

# LIVESTOCK PREDATION IN CENTRAL BHUTAN:

## THE IMPACTS OF SOCIAL AND ECONOMIC CHANGE



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## ABSTRACT

## 1. Introduction

Historically, one of the main production problems faced by pastoralists, along with epizootic disease, is predation. In Africa, Asia and parts of the New World<sup>1</sup>, extensive pastoral zones were also occupied by predators specialised in grazing species. These predators presumably rapidly discovered that, as part of the process of domestication, domestic animals had reduced predator-avoidance behaviour. Therefore, prior to the introduction of modern weapons, protecting animals from predators was a major labour cost to herders. Although pastoralists tend to avoid heavily farmed areas because of the potential danger of crop damage, predators are significantly scarcer in agricultural areas, which is a major consideration when labour is scarce.

Modern weapons began to spread into the interior of Africa during the nineteenth century and by the mid-twentieth, predators had either been eliminated or confined to Protected Areas in much of the continent. As a consequence, when social anthropologists began to produce the classic descriptions of pastoral societies after the Second World War, predation had already ceased to be a major problem for herders. I have been interviewing African pastoralists on development issues since the early 1980s and the issue of predation has been never more than a fleeting mention in discussions dominated by disease. There is no shortage of literature on wildlife and livestock, but this is broadly over competition for access to grazing, especially in the Protected Areas (PAs) of East Africa, rather than the impact of predators.

Central and Inner Asia represents the other great pastoral region of the world, but political constraints meant that few field studies of pastoral societies were conducted until the 1990s. What publications existed were filtered through rather extreme ideological lenses and hence realistic accounts of herding societies were generally not available. This is not to say that the command economies were not aware of predators at a practical level. Russia and Mongolia organised collective wolf hunts to reduce predation and other countries permitted the trapping and elimination of predators. At the same time, these countries also created very large networks of PAs with effective policing, reflecting a high level of social control. In addition, citizens' access to lethal weaponry was fairly restricted. As a consequence, numbers of predator species remained at high levels and continued to represent a threat to herders in a way that no longer had a parallel in sub-Saharan Africa.

By the 1990s, when anthropologists and other social scientists had begun to work in Asian pastoral societies, conservation ideologies had begun to compete with the people-centred accounts that anthropologists usually produce. Wolves, leopards and tigers were no longer simply a cursory irritant, but a major component of the ecosystem and the subject of a considerable lobby in the developed world. As a consequence, newly free countries with shaky economies came under strong pressure to declare PAs and to prevent hunters killing wildlife, irrespective of its impact on livelihoods. The effects of this have varied from state to state, but the general consequence has been to locally increase predator numbers and thus the resentment of pastoralists who are also facing many new challenges, such as the breakdown of state veterinary services.

One consequence of this is that a new literature exists, describing predation from a perspective of environmental conservation, and often focusing on particular species that is said to be endangered. Wildlife reports often have special sections describing strategies for protecting headline species such as the tiger or the snow leopard. Published accounts focus on impacts on these species (e.g. Oli *et al.* 1994; Hussain 2003) and livestock are simply treated as a threat to wildlife habitats.

Bhutan was not one of the command economies in the Chinese or Russian sphere, but national policies have severely restricted sociological research on rural communities. Much of the topography of Bhutan is mountainous and its production systems were strongly dominated by livestock herding, much of it based around vertical transhumance systems similar to those in Nepal and northern India, with a strong stratification of species by altitude. Policies favouring conservation in Bhutan were initiated in the 1980s, and have accelerated following the publication of a National Biodiversity Action Plan (RGOB 1998). To

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<sup>1</sup> The Andes, where llamas were traditionally managed in systems of vertical transhumance, is the third pastoral region of the world, but it seems that predation was never a significant factor in management perhaps due a failure of large predators to evolve to operate at such high altitudes.

date, Bhutan has declared some 35% of its territory within some class of PA (). At the same time, Bhutan is a strongly Buddhist society in the Mahayana tradition and many individuals consider the killing of animals unacceptable for religious reasons, especially in the centre of the country, around Bumthang, where Bhutan's oldest and most revered religious sites are located. There is no doubt that a confluence of ideas from Buddhism with modern conservation ideologies have created unusual national environmental conservation policies that are broadly supported by the herding population in a way that contrasts strongly with some of Bhutan's neighbours, such as Nepal.

