in 2007 (the year in which compensation began) compensation amounted to 2,124,300 yuan; in 2008, 7,974,300 yuan and in 2009, 7,110,000 yuan (Cai et al 2011).

Although the compensation funds have increased every year, human-wildlife conflict is also increasing. Reasons for this include but are not limited to an increase in wildlife population and an increase in human population competing with wildlife over habitat. For example, in Jilin Province, loss caused by wildlife amounted to 2,476,000 yuan in 2007, while 8,106,000 yuan in 2009 (Cai et al 2011). The loss in 2009 was 3.3 times more than that in 2007. In Shaanxi Province, the loss calculated was 11,116,000 yuan in 2005, while 3,570,100 yuan was calculated in 2009 (Cai et al 2011). The loss in 2009 was 3.2 times more than that of 2005.

Furthermore with the increase in conflict the ability for compensation payments to match this increase is becoming more and more difficult and thus in many situations the cost of the loss cannot be fully covered by the compensation budget. In Simao, Yunnan province China, where human-elephant conflict is prominent the Simao forestry bureau was recorded in 2003 as having 20,000 yuan (US \$2,420) assigned especially for compensation each year (Zhang and Wang 2003). However in the area of the Nanping township economic losses caused by the elephants were recorded to be around 650,000 yuan each year (US\$ 78,650) (Zhang and Wang 2003). This therefore meant that in this region, at this time, compensation available to the farmers covered less than one tenth of the damage caused by elephants (Zhang and Wang 2003).

Therefore like many compensation programs around the globe, China's compensation program is in need of review and improvement in order to make it sustainable and reach the

goal of mitigating human-wildlife conflict. Below we describe some of the current work being carried out on compensation in China and other current measures being adopted in china to battle the increasing number of human-wildlife cases occurring.

CASE STUDIES FROM CHINA

RELEVANT WORK ON AMUR TIGER CONFLICT IN HUNCHUN

Cattle are mostly allowed to graze freely in Hunchun. However because the extent of this husbandry practice of “free-feeding” vary in different seasons, the possibility of a tiger attack also varies. Cattle are usually kept around houses during the winter time therefore tiger predation on cattle seldom occurs during this period. During the two periods of time: 1. from the ice-snow melt to late May-early June and 2. after November to before snow, where crops are absent on the farmland, cattle graze freely in nearby villages and are brought back to the pens in the evening. Attacks during this period caused by tigers are also few. From the period of late May-early June to November, crops are grown on the farmland and as a result farmers release cattle into the pastures to ‘free- feed”. Cattle are kept in the pasture overnight and consequently tigers can easily predate on the cattle. Therefore attack cases become quite a seasonal occurrence with a peak in late May to November.

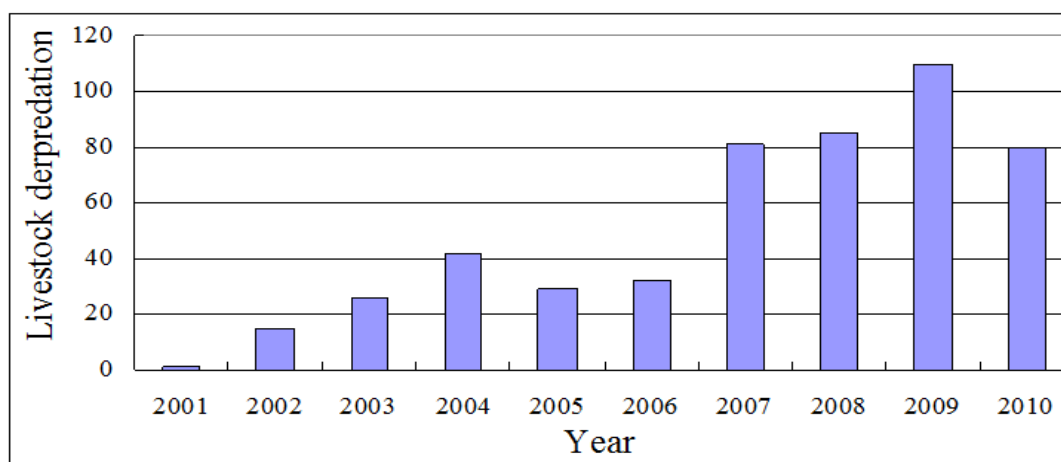


Fig. 3: Livestock depredation events caused by Amur tigers in Hunchun, Jilin, 2001 -2010

WCS implemented the Amur tiger compensation program during 2002-2005. Jilin province initiated wildlife compensation from 2006. Fig 3 shows that the numbers of Amur tiger depredation events are continuing to rise. In 2009; 33,158 cattle were raised in villages that were affected by human-tiger conflict (government statistical data). During this period 110 losses occurred which accounted for 0.33% of stock. In 2010 approximately 80 cattle were lost as a result of tigers. According to the market value (around 5000-7000 yuan (US \$605-\$847) per cattle), economic loss was estimated at 400,000-560,000 yuan (US \$48,400-\$67,760).

If people invested in undertaking precautionary measures to prevent conflicts between

humans and wildlife, we could subsequently avoid conflicts and thus decrease the financial burden associated with a compensation scheme. Therefore in order to test this theory, WCS selected Madida Village (of Hadamen Township) as the testing site in 2008.

We constructed a protective fence for keeping cattle confined at night to prevent cattle from tigers in Madida Village. However, preliminary results show that the fence was too far from the cattle grazing zone and farmers were not bringing their cattle into the fenced area, therefore it played no role in preventing conflict. A suggestion by the local cattle association advised to move the fence to a location where cattle could be easily chased in. However, after further investigation we found that this solution would not be effective for two reasons; firstly the location is within Hunchun Nature Reserve; secondly, although it was suggested to use salt to train the cattle to come in at night, it became apparent that because cattle do not need salt every day, it was difficult to train all cattle to enter the protective fence each night. Therefore, human conflict results would be similar whether the fence existed or not and moving the fence to a better location would make little difference. Consequently this pilot project showed us that using protective pasture fences in collective pastures is unsuccessful. However, it does not indicate that preventive measures can not be used in Hunchun, instead we need to explore more suitable methods. WCS still continues to explore different ways preventive measures can be implemented to reduce tiger conflicts.

SANJIANGYUAN NATIONAL NATURE RESERVE AND HUMAN-BEAR CONFLICT

Sanjiangyuan National Nature Reserve is amongst the largest Nature Reserve in the world and is one of China's most important protected areas and occupies approximately 50% of the land area of the Sanjiangyuan region (Worthy and Foggin 2008). In this area there are three main large predators that create conflict scenarios for local herders, they are the snow leopard (*Uncia uncia*), gray wolf (*Canis lupus*), and the Tibetan brown bear (*Ursus arctos pruinosus*). Worthy and Foggin (2008) highlight that conflict situations between humans and bears are growing and it is unknown if this is due to population growth or whether the conflict is due to potential behavioral changes in the bear.

