

# Chapter 16

## Money, Myths and Man-Eaters: Complexities of Human–Wildlife Conflict

Amy J. Dickman and Leela Hazzah

### Introduction

Human–wildlife conflict—defined at the World Parks Congress as occurring ‘*when the needs and behaviour of wildlife impact negatively on the goals of humans or when the goals of humans negatively impact the needs of wildlife*’—is a phenomenon that has existed throughout human evolution. Early hominids are thought to have been preyed on by leopards (*Panthera pardus*), spotted hyaenas (*Crocuta crocuta*) and sabre-toothed cats (Lee-Thorp et al. 2000), while tales of threatening species have permeated human culture for millennia, appearing in countless myths, songs, stories and works of art (Kruuk 2002; Quammen 2003). Such threats are not merely historical artefacts, though—wild animals attack and kill many hundreds of people a year (Dhanwatey et al. 2013; Loe and Roskaft 2004) and commonly destroy peoples’ livelihoods and severely impact their quality of life (Jadhav and Barua 2012; Thirgood et al. 2005). On the other side of the coin, people have had a devastating impact on wildlife, with humans implicated in the extinction of over 300 terrestrial vertebrate species over the past 500 years (Dirzo et al. 2014).

A huge variety of species create conflict with people, including invertebrates, snakes, birds, rodents and other small mammals, and in many cases, those conflicts are resolved by enacting pest control (Marchini 2014). What comprises a ‘pest’ is a subject worthy of debate—certainly, a hungry leopard prowling around someone’s hut could justifiably be considered far more of a pest than a family of rats (*Rattus*

---

A.J. Dickman (✉)

Wildlife Conservation Research Unit, Department of Zoology, The Recanati-Kaplan Centre, Tubney House, University of Oxford, Tubney, Oxford OX13 5QL, UK  
e-mail: [amy.dickman@zoo.ox.ac.uk](mailto:amy.dickman@zoo.ox.ac.uk)

L. Hazzah

Lion Guardians, P.O. Box 15550-00502, Nairobi, Kenya  
e-mail: [Lhazzah@gmail.com](mailto:Lhazzah@gmail.com)

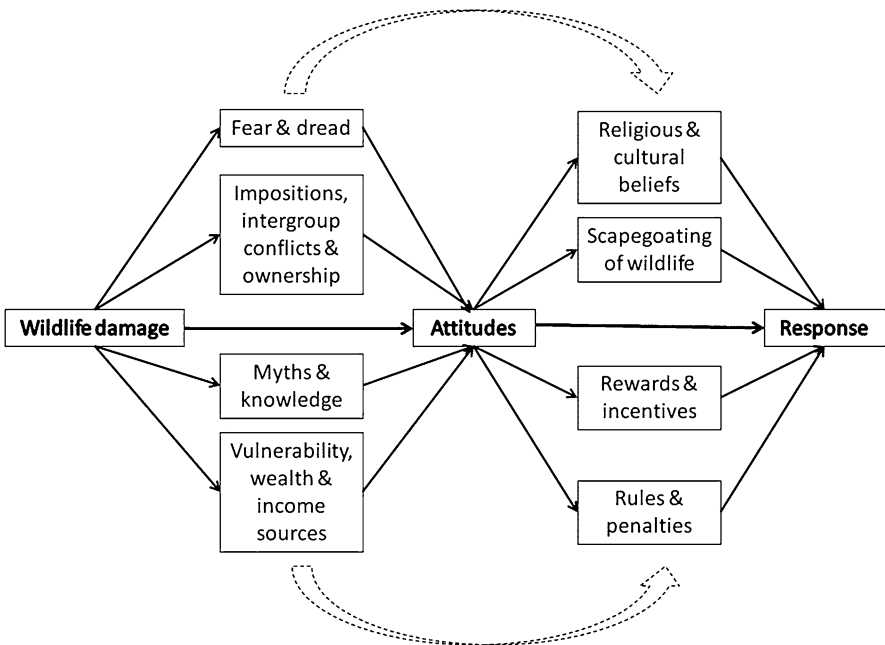
*rattus*) taking up residence in a UK home, and yet wildlife killing only tends to incite much controversy in the first case. Although this is often linked to rarity, it is not always the case—poisoning a leopard, even where they are locally common, is likely to generate more debate than poisoning rats, even though persecution of rats has led to them being named as one of the ten most threatened rodent species in Europe (Entwistle and Stephenson 2000). Regardless of differences in how it is viewed depending on the species, it is clear that conflict imposes very serious costs on both humans and wildlife across the globe (Barua et al. 2013; Marchini 2014; Woodroffe et al. 2005). Indeed, it is now one of the most pressing issues in modern biodiversity conservation, as the world's burgeoning human population means that people and wildlife come into contact ever more frequently (Conover 2002), often with harsh consequences for both sides. Lions (*Panthera leo*), elephants (*Loxodonta africana*), and orang-utans (*Pongo* sp.) are just some of the iconic species for which conflict with humans poses a major threat to their continued persistence across much of their range (IUCN 2006; Meijaard et al. 2011; Naughton et al. 1999).