The consequence of an expanded network of PAs *and* an unwillingness to hunt species that predate livestock has been a significant expansion in predator numbers and an increasing impact on livestock producers. Bhutan thus constitutes a major case study of complex livestock/predator relationships that only occurs in more scattered form in other countries, due to higher levels of habitat conversion and greater landscape fragmentation. Needless, to say the situation is more complex than simple resource competition, since Bhutanese society is also undergoing other major changes as a consequence of globalisation that also affect both herder and conservationist.

This paper<sup>2</sup> describes the pattern of livestock predation in central Bhutan as it emerged from a survey conducted in November and December 2004 in Bumthang *dzongkhag*. It attempts not to take sides but simply to report what herders say and to relate this to our still patchy biological knowledge of predator patterns in this region. But it does emerge that the present situation is unsatisfactory, that policies for livestock production and environmental conservation need to be thought through in a more coherent manner. The impact of Bhutan's remarkable environmental policies may well shed light on related situations in other areas.

## **2. Literature on Himalayan predation**

The literature on livestock predation and large carnivores in the Himalayan region is not extensive, and much of it is in semi-published reports prepared for conservation agencies, for whom the goal is the establishment of ever-larger PAs and for whom the issue of herders' livelihoods is at best a footnote to their real concerns. In addition, most of the literature is species-focused and emphasises endangerment. Thus, the relatively rare tiger has generated far more literature than the common Himalayan dog. Miquelle et al. (1999) describe the complex patterns of ecology and politics that have to be in place to conserve the Amur tiger and other papers in Seidensticker *et al.* (1999) focus on human-tiger interactions across its entire range in Asia.

In addition, the main body literature is concerned with Nepal and India, where a high density of NGOs and long establishment of conservation agencies has created a critical mass of experience that eventually surface in academic papers. There are, however, important differences with Bhutan. Most significant is that strict Buddhism has much less of a hold on the rural population in Nepal; both poisoning and hunting of wild predators are much more prevalent. The breakdown in civil order in rural Nepal over the long period of the Maoist insurgency has probably exacerbated the killing of predators and certainly made the maintenance of PAs more difficult. In addition, the slaughtering of herded animals is more acceptable in Nepal, so the typical victims of predators, weak and aged animals, are not necessarily present in the herds.

Hussain (2003) studied the predation of snow leopards on flocks in the Baltistan area of Northern Pakistan, 1998-2001. Snow leopards are locally believed to a major source of livestock loss and there are no religious prohibitions on trapping and killing them. Hussain (2003:31) reviews accounts of retaliation across the entire range of the snow leopard and notes that 'the main methods described for killing were shooting, poisoning the carcasses of prey species, and trapping using leg snares'. Pakistan law permits the killing of 'problem animals' but farmers were afraid to kill snow leopards openly under this provision for fear of the possible entanglement with the authorities. Nonetheless, there is strong evidence that they kill the leopards anyway as witness by a flourishing illegal market for pelts.

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<sup>2</sup> The author would like to thank RNR Jakar, for logistical support during the survey and for the many herd-owners who took time both to respond to the questionnaire and to discuss specific issues at greater length. Socio-economic survey was described in the Department's annual plan as a high priority and the authors hope to describe other aspects of the results elsewhere.

Johnsingha & Negib (2003) report on the status of tiger and leopard in the Rajaji–Corbett Conservation Unit in Northern India, where tigers have disappeared from many areas but leopards are still flourishing. The main factor seems to be relentless demographic growth, leading to habitat conversion and greater poaching pressure. The main species preyed here are cattle and buffalo, but in an unusual twist, tiger kills are often preyed by humans, the *Gujjar* grass-cutters who move into the region on a seasonal basis.