Additionally to this is the change in the nomadic lifestyle of the Tibetan herdsmen. Whilst most still live a nomadic lifestyle the change from the traditional nomadic lifestyle has changed. Up until the twentieth century herdsmen would live in tents year round and move between pastures over the season, taking with them their family, livestock and all possessions (Worthy and Foggin 2008). However between 1980 through to the mid 1990s land and livestock were privatized and thus these assets were then able to be allocated among families (Worthy and Foggin 2008). Subsequently houses began to be built and whilst herdsmen still moved between pastures the houses were able to be used to store material belongings, including food. Consequently this has provided the brown bear with an 'undefended' source of food (Worthy and Foggin 2008). Coincidentally Worthy and Foggin (2008) documented that according to the herdsmen such conflict between the herdsmen and the bears increased substantially over the summer period in 2007 as a result of a policy aimed at eradicating the plateau pika (*Ochotona curzoniae*). Unfortunately the pika constitutes the main food source of the Tibetan brown bears diet and it is likely that their population reduction is responsible for the increased incidence in bears raiding homes in search of an alternative food source.

Past preventative measures in this area have included strengthening doors, walls, building

fences around the houses, leaving radios playing, guard dogs and fire crackers, all of which to date have mostly been unsuccessful (Worthy and Foggin 2008). According to a facilitated meeting Worthy and Foggin (2008) reported that at the meeting it was agreed that the main cause of bear raiding's was due to bears searching for the food supplies left inside the house. Carrying food supplies was deemed impractical by the herders.

A solution to the problem was trying an alternative preventative measure project adapted from a successful bear –proof project in North America. This project included creating a 'bear-proof container' which could be partially buried in the ground and located near the home of each of the herders. In addition to this would be to include an electric fence around the homes that is solar powered and could aid in bear protection. This was seen as the most effective option to assist in alleviating human-bear conflict in this region. Worthy and Foggin (2008) also indicate the need for Sanjiangyuan National Nature Reserve to continue to address the increase in human-bear conflict and suggested that a compensation program should be considered in future planning to ensure the continued community support for wildlife conservation that has been persistent in this region.

In recent years, human activities have been incessantly expanding to the northern areas of Changtang in Tibet Autonomous Region (northern Tibet, to the north of Nyainqentanglha Range), an area which used to be considered no man's land. Meanwhile, by presence of local wildlife conservation efforts for more than a decade, there has been a partial restoration of local wild animals with their diminishing feelings of apprehension to human beings. The interaction of these two factors has contributed to the increasingly prominent conflict between local residents and wild animals. The activities of some large mammals have triggered the loss of local residents' property or income. Hence, local residents have questioned the current nature conservation, leading to more strain on protection efforts. Studies conducted in other countries and regions have shown that conflicts between humans and animals have a negative impact on the latter; particularly carnivores and this impact can consequently effect the healthy development of herds.

In 2006, the government of Tibet Autonomous Region promulgated the “*Interim Compensation Measures for Personal Injury and Property Damage Caused by Key Terrestrial Wild Animals in Tibet Autonomous Region*”. This stipulates that the government offers funds as partial compensation for residents affected by wild animal accidents, in order to alleviate their economic losses and mitigate their misunderstanding of wildlife protection. The measure has been warmly welcomed by local residents since its implementation.

However, the current compensation policy for accidents adopts a remedial attitude with singular measures, which cannot fundamentally abate the number of conflicts between human and animals. In the long run, the more losses residents will face, the more burden government will shoulder. Therefore, there is an urgent need to research on the scientific preventive measures against the conflicts to abate the frequency of their occurrence, to lower the losses of local residents and to dent the negative impacts on wild animals.

In order to explore preventive measures suitable for Changtang grassland, we selected Tibetan brown bears as the research object as it had the greatest number of accident records. We launched the project in order to experiment and demonstrate for preventive measures to be taken against Tibetan brown bear accidents in communities during 2008-2009. During the project, through discussions undertaken with communities, the task force selected and decided on 20 demonstration sites in Pubao Town (Ban'ge County), Baling Township (Shuanghu Special Zone) and Nima Town (Nima County), involving 40 herding households and 7,337 livestock. Together with the households, the task force designed and established the protective measure of a pasture fence. With demonstration households completing monitoring forms on a regular basis (a total of 224 copies have been collected) and on-site visits by the task force, the effects of pasture fences in demonstration sites have been tracked and monitored for a whole year or for six months. In the meantime, the task force selected 10 personal behaviors to prevent brown bear accidents, printed them on posters and brochures and distributed them to the local residents.

According to the current testing and feedback, protective pasture fences played a certain role in preventing damage from brown bears. In all demonstration areas, it was recorded that, from the second half of 2008 to the second half of 2009, brown bears appeared around demonstration households for a total number of 71 times, tried to attack or attacked the fences approximately 16 times, broke the fences 4 times, resulting in the loss of 7 sheep. In

demonstration areas, livestock loss rate decreased by over 90% compared with the annual average prior to the establishment of protective pasture fences. Additionally brown bear's visit rate dropped by 53%. Thus, we can conclude that the adoption of normative preventive measures, such as protective pasture fences can indeed abate the extent and frequency of brown bear accidents.

YUNNAN PROVINCE AND HUMAN-ELEPHANT CONFLICT.

Populations of the Asian Elephant (*Elephas maximus*) in Xishuangbanna, Lincang and Puer in Yunnan province are estimated to stand between 200-250 individuals (Qingcheng *et al* 2011). Despite the substantially low population size human-elephant conflict is prominent in these areas. Human death and illegal poaching being the greatest consequences of this conflict. A study by Qingcheng *et al* (2011) investigated local perception and attitudes toward elephant-related problems and conservation in Xishuangbanna (South-western China) and used results from this to put forward strategies to alleviate such conflict. They found that more than half the participants that they interviewed were willing to support (in some form) the conservation of wild elephants. However this studied also demonstrated that the local communities had their own views and opinions of what causes elephant related problems, none of which acknowledged or included the range restriction that elephants have undergone since their habitat was converted to cultivated land.

They found however that local communities were enthusiastic about the mitigation of human-elephant conflict and their views on the matter were largely focussed on separating wild elephants from humans with some sort of artificial blocks. Local communities also acknowledged that planting food resources on the outskirts of the reserve could work well initially but they were concerned that it would change the feeding habits of the elephants and that this would lead to further damage in the future. The authors suggested that in Xishuangbanna linking the reserves together by constructing corridors would help to effectively mitigate the conflict but they recognized that gaining local community support was necessary for its success. The authors identified that the main reason for poor or indifferent perceptions and attitudes toward wildlife conservation was likely due to education level, local communities' perception of human-elephant conflict, gender and self-interest. They put forward three suggestions to help assist human-elephant conflict in this area which include public education on how to co-exist between humans and elephants, withdrawing human inhabitants and agricultural cultivation where wild elephant problems are apparent and lastly suggested that compensation should be considered for the future.