Perhaps the most obvious human–wildlife conflict situation is one where a wild animal destroys someone's property or takes a human life, which may lead to retaliatory action on the part of the human. This kind of direct wildlife damage is undoubtedly important and can have extremely significant impacts on local people and their livelihoods (Barua et al. 2013; Thirgood et al. 2005). For instance, around Zimbabwe's Sengwe Wildlife Research Area, livestock attacks by baboons (*Papio ursinus*), lions, leopards and other species cost householders an average of 12 % of their net annual income (Butler 2000), while around Gishwati forest in Rwanda, crop-raiding by chimpanzees (*Pan troglodytes*) and *Cercopithecus* monkeys incurred a food replacement cost of 10–20 % for local households (McGuinness and Taylor 2014). These costs are not limited to the developing world—in Wisconsin, crop damage by white-tailed deer (*Odocoileus virginianus*) costs over US\$34 million a year (Naughton-Treves and Treves 2005). In traditional rural societies, wildlife-related damage can incur cultural costs as well as economic ones, as livestock in particular are often vital sociocultural assets, and their loss affects social standing and status (Dickman 2009).

Human–wildlife conflict can also have more subtle or 'hidden' impacts (Barua et al. 2013). In areas with problematic wildlife, there are opportunity costs where people have to spend time, energy and money protecting their assets, which could be invested in more valuable alternatives such as attending school, generating revenue or engaging in culturally valued activities (Barua et al. 2013; Thirgood et al. 2005). In some cases, wildlife damage forces people to relocate, leading to significant social impacts (Barua et al. 2013). There can also be significant wider scale opportunity costs, from setting aside land for wildlife—a 1995 analysis suggested that Kenya's parks, reserves and forests could generate US\$203 million if put to other use, meaning that the US\$42 million generated instead by conservation activities was a huge net loss for the country (Norton-Griffiths and Southey 1995). Furthermore, when incidents such as man-eating occur, there are huge behavioural and psycho-social impacts in addition to economic ones, especially as in rural communities the victim is often a male, and therefore a principal wage-earner (Barua et al. 2013; Jadhav and Barua 2012).

However, most of these issues are still linked to wildlife damage as the central problem. Because wildlife damage is usually cited (often vociferously) as the key reason for conflict, it is unsurprising that many mitigation strategies, such as the use of communal herding, guardian animals, thunder-flashes, fladry, chilli or chilli-tobacco fences (Chelliah et al. 2010; McManus et al. 2014; Musiani et al. 2003; Sitati and Walpole 2006) are centred around reducing that damage. These approaches are often successful, and reducing attacks can have a demonstrable effect on wildlife populations—in the Phinda area of South Africa, conservation initiatives such as improving livestock husbandry and response to conflicts were linked to reduced leopard mortality and a leopard population growth rate of 14–16 % (Balme et al. 2009).