One attempt to present a rounded picture of predation is Mishra (1997) describes losses to predators, especially the snow leopard and Tibetan wolf, in proximity to the Kibber Wildlife Sanctuary in Himachal Pradesh, India. Many other predator species potentially present have been eliminated, but these two appear to have expanded to fill the vacant niche. A compensation scheme introduced by government has certainly increased claims, but still predation is a major source of loss to the herders. Despite their Buddhist beliefs, villagers regularly identify wolf lairs and capture the pups, parade them around the village and then explode them with dynamite (*sic*).

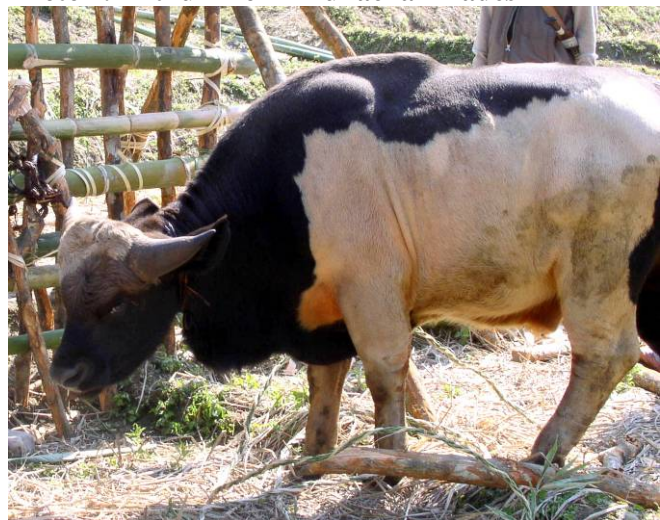
Overall, descriptions of predator-herder relationships in the Himalayas are too fragmented to make any very resonant generalisations. Enforcement of wildlife laws is highly variable in different countries and the belief systems and consequent ethical prohibitions also vary from one population to another. Nonetheless, it is clear that Bhutan has a number of unusual features that differentiate it from its neighbours.

### 3. Background to Bhutanese pastoral systems

Bhutan is characterised by extreme topography, from high alpine pastures to subtropical jungle. Very steep hillsides and unpredictable heavy snow make much of the country unsuitable for agriculture, and where cultivation takes place, the work of maintaining fields is hard and productivity low. Bhutanese subsistence has therefore historically depended on livestock production, and more particularly pastoralism<sup>3</sup>. Typically, Bhutanese herders practice vertical transhumance, moving between winter and summer pastures, usually with a substantial house close to where agriculture is practised. Transhumance is stratified, with the high pastures used by yaks with some cattle and sheep, and lower pastures with horses, cattle, sheep and goats. Animal breeds are highly evolved to deal with extreme conditions. Unlike, for example, the Alps, the movement down to subtropical jungle requires stock to resist high degrees of leech and other parasite infections.

One strategy evolved by Bhutanese herders to increase stock survival rates is extensive crossbreeding (Hickman & Tenzing 1982). The earliest traveller in Bhutan (Turner 1800) records the presence of mithun (*Bos frontalis*), the semi-domestic bovid<sup>4</sup> from NE India. The mithun is thought to have developed from the wild gaur (*Bos gaurus*), which is kept in forests and used for sacrifices by the indigenous peoples across Arunachal Pradesh and the Naga areas (Photo 1). The mithun is interfertile with cattle and is used for crossbreeding with the local *siri* breed because of the perceived virtues of the F<sub>1</sub> cross. No breeding populations of mithun exist in Bhutan and so there is a continuing historic trade in these animals across the mid-level pastures. Similarly, in the higher-level pastures, herders capture hybrid vigour by crossing yaks with the *goleng* taurine cattle typical of Tibet (Winter & Tshewang 1989). The closing of the Tibetan border in 1959 after the Chinese invasion had a great impact on the Bhutanese population, partly because there was previously extensive traffic in livestock and its products across the international frontier.