In addition to the above case studies table 4 below summarises some of the other current actions being taken in China to mitigate human-wildlife conflict as well as their strengths and weaknesses

Region	Species causing conflict	Management Practice	Strengths	Weaknesses
Jilin Province, Hunchun (Berger, 2011 and WCS)	Amur Tiger	Compensation	Community support Aided in tolerance toward tigers	<ul style="list-style-type: none"> - Financial burden - Current policy lacks incentive for villagers to take preventative measures.
Jilin Province, Changbai Mountain (Xiang Guiquan)	Wild Boar	Using tiger scats, pig blood and chemicals (formaldehyde 20-30%) and construction of ditches to deter wild boars from encroaching on farm land	Initial pilot study shows signs of success with the use of pheromones	<ul style="list-style-type: none"> - Need further research - Assistance and willingness needed to expand and experiment at a larger scale.
Yunnan Province, Simao (Zhang and Wang 2003)	Elephant	Sound, light, fire, man-made salt ponds	<p>Success initially with sound and light</p> <p>Salt licks successful in providing a sought out resource and prevented elephants from pursuing access to the villages</p>	<ul style="list-style-type: none"> - Elephants learn over time that the noise is a false threat therefore this is a short-term fix! - Large amounts of salt is required and intensive labour for construction.
Laoxiancheng Nature Reserve, Shaanxi Province (Cai <i>et al</i> 2008)	Wild Boar	<p>A) Setting up straw-men</p> <p>B) burning plastic or rubber shoes</p> <p>C) campfires</p> <p>D) guard dogs</p> <p>E) Human Patrol</p> <p>F) Eco-tourism development</p>	<p>Only method E and F have shown signs of success</p> <p>Increasing human patrols have been identified as successfully deterring wild boars.</p> <p>Additionally ecotourism development has led farmers to plant fewer crops and invest and subsequently earn more from eco-tourism.</p>	<ul style="list-style-type: none"> - Methods A-D have been largely unsuccessful in reducing the growing number of conflicts.

Table 4: Summary of other Human-Wildlife Conflict Mitigation Cases in China

RECOMMENDATIONS

Based on WCS experiences in China, we recommend that in response to wild animal accidents, more considerations should be given to preventive measures. We suggest a shift from singular compensation at its current stage to a combination of compensation and prevention. A resolution program with prevention playing the primary role complemented by compensation should be taken into account at a more mature stage in the future, so as to develop more sustainable and integrated prevention policies and measures. At the same time, it is necessary to encourage targeted research and monitoring of wild animal populations and activities and establish corresponding databases and forecasting models. This can ensure that the solution measures of the conflicts will not affect healthy wild animal populations and will maintain the effectiveness of protection while assuring the livelihood interests of local residents.

From review of international experiences (Appendix A), we have provided 5 recommendations to assist the current compensation program to better meet its goal of alleviating human-wildlife conflict.

RECOMMENDATION ONE: MAINTAIN AND INCREASE EFFORTS TO ENFORCE THE EXISTING LEGISLATION AGAINST HUMAN ACTIVITIES (ESPECIALLY LIVESTOCK HUSBANDRY) INSIDE THE CORE ZONE

There is already existing legislation that forbids human activity inside the core zone of the reserve. It would be beneficial to increase the enforcement efforts of this legislation to ensure minimal disturbance of the core zone. This should be done by enforcing the removal of all livestock from the core zone thus directly reducing human-wildlife conflict. Similar enforcement is conducted in Australia where legislation outlines restrictions in human activity in designated habitats such as Remnant Native Grasslands, National and Conservation Parks, Protected Coastal lands etc. Breaches of rules outlined in the legislation can result in severe penalties or prison time (*National Parks and Wildlife Act 1972; Native Vegetation Act, 1991; Natural Resources Management Act 2004; Pastoral Land Management and Conservation Act 1989*)

Implementation of recommendation 1

- Educate the local people so they are aware of where the boundaries of the core zone are and the consequences (fines) that apply if found partaking in any activity in the core zone of the reserve.
- Increase patrols in the reserve to monitor illegal activity and enforce fines/punishment for activities found in the core zone.
- Provide interpretive signage demonstrating the location of the boundaries of the core zone.

RECOMMENDATION TWO: CHANGE THE 'FLAT RATE; COMPENSATION FROM 100 TO A SPATIALLY DEPENDENT ONE

Currently compensation is given at a flat rate and damage/loss is paid at a market price regardless of where the loss/damage occurred. In order to complement recommendation 1, it is suggested that the decision of compensation payment amount becomes a spatially dependent one. For example the closer to a protected area the loss occurs the lower the compensation amount or in the case of the core zone no compensation payment should be given.

This concept is used in a compensation payment program in Finland as outlined in the review (Klemm 1996). Additionally similar restrictions on compensation payments are used in Namibia (Lamarque, *et al* 2008; Morrison, *et al* 2009). Livestock loss and crop damage in Namibia caused by crocodiles, elephants and large cats have resulted in retaliatory killings. A compensation payment program has been put in place that assists in alleviating this conflict. The program covers human life, livestock death and crop damage, however **NO** payments are made to farmers whose livestock were killed in protected areas.

RECOMMENDATION THREE: IMPLEMENT AN INSURANCE SCHEME

In 2011 WCS conducted a social survey in 12 villages and interviewed 113 households about their current livelihood practices and their views and understanding of the compensation process (Chin, 2011 and Berger, 2011). Our survey results show that there was a strong interest among our surveyed population to participate in an insurance program. We asked 95 households if they would be willing to pay a small annual insurance fee per head of cattle if this payment would guarantee they would be compensated at full market price within 2 months. 70% of households responded saying they would be willing to pay for insurance (fig 4). It is therefore suggested that this be an option for further investigation.

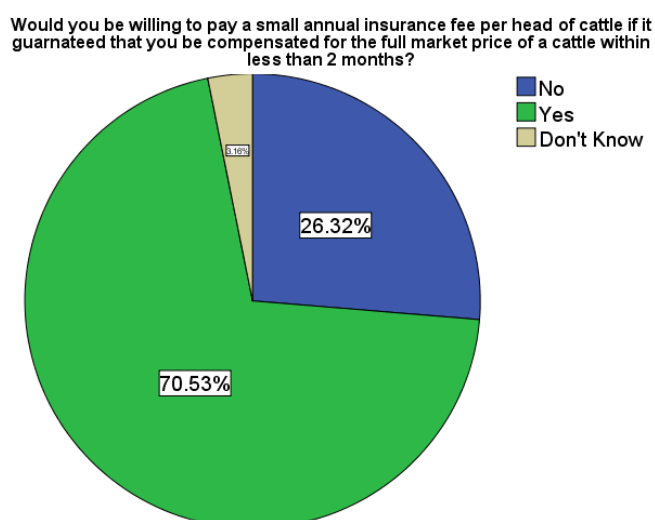


Fig 4: Graph of the percentage of households that showed an interest in paying insurance

Insurance schemes can assist compensation programs by reducing the financial burden often carried by government organisations that currently fund compensation payments. Insurance schemes in their early stages in Pakistan (outlined early) and India are showing signs of success as an alternative way to fund compensation (Hussain 2000 and Mishra, *et al* 2003).