While reducing wildlife damage therefore plays an important role in easing human–wildlife coexistence, it will often only address part of the problem. It might seem logical that the different elements of conflict, such as the wildlife damage incurred, the degree of conflict reported (in terms of negativity towards the species concerned), and the response taken are relatively simply related. However, in reality, the situation is usually more complex than initially envisioned, with multiple factors affecting the relationships between the different components (Dickman 2010). Here, we examine factors affecting two key aspects of conflict, namely (1) the relationship between the extent of wildlife damage and attitudes towards wildlife; and (2) the relationship between reported attitudes and the response to conflict (Fig. 16.1). We provide examples from a



**Fig. 16.1** Conceptual model showing some of the key factors likely to influence the relationships between (a) wildlife damage and attitudes, and (b) attitudes and the response taken

range of study sites and species which demonstrate that issues as varied as religion, economics, cultural beliefs, rules, fear and rewards all influence the complexity of human–wildlife conflict.

### ***Relationship between Level of Damage and Attitudes towards Wildlife***

In some cases, the relationship between damage caused by a species, and negativity towards it, seems proportional. In the Pantanal region of Brazil, 82 % of ranchers suffered depredation from jaguars (*Panthera onca*), and unsurprisingly, those people considered them a greater threat than others did (Zimmerman et al. 2005). However, there are many situations where people report very negative views towards a particular species, ostensibly due to the fact that it causes substantial damage, but where closer examination reveals that the value of actual wildlife damage caused by that animal is very low or even absent. For example, Maasai respondents in southern Kenya reported high levels of conflict with lions and negative attitudes toward them; however, actual rates of conflict was quite low, with less than 5 % of all depredation events attributed to lions (Hazzah et al. 2009) (although lions do tend to take relatively valuable stock in the form of cattle). In Zanzibar, the endangered red colobus (*Procolobus kirkii*) is considered by farmers to be one of the most serious local pest species, mainly due to their consumption of coconuts (*Cocos nucifera*), but research revealed that the presence of colobus did not decrease coconut harvests, and in fact had a slight positive impact, possibly due to a pruning effect (Siex and Struhsaker 1999). In other cases, people seem unusually tolerant, even where wild animals impose high levels of damage. In the Kibber Valley area of Nepal, 43 % of interviewees experienced livestock depredation by snow leopards (*Panthera uncia*), but less than a third had strong negative attitudes towards the cats (Bagchi and Mishra 2006). There are many factors which affect someone's attitudes towards wildlife, making them more positive or negative than might be expected from the 'actual' damage caused, and some of the key ones are reviewed below.

### **Intrinsic Fear and Dread**

Certain species of wildlife seem to incur levels of antagonism that are particularly disproportionate to the actual risk posed—this often occurs when the idea of an encounter incites intrinsic fear and dread, such as in cases of man-eating predators. These fears are not necessarily unfounded—in Tanzania, there were over 800 lion attacks on people between 1990 and 2004, resulting in at least 563 deaths (Packer et al. 2005). However, the degree of fear is often extremely high relative to the number of deaths—sharks are a classic example of this, where even relatively rare (and sometimes non-fatal) attacks tend to elicit huge attention and public fear of the species concerned (Neff 2012). In upland Japan, an attack where a brown bear

(*Ursus arctos*) killed seven people (known as the Hokkaido Incident or Sankebetsu Brown Bear Incident) became infamous and contributed to a widespread fear of bears which persists to this day, despite the attack happening a century ago (Knight 2000). Deep-seated fear and dread can also be felt even for species which pose little or no threat to humans, such as spiders in Europe (Prokop and Tunnicliffe 2008). The fear of catastrophic loss, such as when species engage in surplus killing, can also compound fear of and hostility towards wild animals. This has been seen in multiple locations, such as in the western US, where grey wolves (*Canis lupus*) killed up to 98 sheep per attack, reducing local tolerance for them (Muhly and Musiani 2009), and in Chile, where the widespread reporting of surplus killing by pumas (*Puma concolor*) led to intensely negative attitudes, with the cats being perceived as bloodthirsty killers (Murphy and Macdonald 2010). In reality, these incidents of mass killing are rare, but the attention given to these occasional events results in a disproportionately high sense of fear and risk.