**Photo 1. Mithun from Arunachal Pradesh**



Source: Courtesy Mark Post

<sup>3</sup> See, for example Bourgeois-Luethi (1999), Arbenz & Tshering (2000).

<sup>4</sup> See Gupta et al. (1999) for a recent overview of mithun in NE India.

Another characteristic feature of Bhutanese pastoralism is the impact of religious belief. As Buddhists, most Bhutanese believe that animals should not be slaughtered for meat. They are therefore reliant on ‘accidental’ deaths of stock, a not uncommon occurrence in very steep pastures. It seems that much greater emphasis has been placed on this aspect of religion by radical Buddhist preachers in recent years. For example, in the past, pigs used to be kept in the community and sacrificed at the *dzong* annually. However, once killing animals for meat is discouraged, a species such as the pig has little other use, since it produces neither milk nor fibre. Hence, pig production has declined sharply in Bhutan in recent years, and is now largely in the hands of the Nepalese minority. Paradoxically, the taste for meat has not declined, and thus much of the meat eaten in Bhutan, especially in towns, is imported from India.

The Bhutanese government has had a well-structured programme of modernising the livestock sector since the 1960s, heavily influenced by experiences from Switzerland and indeed, often funded by Swiss aid funds. Swiss Brown Jersey cattle have been introduced and given out to farmers for cross-breeding. The government wishes to encourage herders to settle down and use planted pastures to feed stock; much research effort has gone into the most appropriate species and rotation patterns to produce suitable fodder crops. However, perhaps predictably in the light of experiences with transhumant pastoralists elsewhere, adoption has remained at low levels and herders continue to migrate, partly because of the high labour and financial costs of planted pastures and partly because of the land requirements of larger herds, where land is increasingly going under rice in the valleys. If any factor is influencing herders to settle down it is the changes in household structure induced by labour migration, which means that there simply are not enough family members to look after the herds en route.

#### 4. The predators

##### 4.1 Species

Bhutan has no comprehensive guide to mammal species, although many lists of mammals occur in unpublished conservation documents. These are often impressionistic and based on broader hypothesised distributions. Lexicography is also poorly developed, so it is not possible to be sure of the referent of local names, even in Dzongkha, let alone Bumthangkha, the principle language spoken in Central Bhutan. The identifications of predators are thus based on recent sources for India, such as Menon (2003) and lists of mammals potentially occurring in Thrumshingla National Park (Pradhan et al. 2002). Table 1 lists the main predators occurring in Central Bhutan, with their likely names in Dzongkha, followed by the Dzongkha script version and Bumthangkha;

**Table 1. Predators on livestock in Bhutan**

English name	Latin name	Dzongkha name	Dzongkha	Bumthangkha
Tiger <sup>5</sup>	<i>Panthera tigris</i>	ཉར་ཐ	<i>tak</i>	
Leopard	<i>Panthera pardus</i>	ཐའ་ལྷོ་ཐ	<i>zek</i>	
Clouded leopard	<i>Neofelis nebulosa</i>			<i>chang</i>
Snow leopard	<i>Panthera uncia</i>			<i>chang ku</i>
Asiatic black bear	<i>Ursus thibetanus</i>	དབེ་མེ	<i>dom</i>	<i>wom</i>
Wild dog	<i>Cuon alpinus</i>		<i>phaw</i>	
Tibetan wolf	<i>Canis lupus chanco</i>	ཀཱཱ་མེ	<i>phaw</i>	
Feral dog	<i>Canis familiaris</i>	ཆཱཱ་ལྷོ་ཐ	<i>roche</i>	
Wild boar	<i>Sus scrofa</i>	ཆཱཱ་ཀཱཱ་ཐ	<i>rifak</i>	
Yellow-throated marten	<i>Charronia flavigula</i>	ཉ་ཐཱཱ་ལྷོ་ཐ	<i>achoneney</i>	
Crow		ལྷོ་ཐ	<i>oula</i>	
Eagle	<i>Aquila spp.</i>	ཀཱཱ་ཐཱཱ་ཐ	<i>chagay</i>	

<sup>5</sup> Seidenticker et al. (1999:xvii) estimate that there were just 67-81 adult tigers in Bhutan in 1998.