EXAMPLE FROM INDIA

Similar to our own survey results in Hunchun. A survey amongst local farmers in India revealed that farmers in areas who suffer large amounts of livestock loss due to the snow leopard were willing to join a self-financed compensation scheme. This scheme involved households paying a monthly premium per head of livestock that would then entitle them to insurance and subsequent financial compensation for any loss of livestock as a result of wildlife predation (Mishra, *et al* 2003). Currently this insurance program is supported with funds from an NGO. No current up to date data is available of the success of this program to date.

An initiative that has developed from this program and has proved to be successful for conservation is the concept of distributing awards for good husbandry practices. This is accomplished by using the insurance fund to provide bi-annual momentary awards to farmers who have lost the least amount of livestock creating a large incentive for preventative measures.

RECOMMENDATION FOUR: LINK COMPENSATION TO PREVENTATIVE ACTIVITIES.

As outlined in our review many compensation programs around the world enforce farmers/herders to take preventative measures in order to be eligible for compensation if they lose stock. This assists the compensation program to be more accountable to the intended conservation objective. For example by enforcing farmers to bring their stock in at night reduces the risk of them being killed by wildlife and reduces the impact the stock has on the environment. However if unfortunately the farmer still happens to suffer a loss, the human-wildlife conflict is still alleviated as they are eligible to be compensated for their loss due to the fact that they were following the appropriate preventive measure guidelines, i.e. bringing their stock in at night.

Preventative measures vary depending on the compensation program. Some have very strict rules associated with eligibility to compensation others have less severe rules. Table 5 outlines a few examples from around the world. Not all preventative measures can be adopted from other countries and research into measures that are feasible for the location and species in question is required in order for them to be successful.

Location	Animal	Preventative measures required
Greece (Fourli, M. 1999)	Bear and Wolves	There are two known sites where projects have been set up to provide them with electric fencing. At these two sites all livestock are to be kept inside the fence or farmers are not eligible for compensation. For most other areas preventative measures are only required where there are repeated cases of damage.
Portugal (Fourli, M. 1999)	Wolves	If sheep/goats are free-ranging there must be at least one shepherd and one guard dog for every 50 animals. If sheep/goats are kept in an enclosure they must have a guard dog In regards to cattle and horses, if the animals are in groups of less than 8, a person is required to guard them. If the group is more than 8 they are required to be checked at least once a week.
Kenya-Massailand (Murphy, J. 2010)	Lion	Livestock are required to be kept in an enclosure at night and this enclosure must be in a well maintained condition. If this is violated and livestock were killed whilst wandering unprotected the compensation payment can be reduced to half.
Abruzzon Region Italy: (Fourli, M. 1999)	Bear and Wolves	Sheep and goats are required to be guarded

Table 5: Some examples of preventative measures that are required as a condition for eligibility to compensation payment.

RECCOMENDATION FIVE: COMPENSATION IN ADVANCE PAYMENTS

Compensation in advance payments have been adopted and shown to be successful in Sweden and Germany (Fourli 199 and Schwedtner and Gruber 2007). It allows public authorities better opportunity to manage and budget for compensation each year. Allocating a set budget and distributing it amongst farmers may encourage farmers to take preventative measures to protect their livestock and thus turn their payment into income.

Alternatively a set amount of the compensation budget (20-30%) could be given to the farmers at the beginning of the year to spend on preventative measures. If appropriate measures are not taken to protect their livestock from depredation then eligibility to compensation could be withdrawn.

SUMMARY

Compensation is one of many initiatives aimed at alleviating human-wildlife conflict. Unfortunately it can be one of the most financially draining and runs the risk of being a pool of money that is dispensed amongst victims of wildlife damage without any associated accountability. In many cases compensation does nothing to encourage preventative measures and in some extreme cases it has been suggested that compensation encourages the opposite and pastoralists will actually reduce their efforts to protect their livestock and just receive the compensation payment instead (Bulte and Rondeau, 2005; Nyhus, *et al* 2003; Rondeau and Bulte, 2007). Additionally having no accountability for the safety of their livestock and having the security of compensation can often provide a good incentive for

livestock owners to increase their numbers of stock. The consequence of this can lead to more disturbance of the land, a reduction in the number of native herbivores and consequently an increase in depredation of livestock. For a compensation program this can be financially unsustainable.

The recommendations that we have suggested utilise lessons from around the globe and are all aimed at improving the current compensation program. By encouraging enforcement of existing legislation and enforcing spatially dependent compensation payments (outlined in recommendation one and two) will directly assist in restricting activity in the core zone of the park and subsequently alleviate human-wildlife conflict.

Recommendation three is largely focussed on results from our survey that indicated a strong trend for interest in an insurance program and could be a project that warrants further research. A community self- financed insurance program could eliminate (at least in part) the financial burden often suffered by the government who currently pay for compensation.

Recommendation four is aimed at making compensation more accountable to conservation goals. Preventative measures are currently actioned in several current compensation programs around the world. Eligibility for compensation is directly linked to preventative measures that are required to be taken to reduce the risk of an attack. Further research would be required in order to develop the most appropriate preventative measures that could be enforced for each area.

Lastly recommendation five is based on an initiative seen in Germany and Sweeden where compensation payments are made in advance. Again this helps compensation to be more accountable to conservation by encouraging farmers to take preventative measures to either to turn the payment into direct income.

For further details of the compensation process in other countries please see appendix (A) and/or refer to Berger, J. (2011).

Lastly compensation is just one of many conservation initiatives that can be used to alleviate human-wildlife conflict. Ideally compensation should be used in combination with several other conservation programs. Goodrich (2010) outlines the need for a comprehensive plan to tackle human-wildlife conflict and this includes, (but is not limited to) such things as education, community involvement, incentive programs and reactive measures. Reactive measures can include techniques like hazing (scaring away of the animal), radio telemetry to monitor wildlife movement and even in some more extreme cases, translocation. Goodrich and Miquelle (2005) showed in their study that in the case of “problem” Amur tigers translocations could in fact be a viable option to consider. It would be recommended that combinations of conservation based programs along with compensation are considered as tools in battling human-wildlife conflict.

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APPENDIX (A):

Incentive and Compensation Programs: Examples From Across the Globe.

INCENTIVES AND ALTERNATIVES TO COMPENSATION

REFERENCE: Mishra, C., Allen, P., McCarthy, T., Madhusudan, M. D., Bayarjargal, A., and Prins, H. H. T. (2003). The role of incentive programs in conserving the snow leopard. *Conservation Biology* **17**(6), 1512-1520

COUNTRY – India

ALTERNATIVE – Insurance Program

ANIMAL - Snow Leopard

PROBLEM - Research in the area showed that competition from livestock with wild ungulates was a serious area of conflict leading to the decline of wild ungulates. This has resulted in livestock now constituting approximately 40-58% of the diet of the snow leopard! This has led to serious HWC with retaliatory killings threatening the survival of the snow leopard.

Current Policy Issues leading to need for change!	Social Research Results	Aim	How it was Actioned	How the Insurance Fund is Implemented	Benefits of the Insurance Program
<p>Compensation rate is low with an average of only 3% of perceived loss being compensated.</p> <p>Compensation payments were also low, 6-20% of market value.</p> <p><u>THEREFORE:</u> Current policy was not mitigating conflict</p>	<p>Surveys indicated that most families would be willing to contribute on average around 4.8% of their average monthly per capita income, if a self-financed compensation scheme was developed in the area</p>	<p>It was recognised the reduction of stock was not a viable option as the community relied too heavily on them for income. Therefore they aimed to set up livestock grazing free areas and a communal insurance fund.</p>	<p>The council in exchange for a yearly sum of (US\$425) set aside part of its regularly grazed rangeland and implemented a suspension on all forms of agriculture (grazing, ploughing etc.) In addition three villagers are employed as guards.</p> <p>The money paid by the NGO is to be used for community projects to benefit the village.</p>	<p>In 2002 the insurance program began.</p> <p>The village council appointed a committee of 4 villagers to oversee its implementation.</p> <p>Villagers contribute monthly premiums toward livestock. A NGO is currently helping with funds until it is self-sustaining (Predicted to be in 2-3 years time however we have not data on its current status)</p>	<p>Biannual monetary rewards that come out of the insurance fund and are paid to herders with the least number of livestock predation cases, providing an incentive toward prevention practices!</p> <p>Insurance program provides better rate of payment, up to 100% compared to current payment of 6-20%. The biannual monetary reward deters false claims.</p>

REFERENCE: Mishra, C., Allen, P., McCarthy, T., Madhusudan, M. D., Bayarjargal, A., and Prins, H. H. T. (2003). The role of incentive programs in conserving the snow leopard. *Conservation Biology* 17(6), 1512-1520

COUNTRY – Mongolia

ALTERNATIVE TO COMPENSATION – Incentive program to add value to wool

ANIMAL - Snow Leopard

PROBLEM: Almost 1/3 of Mongolia's people have a pastoral lifestyle and livestock constitutes the wealth of most herding families. The sale of wool is the MOST important source of cash income. Therefore losses of livestock to predators such as the snow leopard cause a substantial economic loss. As a result in Mongolia there is a high level of retaliatory killings.

Current Policy Issues leading to need for change!	Social Research Results	Aim	How it was Actioned	How it works	Benefits
<p>Not a lot of information but suggested it is very similar to India, slow to process and less than market value. I would guesstimate from literature that access to compensation for many nomadic herders is not feasible.</p> <p>Retaliatory killings are considered a very big problem in Mongolia!!</p>	<p>Herders are dependent on passing traders to sell raw wool and have little <u>control over price</u>.</p> <p>Research also indicated that it was difficult for herders to access markets.</p> <p>Surveys also highlighted that herders work as independent units and are very resistant to work collectively!!</p>	<p>To improve access to the markets in exchange for a conservation commitment from them.</p> <p>The program focuses on the value addition to wool.</p> <p>Aim for the NGO to assist in the setup of the program and in return herders are to assist in the protection of wildlife.</p>	<p>Due to results from a survey indicating the reluctance of herders to join a cooperative the NGO opted to initiate a program on an individual basis with each herder family.</p> <p>Herders are trained and encouraged to produce hand craft products.</p> <p>These products sell for about 15-20 times more than the raw wool.</p>	<p>The NGO guarantee to purchase a set number of handicrafts. In return, herders sign a contract committing to a specific conservation action. Such as a complete ban of poaching.</p> <p>The NGO purchase the products at the agreed price and if herders have honoured their conservation contract they receive a 20% bonus.</p> <p>Any violation (i.e. in this case poaching) in the project area by either a person in the community or outside results in a loss of the bonus for ALL participants.</p>	<p>The loss of the bonus provides incentive for herders to maintain their conservation contract and to protect wildlife.</p> <p>The program is growing in popularity and since the start of the program herders have begun to organise into collective groups, therefore increasing conservation impact.</p> <p>So far there are no reports of snow leopards being killed in the project area since the program was initiated.</p>

REFERENCE: Hussain, S. (2000). Protecting the snow leopard and enhancing farmers' livelihoods. *Mountain Research and Development* **20**(3), 226-231.

COUNTRY – Pakistan: Specifically the Northern areas of Pakistan, a village of Skoyo Baltistan

ALTERNATIVE TO COMPENSATION – Insurance scheme and Ecotourism activities

ANIMAL – Snow leopard

PROBLEM - In Pakistan livestock represents a significant source of income as well as important assets of which farmers rely on in times of hardship. Therefore when snow leopards kill livestock this presents a huge financial burden. As a result retaliatory killings have now become a major threat to the survival of the snow leopard in Pakistan.

Social Research Results	Aim	How it was Actioned	How it works	Benefits
The loss of livestock to snow leopards is a random risk but the risk is evenly distributed. This lead to a good argument for collective coverage of farmer's individual risk.	<p>INSURANCE: To set aside a collective pool of money equal to the value of the average annual loss rate. Allowing the community to spread the risk and reduce the impact of a loss</p> <p>ECOTOURSIM: Generates a second fund that helps to co-finance the insurance fund for compensation payments.</p>	<p>All households in the village take out the insurance on their goats</p> <p>The premium rate is 1% of the goat's current value.</p> <p>Insurance premiums are paid annually and into one fund and records are kept of who has paid.</p> <p>In a separate account profits made from ecotourism trekking packages get put in a second fund.</p> <p>A village insurance committee was set up. The committee is nominated by villagers</p>	<p>To claim, a farmer has to formally file an application</p> <p>The Committee verifies the killings and makes recommendations.</p> <p>If they recommend compensation then the claimant receives their individual accumulate of the premium amount paid to fund 1. If the fund is not enough to cover the loss then fund 2 (tourism fund) is used to cover remaining cost.</p> <p>If fund two is not used and grows past a particular threshold then the surplus income can be distributed equally among members</p>	<p>It is difficult to cheat this scheme</p> <p>There is a strong incentive to let Fund 2 grow and gain bonus pay outs. This can encourage more preventative measures.</p>

Reference: Fourli, M. (1999) Compensation for damages caused by bears and wolves in the European Union. In. ' Ed. NSaCP Environment

COUNTRY – Sweden

ANIMAL – Bear, wolf and lynx

PROBLEM: Reindeer herding is one of the most widespread land-uses. Damage from large carnivores is a serious problem. Wolves are a large problem in Sweden as they feed almost exclusively on the reindeer.