The Tibetan wolf is not definitely reported from this region; but all around the edge of Thrumshingla National Park, livestock owners reported the replacement of the ‘wild dog’ in recent years by a new ‘type’, with distinct body markings and a different, bolder predation strategy. Wild dogs were poisoned extensively some fifteen years ago by the Forestry Department, leading to a significant increase in wild pigs, which have become a pest on crops, especially potatoes, which in turn have taken off as a major cash crop in this region since the 1970s. In the late 1990s, the Government declared open wildlife corridors between the PAs. Thrumshingla, in particular, is connected to Jigme Singye Wangchuk National Park and thence to Jigme Dorji National Park via biological corridors (WWF map of National Protected areas of Bhutan). It is therefore likely that the wolf took the opportunity to fill what had become an empty niche and migrated to the area of the Park. Interestingly, it is widely believed that this is an intentional re-introduction carried out secretly by government to resolve the wild pig problem. This is highly unlikely, but it illustrates the ethical issues connected with predators. Since many people think that intentionally introducing predators and thus increasing the deaths their prey would be contrary to the tenets of Buddhism, ergo this act was clandestine.

#### 4.2 Conceptualising predators

As elsewhere, major predators attract a rich corpus of belief. Just as the tiger is a headline species for Western conservationists, so it is the most salient predator for the Bumthapha people. In the Bumthangkha language, the tiger is given the same honorifics as rulers, notably the King. A Dzongkha saying has it that ‘each valley has its tiger, each settlement has its ruler’<sup>6</sup>. Tigers are noted for their ability to function in a wide variety of habitats, from alpine pastures to jungle, in contrast to most of the other predators, which are ecologically stratified.

However, the most feared predator in the Bumthang area is one that does not exist. General discussion of predators in this region always leads to mention of the *gung* (Dzongkha) or *zitam* (Bumthangkha). The etymology of the Bumthangkha word means quite literally ‘leopard-tiger’ and it is locally believed that the *gung* is a hybrid of these two species. It is widely believed to be the most ferocious of predators, still more dangerous than the tiger. A Dzongkha proverb says ‘the *gung* is senior to the tiger’. Despite this, the *gung* is almost certainly a mythical animal and no actual records of livestock predation attributed a killing to a *gung*.

#### 5. Species predated

Table 2 shows the predators matched against the species for which they are a particular threat, according to interviews conducted in the Bumthang region. The ++ indicates that a livestock species is particularly a victim of a specific predator.

**Table 2. Livestock species predated in central Bhutan**

English name	Equines	Yak	Cattle	Sheep	Pig	Goat	Chicken
Tiger	+	+	+	+	–		–
Leopard	+	–	+	+	++		–
Clouded leopard		+	+	+	+		–
Snow leopard	–	++	–	–	–		–
Bear	+	–	+	++	+		–
Wild dog	++	+	+	+	+		–
Tibetan wolf	++	+	+	+	+		–
Feral dog	–	–	–	+	–		+
Wild boar	–	–	–	+	–		–
Mongoose	–	–	–	–	–		+
Crow	–	–	–	+	–		
Eagle	–	–	–	–	–		+

<sup>6</sup> Dzongkha, locally transcribed, *yousen rey hu gelpo re, lungpa rey u ta re*

Several comments need to be made on this table. For example, although there is in principle a distinction between the ordinary leopard and the clouded leopard, it seemed that most of those interviewed lumped together predation by both species into a single category. Clouded leopards do not attack such large prey as the common leopard and probably live in a higher ecological stratum as they are recorded up to 3000m. (Menon 2003). The problem over the likely confusion over the identification of the Tibetan wolf is discussed above and I have simply put the same incidence for both species, pending further more detailed fieldwork. However, the increased boldness of the 'new' canids is certainly responsible for greater losses in recent years. I have left the column for goat empty as there are now very few goats in this region and almost none kept in villages. Goats are mainly seen in the encampments of Nepalese roadworkers and are relatively well-supervised compared with herded animals. Buffalo and goats are kept in larger numbers in subtropical Bhutan but we have no interview data on the incidence of predation. Attacks on pigs refer mainly to the past and other areas of Bhutan; pig-keeping is now rare in the Bumthang area.

## **6. Factors affecting incidence of predation**

### **6.1 The growth of Protected Areas**

Bhutan created its first Forest Act in 1969 to control the exploitation of forest resources and designated a network of Protected Areas (PAs) in 1983. The Bhutan Trust Fund was given a Royal Charter in 1991 to create sustainable financing for PAs. The system of PAs was revised in 1993 and again through the Forest and Nature Conservation Act of 1995. Bhutan has signed all major international treaties concerning the environment and biodiversity and is generally regarded as a biodiversity hotspot by ecologists. It has collaborated with the principal conservation NGOs to survey and establish an extensive system of PAs and biological corridors across the country. Although there is limited ecotourism, this is not the main driving force behind the PA system, which is rather related to the dominant Buddhist belief system. It has been possible to establish such a system because the human population is low and government subsidies to the rural population, such as free healthcare, education, veterinary services etc. make viable a lifestyle that would be unsustainable in, for example, Nepal.

One consequence of so many PAs has been a rapid regrowth of forest cover; it is clear, both from talking to herders and reading older travellers' accounts, that timber cutting and burning trees to create pastures was common practice in the past and that this was connected both with the need to create transhumance corridors and also as part of the cycle of slash-and-burn agriculture. The prohibitions on hunting, trapping and poisoning animals have had a major impact on habits, although some poisoning of nuisance species still occurs. On the whole, as Buddhist ideas about the sanctity of life are more widely promulgated, rural populations accept the situation. As a consequence, there are many reports of an increase in predators. This is hard to quantify because there are many other reasons why predators might appear to be more common. For example, the forest comes right to edge of villages in many places and as a consequence, predators enter settlements more easily and are more visible. Similarly, labour migration inevitably decreases the number of eyes watching the animals and therefore more predator attacks are successful.

Another consequence of the PA system and creation of corridors between areas that may not have been connected for a long time, is that the relationship of predators to one another changes. The interplay of Himalayan dog and wolf has been discussed, but a similar phenomenon appears to occur between tigers and leopards. Despite the tiger population being part of the rationale for the creation of Thrumshingla National Park, villagers report seeing many fewer tigers and more leopards in the past decade. However, west of Jakar, villagers reported greater numbers of tigers, which have perhaps displaced the leopards. Overall, the interconnectedness of the system favours species that can thrive around humans and in a wide variety of habitats, such as the canids.

### **6.2 Buddhist belief**

The Buddhist belief that animals should not be killed has clearly always existed, but only in more recent times has it become more widespread in Bhutan; and the Jakar valley, as the locus of some of Bhutan's oldest sacred sites has been the focus of monks preaching against animal slaughter. This has various consequences. First, domestic animals cannot be killed for food; species mainly raised for meat are thus tending to disappear. In another version of this, they cannot be sold to people who might kill them. Previously, pigs, goats and sheep were sold across the border to India where their fate was unknown but



terminal, although ironically some of the butchered meat clearly returned to Thimphu via the freezer truck. Although the Merak/ Saktien herders in the east of Bhutan still sell their animals across the border, this trade has largely stopped. The consequence has been that many types of livestock production that were previously viable are no longer practical, leading to great changes in the nature of the pastoral enterprise.