Legislation	How it works	Payment	Benefits	Negatives
1996 a compensation-in-advance scheme was introduced	<p>A compensation in advance system was set up in reindeer herding districts that contained verified reproducing carnivores. E.g. Presence of a wolverine den or a reproducing lynx family</p> <p>Money is given up front to the herding community each year regardless of if they experience a loss or not.</p>	Currently for a reindeer district the level of compensation in advance for having a den or reproducing lynx family is equal to the market value of 200 reindeers. This is irrespective of the actual number of reindeers that may or may not be killed.	There is a large incentive to take preventative measures to reduce the risk of losing reindeer in order to turn compensation money into direct income	<p>In Sweden the compensation is not paid directly to the owner but to the reindeer herding district. The district board has a right to decide about the use of the money.</p> <p>IE. If it will give the money to individual owners who lose an animal or whether it be invested into the profit of communal herding. This has resulted in tension between owners and the district board.</p>

REFERENCE:

Lamarque, F., Anderson, J., *et al.* (2008) Human-wildlife conflict in Africa; An overview of causes, consequences and management strategies. In. ' pp. 1-81. (International Foundation for the Conservation of Wildlife: Food and Agriculture Organisation of the United Nations)

Morrison, K., Victurine, R., and Mishra, C. (2009) Lessons learned, opportunities and innovations in human wildlife conflict compensation and insurance schemes. WCS TransLinks Program.

COUNTRY –Namibia

ANIMAL – crocodile, elephants, large cats.

PROBLEM: Predation on livestock resulting in retaliatory killings.

Legislation	How it works	Payments/Requirements	Benefits	Negatives/Recommendations
Compensation programs here were previously financially unsustainable. A Human Animal Conflict Self Insurance Scheme (HACSIS) was developed by a NGO with 9 other conservancies. It was funded by grants	Businesses that directly benefit from wildlife are accepting some of the costs associated with compensating people for HWC damage. In this scheme villagers pay NO premiums. Rather the business owners benefiting from wildlife pay for insurance against claims made by the villagers for wildlife damage. The local NGO pay half of the cost and the businesses/conservancies pay the other half.	Compensation payments are only paid to members who have taken the required precautions to protect their livestock. This includes the use of crocodile proof fences at drinking points for cattle, putting cattle in a pen at night, herding during the day etc. No payments are made for livestock killed in protected areas.	The scheme covers human life, livestock death and crop damage.	Cost of damage is beginning to threaten bankruptcy of the local NGO. Current discussions are looking into expanding the program to include more businesses/conservancies as well as investigating the development of an endowment or a trust fund so claims can be paid out of the interest of the fund.

COMPENSATION PROCESSES: EXAMPLES FROM OTHER COUNTRIES

REFERENCE: Fourli, M. (1999) Compensation for damages caused by bears and wolves in the European Union. In. ' Ed. NSaCP Environment)

COUNTRY – France

ANIMAL – Bear and Wolf

PROBLEM: Predation of livestock by bears and wolves. Bears also cause damage to infrastructure such as farming equipment, fences and beehives and can invade crops such as corn and fruit trees.

Legislation	Compensation Procedure	Compensation Criteria	TIME UNTIL COMPENSATION PAYMENT	Conditions of Compensation	Compensation Calculations
<p>The state compensate for wolves, bears and lynx. The Departmental Direction of Agriculture and Forest is responsible for decisions.</p> <p>To fund compensation they rely on NGOs, Hunting associations and inter-communal groups (such as tourist development associations)</p>	<p>Two procedures</p> <p>Wolves: The claimant has to contact DDAF. An inspection is made. Final decision of payment is made by DDAF based on expert opinion and report.</p> <p>Bears: The claimant must contact within 48hrs. Inspection occurs within 36 hours of contact and a report made. The claimant also completes a damage declaration report. Reports are sent to DDAF for assessment</p>	<p>With respect to the probability of the livestock being killed by a predator The inspection can be deemed as either; Positive, Probably, Possible, Doubtful, Non-attributable and Undetermined.</p> <p>Compensation is awarded to inspections with a positive, probably or possible outcome.</p>	<p>WOLVES: Average of 3 months</p> <p>BEARS: Less than 1 month</p>	<p>Mostly no conditions or prerequisites are required to be eligible. The only exception is in the French Alps where preventative measures are required after the 4th attack (however this is not enforced)</p>	<p>Market value of crop or animal</p> <p>If attack was by a bear an additional allowance is given of 91 Euro per attack.</p> <p>An allowance can also be given for income foregone due to such things as reduction in milk production, abortion due to stress of attack etc. This is equal to 30 Euro per head. Or 10% of the value of the animal if it is worth more than 302 Euro.</p> <p>100% of veterinary costs paid</p>

REFERENCE: Fourli, M. (1999) Compensation for damages caused by bears and wolves in the European Union. In. ' Ed. NSaCP Environment)

COUNTRY – Greece

ANIMAL – Bear and Wolves

PROBLEM: Predation of livestock resulting in retaliatory killings

Legislation	Compensation Procedure	Compensation Criteria	TIME UNTIL COMPENSATION PAYMENT	Conditions of Compensation	Compensation Calculations
<p>The body responsible for payments is the Greek Agricultural Insurance Organisation (known as ELGA) Their financial source comes mainly from obligatory insurance premiums from farmers.</p> <p>They compensate for all kinds of damages including wild animal attacks, sickness and damage to infrastructure by weather.</p>	<p>The claimant must present a claim to the representative of the insurance company within 24 hours in summer and within 48hrs in winter.</p> <p>An inspection fee is also to be paid, with the purpose of discouraging false claims.</p> <p>Once fee is paid an inspector comes within 24-48hrs.</p> <p>A report is then sent to insurance office.</p>	<p>With respect to the probability of the livestock being killed by a predator The inspection can be deemed as either; Positive, Negative, Claim presented with delay, Old damage and Carcass not found.</p> <p>Compensation is only given for Positive</p>	<p>On average 2.5 months</p>	<p>Where there have been repeated cases of damage, the insurance company demands proper preventative measures to be taken.</p> <p>Two sites have had projects set up where they have provided them with electric fences for the safety of their livestock. This is now a prerequisite; if livestock are not kept within the fence they are not eligible for compensation.</p> <p>No compensation is given for crop damage if it does not exceed over 5% of the total crop</p>	<p>100% market value for bears and 80% for wolves. No money for disturbance, income forgone or medical expenses.</p>

REFERENCE: Fourli, M. (1999) Compensation for damages caused by bears and wolves in the European Union. In. ' Ed. NSaCP Environment)

COUNTRY – Portugal

ANIMAL – Wolf

PROBLEM: Predation of livestock resulting in retaliatory killings

Legislation	Compensation Procedure	Compensation Criteria	TIME UNTIL COMPENSATION PAYMENT	Conditions of Compensation	Compensation Calculations
<p>Only compensate the damage caused by the wolf.</p> <p>The institute for the Conservation of Nature (ICN) is the governmental body responsible for compensation decisions and payments.</p> <p>Funds come solely from the state budget.</p>	<p>The claimant must make contact with the ICN within 48 hours.</p> <p>Inspection is made on the same or following day of the claim.</p> <p>ICN makes decision</p>	<p>With respect to the probability of the livestock being killed by a predator The inspection can be deemed as either; Positive, Doubtful or Negative.</p> <p>Compensation is given if it is deemed positive or doubtful.</p> <p>Compensation is only given if the attack occurred in an area where wolf damage has already been observed.</p>	<p>Officially compensation should be paid within two months following decision of ICN. However it can take up to 1 year.</p>	<p><u>Strict Conditions</u></p> <p>If sheep and goats are free-roaming at least one shepherd and one guard dog must be used for every 50 animals</p> <p>If sheep/goats are kept in enclosure, they do not require a shepherd but must have a guard dog.</p> <p>With respect to cattle and horses, if the animals are in groups of less than 8 a person is required to guard them. If the group is greater than 8 they need to be checked at least once a week.</p>	<p>Market price</p> <p>All medical expenses resulting from an attack are compensated. No money is given for disturbance or income foregone.</p>