Secondly, most villagers agree with the notion that wild animals should not be killed, despite the impact of predation. This is also the legal situation in relation to National Parks, but it meshes well with religious practice. As a consequence, few rumours were heard about poaching<sup>7</sup> and trapping and indeed, Bhutan would be difficult terrain for the type of trans-national poacher such as has been reducing predator populations in Russia or Nepal. Indeed, the idea that the authorities had been secretly poisoning the Himalayan dog was mentioned several times with disapproval.

### **6.3 Changing household structure**

A key aspect of the changing pattern of predation in Bhutan is part of the overall shifts in society and economy. Bhutan was for a long time a very closed society, but it has begun to open up to the world. Although tourism and other visits are still at low levels, Bhutanese citizens can and do travel, both outside their region and to other countries. Within Bhutan, numerous economic opportunities have opened up, partly funded by government income from hydroelectric power sales. So work on timber-cutting, road-building and other government jobs is now a possibility and as education and satellite television become more widespread, dissatisfaction with village life among the young is inevitable. Many households are short of members, working or studying elsewhere. Households tend to be more female-centred, as labour migration is more common among men. Transhumant pastoralism requires labour, because the household must be split and moreover, the animals must be watched constantly. Many households are having to manage their stock with fewer herders than in the past. This inevitably leads to greater losses from predators.

### **6.4 Changing production systems**

Changes in the pastoral system itself are also affecting the pattern of predation. Sheep are disappearing from many flocks, because they are not milked and the wool is being replaced by imported synthetics. Although a certain demand for wool for felt and weaving remains, it only supports small flocks and pastoralists are switching towards increased cattle numbers. Predators that can bring down calves tend to larger size and therefore this favours larger predators.

Predators form complex inter-relations and domestic animals are only a part of these, as is illustrated the case of the wild pig. During the 1990s, a growing wild dog population meant that losses of sheep began to increase. Following protests by farmers, the National Parks Service began a programme of poisoning the dogs. As a consequence, their traditional prey, the wild pig, began to increase. The pigs then discovered the pleasures of potatoes and paddy rice and began to cause major devastation in farmers' fields. So the Parks Service was obliged to secretly<sup>8</sup> re-introduce wolves translocated from other areas. Since 2002, farmers have noticed a decline in pig depredations. The Forestry Department has also introduced 'selective culling' in problem areas.

Cattle lack anti-predator behaviour and therefore, once an individual carnivore becomes habituated to killing cattle they may kill large numbers. In the Thrumshingla Park area, it is believed by herders that single animals are responsible for large numbers of stock deaths. There is strong anecdotal evidence for the killing of carnivores with ground glass.

### **6.5 Vegetation change**

With the introduction of controls on timber-cutting and prohibition of burning to clear land, trees have begun to cover open land at every ecological stratum. Herders frequently pointed to pastures that were once open but which are now covered by trees. This is strongly linked with agricultural intensification; with less land to cultivate, farm households are more likely to cultivate potatoes or other tubers than buckwheat. This turn attracts species such as wild pig and the predators that prey on it. At the same time, typical grazing

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<sup>7</sup> Although there *is* evidence of poaching of musk deer for the musk.