REFERENCE: Fourli, M. (1999) Compensation for damages caused by bears and wolves in the European Union. In. ' Ed. NSaCP Environment)

COUNTRY – Austria

ANIMAL – Bear

PROBLEM: Livestock predation resulting in retaliatory killings

Legislation	Compensation Procedure	Compensation Criteria	TIME UNTIL COMPENSATION PAYMENT	Conditions of Compensation	Compensation Calculations
<p>Wildlife management is the responsibility of the regional authority.</p> <p>Bears are game species and as a result all hunters must be members of a hunting assoc. As part of the membership approx. 50% is used to pay the premium to the private insurance company that cover the financial compensation of game species.</p> <p>WWF is the secondary body that assists with compensation payments</p>	<p>The claimant must make contact ASAP. An inspection is carried out within 2 days of report and then results given to insurance company.</p> <p>The claimant must also produce a report indicating value of damage. If damage estimates seem too high then an expert is called to give their own estimate.</p>	<p>With respect to the probability of the livestock being killed by a predator The inspection can be deemed as either; Positive, Probable, Doubtful or Negative</p> <p>The claim is only paid if the outcome is Positive or Probable.</p>	<p>1 -1.5 months</p>	<p>There is no conditions or prerequisites set up for bear damage by the insurance company</p>	<p>The insurance company does not use fixed lists. Instead compensation is based on the actual claims made by the people who suffered the damage. This ideally reflects market value.</p>

REFERENCE: Fourli, M. (1999) Compensation for damages caused by bears and wolves in the European Union. In. ' Ed. NSaCP Environment)

COUNTRY – Spain

ANIMAL – Bear and Wolf

PROBLEM: Predation of livestock resulting retaliatory killings

Legislation	Compensation Procedure	Compensation Criteria	TIME UNTIL COMPENSATION PAYMENT	Conditions of Compensation	Compensation Calculations
The regional administrations of the autonomous communities are responsible for the damage caused by wild animals.	<p>The claim can be presented to the nearest forest ranger who will then subsequently pass it on to the appropriate authority.</p> <p>There is no fixed deadline by law for the when the declaration of damage is to be made or for when the inspection is to be made.</p>	<p>The criteria for inspection outcomes vary depending on the region.</p> <p>Region 1: Three outcomes, Positive, Doubtful and Negative. Compensation is only paid for Positive.</p> <p>Region 2: There are four outcomes, Positive, Probable, Doubtful, and Negative. Compensation is only given for outcomes deemed Positive or Probable</p> <p>Region 3: There are only two possible outcomes, Positive or Negative. Compensation is given to only Positive Outcomes</p>	There is a large range depending on the region; It can range from 1-18 months.	No specific conditions or prerequisites are set for any of the seven Spanish regions.	<p>100% market value.</p> <p>However in two regions of Spain they pay 120-200% of market value.</p> <p>In Asturias there is payment for income foregone which amounts to 12-20% of the dead animals market value. This region also compensates for injured or lost animals.</p>

REFERENCE: Fourli, M. (1999) Compensation for damages caused by bears and wolves in the European Union. In. ' Ed. NSaCP Environment)

COUNTRY – Italy

ANIMAL – Bear and Wolf

PROBLEM: Poor tolerance toward wildlife

Legislation	Compensation Procedure	Compensation Criteria	TIME UNTIL COMPENSATION PAYMENT	Conditions of Compensation	Compensation Calculations
<p>Legislation delegates wildlife management to the regional authorities but there is NO obligation outlined in the legislation to provide compensation</p> <p>Each region handles its own procedures and funds. Fund can be financed by taxes, hunting licences, regional funds and in one region assisted by NGO, WWF</p> <p>Some regions provinces may insure themselves to cover their liability for damage caused by wild animals.</p>	<p>Incredibly variable depending on the region and also variable within region depending on if damage occurred within a national park.</p> <p>There is no set deadline for the when damage is to be reported or when the inspection must be carried out. However some regions do set deadlines in relation to compensation payment, however this is largely ignored</p>	<p>Varies between and within regions.</p> <p>In the eastern Alps, the region of Friuli-Venezia-Giulia: the inspection outcomes can be Positive, Doubtful or Negative. Compensation is paid if the outcome is either Positive or Doubtful.</p> <p>In the Western Alps, the region of Piemonte, the outcome categories can be Positive, Probable, Doubtful, Not Confirmed or Unverifiable. Compensation is paid for Positive and Probable.</p> <p>In central Apennines, there are only two categories either Positive or Negative. Evidently compensation is only paid for Positive.</p>	<p>Again varies depending on region but can range from 3-12 months</p>	<p>Very structured depending on the region.</p> <p><u>Abruzzon Region:</u> Requires the guarding of sheep and goats.</p> <p><u>Abruzzo Park:</u> Requires prior authorisation of grazing. Use of guard dogs/electric fences and requires livestock to be kept in pens at night.</p> <p><u>Maiella Park</u> Grazing authorisation required</p> <p><u>Marche</u> One guard dog for 50 sheep And use of enclosures</p> <p><u>Friuli-Venezia</u> Damage needs to be equal or greater than 51.3 euro</p> <p><u>Trento</u> Damage needs to be equal or greater than 102.6 euro and electric fences need to be used.</p>	<p>In most bear and wolf areas market price is used as the basis.</p> <p>However there are some areas that pay less. Marche and Piemonte pay 60% and Abruzzon also give lower payments due to low availability of funds.</p> <p>Aside from two regions in Italy the Piemonte region and Gigante Regional Park, no additional payment is given for medical treatment or income foregone.</p>

REFERENCE: Treves, A., Jurewicz, R. L., Naughton-Treves, L., and Wilcove, D. S. (2009). The price of tolerance: wolf damage payments after recovery. *Biodiversity and Conservation* **18**(14), 4003-4021.

COUNTRY – USA Wisconsin

ANIMAL – Wolf

PROBLEM: Livestock losses from wolves resulting in retaliatory killings

Legislation	Compensation Procedure	Compensation Criteria	TIME UNTIL COMPENSATION PAYMENT	Conditions of Compensation	Compensation Calculations
<p>Wisconsin began compensating for livestock loss to wolves in 1982 after the wolf was classified as an endangered species. However since then wolf numbers have increased and so have compensation claims!</p> <p>Compensation is funded by annual state income tax, a surcharge on specialty licence plates that depict a wolf and from state revenue</p>	<p>Claimant must contact the government within 24 hours of the depredation or loss event</p>	<p>Until recently field verification was required for compensation payments. However this caused frustration due to the difficulty in proving wolf attacks and the increase in wolf attacks meant it was not feasible to inspect them all.</p> <p>Therefore by 2007 it was formalised that compensation payments were made for all livestock based on prior verified losses, without the need of direct evidence of the predation event.</p>	<p>No consistent information available</p>	<p>For compensation of missing livestock the claimant must have tagged all calves and have records verifying the number of missing calves.</p>	<p>100% of market value</p>

REFERENCE: Murphy, J. (2010) Do Compensation Schemes Work? In. ' (African Lion and Environmental Research Trust;
<http://lionalert.org/pages/issues%20compensation%20schemes.html>)

COUNTRY – Kenya - Maasailand

ANIMAL – Lion

PROBLEM: Pastoralists lose livestock to lion predation and as a result take retaliatory measures including killing lions and other predator. Poisoning, snaring or spearing are common methods of killing the animals.

Funding	Compensation Procedure	Compensation Criteria	TIME UNTIL COMPENSATION PAYMENT	Conditions of Compensation	Compensation Calculations
<p>The Mbirikani Predator Compensation Fund (MCPF) was established by Richard Bonham and Thomas Hill of the Maasailand Preservation Trust (MPT) in 2003.</p> <p>Agreements with the Mbirikani Group Ranch (MGR) committee who represent the interests of pastoralists agreed that the funding of the scheme would be divided 70/30 between the MPT and the MGR committee</p>	<p>Claims need to be made within 24hours of the kill and payments are made for livestock that have been killed or within 1.5km of MGR</p>	<p>Claimants are expected to provide evidence of their loss. In the form of a carcass, or some form of physical evidence such as spoor or drag marks.</p> <p>Unsuccessful claimants can be fined if the verification officer feels they are making a false claim.</p>	<p>If claim is successful then payments in cash are made on a bi-monthly basis.</p>	<p>Livestock are required to be kept in a boma (enclosure) at night and this must be kept in a well maintained condition.</p> <p>Livestock are not allowed to wander unprotected.</p> <p>If these criteria are violated the compensation payment can be reduced to 50%.</p> <p>If poaching or retaliatory killing occurs and culprit is identified they will be fined and all pastoralist who live in the area will have compensation payments due to them suspended for 2 months. The rationale is to create an element of collective punishment where ideally pastoralists are less likely to kill lions for fear of the aftermath of the loss that their fellow kinsmen will experience as a result of their action.</p>	<p>NO AVAILABLE INFORMATION</p>

REFERENCE: Linnel, J. D. C., and Broseth, H. (2002) Compensation for large carnivore depredation of domestic sheep 1994-2001. In. '*A large Carnivore Initiative For Europe; Carnivore Damage Prevention News.*

COUNTRY – Norway

ANIMAL – Wolves, bears, lynx and golden eagle

PROBLEM: Predation of sheep. Lambing generally occurs in spring and is indoors however as soon as lambs are large enough and the snow has melted they are released into fields surrounding the farm. Sheep farmers now exploit the grazing resources provided in the forests and mountain (similar to China). Sheep are generally un-herded, unguarded and unsupervised. However with a legal change to the protection of large predators their numbers have slow begun to increase and consequently this has increased the predator/sheep conflict.

Legislation	Compensation Procedure	TIME UNTIL COMPENSATION PAYMENT	Conditions of Compensation	Compensation Calculations
Funding comes from National Government and County level	The claimant is responsible for finding the sheep killed/injured by the predator. An inspection is carried out in order to confirm findings.	No information available	Documentation of loss is required Evidence of permanent presence of large predators within the region and a history of depredation occurring in the grazing area.	Value is designed to cover the slaughter value of the sheep. On occasion payments are given for loss of production from a ewe

REFERENCE: Nemtsov, S. C. (2003) A short-lived wold depredation compensation program in Israel. *A large Carnivore Initiative For Europe; Carnivore Damage Prevention News*.

COUNTRY – Israel

ANIMAL – Wolves

PROBLEM: Livestock predation resulting in retaliatory killings (program only ran for a year)

Funding	Compensation Procedure	Compensation Criteria	TIME UNTIL COMPENSATION PAYMENT	Compensation Calculations	Problems and Alternatives
One quarter of the scheme was paid for by the federal government. The rest was covered by a sponsor	All cases are required to be approved by a government wildlife ranger	The inspector needs to find proof that the animal was killed by a wolf. Compensation rates were relatively low.	Payments were made once every 6 months for all documented approved cases	Compensation was paid at 100% if the farmer had an electric fence or guard dog. Compensation was paid at 80% if herd was not fully protected. Approved cases of missing calves were compensated at 80%	Program only lasted one year (1998-99) after the sponsor withdrew its support. They felt money would be better spent on protection rather than compensation. Since then ranchers have received government subsidies to purchase electric and conventional fences, to train guarding dogs etc. Their effect in protecting sheep has been substantial.

REFERENCE: Hotte, M., and Bereznuik, S. (2001) Compensation for livestock kills by tigers and leopards in Russia. In. ' (A large Carnivore Initiative For Europe; Carnivore Damage Prevention News.)

COUNTRY – Russia – Khasanski Rayon (Far-East Russia)

ANIMAL – Amur tiger and Amur Leopard

PROBLEM: Livestock predation largely deers, resulting in retaliatory killings

Funding	Compensation Procedure	Compensation Criteria	TIME UNTIL COMPENSATION PAYMENT	Compensation Calculations
Funding comes from the Tigris Foundation	<p>Farm-staff contact the Tiger team when they discover a kill or remains.</p> <p>The report is checked by an inspector within 24 hours</p> <p>Once established how the animal has been killed the inspector and farm staff agree on the value of the animal that has been killed.</p> <p>An agreement is then drawn up detailing the livestock killed, date, place, circumstances and the agreed compensation amount.</p> <p>The copies of the agreement are sent to 'Inspection Tiger' and 'Phoenix Fund'. Phoenix fund are responsible for paying the compensation from money funded by the Tigris Foundation.</p>	<p>Farmers that want to be eligible for compensation are required to sign an agreement with the Phoenix Fund.</p> <p>The agreement states that farmers will not take actions that can harm the tiger or leopard. It also states that they will report all available info about tiger and leopard poachers.</p>	Could not find this information	Between September 1999 and Nov 2000 compensation of around \$US 1,360 were made for livestock kills

LESSONS TO BE LEARNED FOR CHINA PROGEAM

- Include conditions for entitlement to compensation (fencing, bringing in cattle at night, provide guard dogs, shepherding etc.)
- Engage private businesses that directly or indirectly benefit from wildlife to contribute to HWC compensation. This will assist in alleviating funding shortage
- Include a fee for compensation applications to reduce false claims
- Use of fines for bad/fraudulent claims
- Investigate the possibility of Private Insurance to cover all or part of the financial burden of compensation payments
- Investigate the possibility of developing a program of advance payment, similar to what is done in Sweden. This could result (as it has in Sweden and Germany) in farmers taking more preventive measures to turn the money into direct income for themselves or for the village.