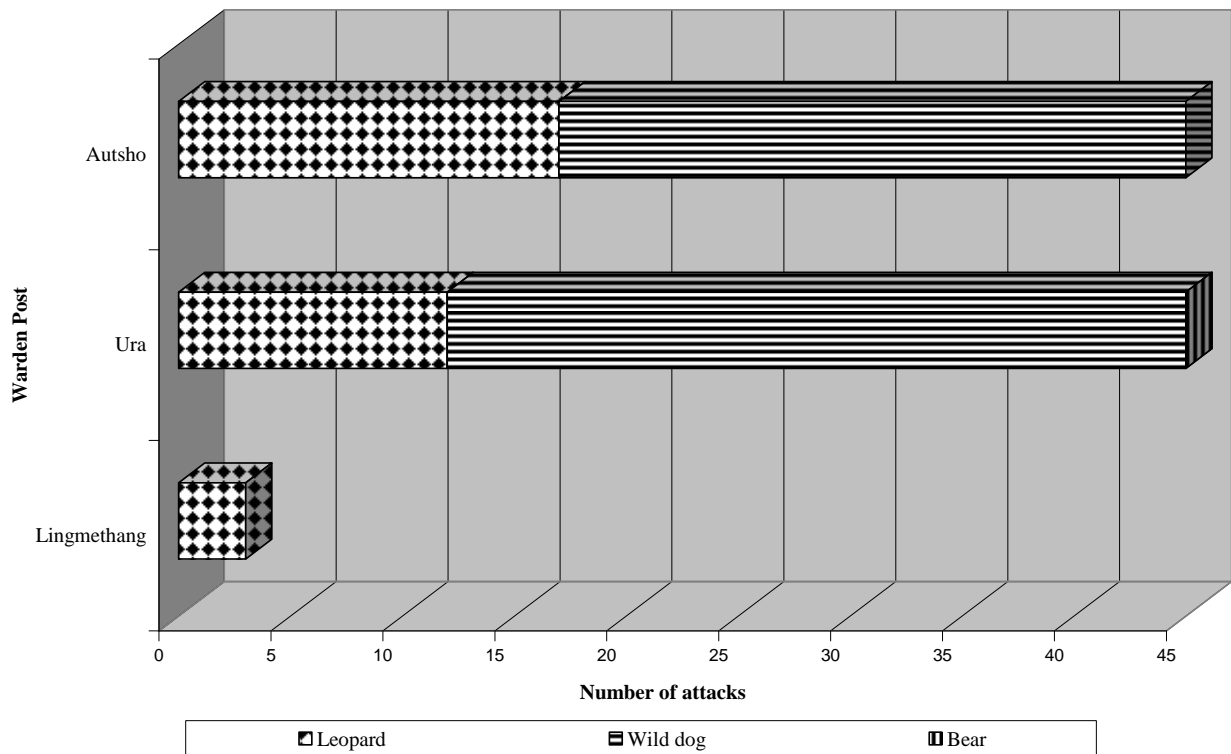
Secretly because both poisoning wolves to begin with and then re-introducing them to predate pigs would be against Buddhist orthodoxy.

species that thrived on the open grasslands created by burning, such the serow (*Capricornis sumatrensis*) and sambar (*Cervus unicolor*) have reduced in numbers which makes the slow-moving domestic stock more attractive.

### 7. Compensation and its likely impact

Since 2003, farmers have been able to claim compensation from the National Parks Service for animals lost to predators, specifically bear, snow leopard and leopard. This procedure is quite complex, in part because the identity of the predator is often difficult to determine. Figure 1 shows the preliminary statistics for the year 2003-2004;

**Figure 1. Predator attacks around Thrumshingla Park for which compensation is payable**



Source: Park documents

These statistics have several curious features, the main one of which is that there are no claims for tigers or snow leopards and only a single claim for bears. This does not correspond to the assertions made by herders in interviews and it may be that it is difficult to prove a tiger or snow-leopard attack while attacks by dogs or wolves are relatively common. If the other predictions in this study are correct, the incidence of claims for compensation will rise substantially in the next few years.

### 8. Conclusions

Bhutan has a unique system of pastoralism as a consequence of its topography, ecology and religious belief system. It therefore allows us to see the relationship between predators and domestic animals in a manner that is more complete than in other Himalayan countries where high levels of human encroachment and uncontrolled poaching have created highly unbalanced situations. Despite the language of conservationist reports, it is now clearly the pastoralists who are under pressure, and as predator numbers increase, livestock production will face increasing challenges. At this point the government will have to make some hard choices, either to maintain strong conservationist policies and face an ever-increasing and complex system of demands for compensation from rural populations, or to allow ‘selective culling’. Whether this could be introduced in conjunction with a trophy system open to international clients with benefit-sharing to affected villages remains open to question. However, the current system is clearly unstable and the situation is not helped by allowing conservationist agencies to always set the agenda.

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