### **Impositions, Inter-Group Conflicts and Ownership**

People are far more willing to deal with risks that they undertake voluntarily compared to those which are imposed upon them (Starr 1969), and the unwillingness to deal with risks is exacerbated further if they are imposed by a disliked external group. In the United States, Sweden, Norway and elsewhere, conflicts with grey wolves are heightened by perceptions that the animals are imposed upon rural people by other groups, in these cases remote, urban governments who are unconcerned about the costs incurred by farming communities (Kaltenborn and Bjerke 2002; Knight 2000; Lindquist 2000; Wilson 1997). Similar inter-group conflicts over predator presence emerge in many locations worldwide (Knight 2000)—for instance, in Tanzania's Ruaha landscape, carnivore conflict was heightened because people felt that lions and hyaenas were sent by rival tribes to cause problems and kill their stock (Dickman, pers. obs). In Chile's Araucania Lake Region, 55 % of people surveyed believed (erroneously) that pumas had been released deliberately by wildlife managers into the area, leading to antagonism that the cats' presence was being forced upon them by authorities (Murphy and Macdonald 2010). Similarly, focus groups in Wisconsin revealed negative attitudes towards recolonizing grey wolves, with a commonly cited suspicion that wolves had been reintroduced covertly to the area by the Wisconsin Department of Natural Resources (Browne-Nunez et al. 2015). In Yellowstone National Park, where grey wolves actually were reintroduced, people were resentful that the actions of the 'controlling, domineering, intrusive' federal government had overridden the freedom and self-determination of local people—and even of the wolves themselves—by actively bringing them into the local area (Scarce 1998). The reintroduction of the wolf into Yellowstone was seen by some as a method of exerting social control over peoples' private property, and the wolves were denounced during a speech by activists to local people as 'only a tool being used by those who don't want you around' (Wilson 1997).

Ownership towards a species is also often important: people tend to kill wildlife, even if conflict is low, when they perceive they have no ownership over the resource. Concerns over lack of ownership are often centred around protected areas, which can significantly restrict local peoples' livelihoods—for instance, villagers have reported that the presence of Masaola National Park in Madagascar has limited their options for inter-generational growth and stability so much that they feel 'defeated in the very purpose of life' (Keller 2009). When Namibia obtained independence in 1990, the Ovambo people broke down the fences around Etosha National Park and killed Park animals for meat, as they had previously been banned from hunting in the protected area (IIED 1994). Increasing access and ownership can have marked positive effects—(Hazzah et al. 2013) found that access to protected areas during time of crisis, such as droughts, had a stronger positive influence on Maasai attitudes towards lions, and their likelihood of killing, than more conventional predictors such as rates of conflict. Meanwhile, in the Balikpapan area of Indonesian Borneo, the sun bear (*Helarctos malayanus*) creates substantial conflict, particularly over its destruction of mature coconut trees (Fredriksson 2005). However, the selection of the sun bear as the official mascot for the Balikpapan district in 2001 seems to have improved local attitudes towards the species, with people now having a sense of ownership and pride in the species (Fredriksson 2005).

### Myths and Knowledge

Often, the dread and fear mentioned above are linked to local myths regarding a species. In rural Madagascar, the aye-aye (*Daubentonia madagascariensis*) is traditionally believed to be a harbinger of sickness and death, so they are often killed on sight and entire villages have been abandoned after aye-ayes were seen in the vicinity (Simons and Meyers 2001). Fears of relatively small, seemingly innocuous creatures are not restricted to remote cultures—across much of the world, bats are feared, with a persistent belief that they will become tangled in human hair. This myth is so common that researchers have experimented with placing bats on peoples' heads and wrapping them in hair (whereupon the bats merely freed themselves, presumably rather perplexed), but persistent myths can strongly affect views towards a species, even if it causes no apparent damage at all.

Myths can sometimes reflect the kinds of inter-group conflicts mentioned above. This is often the case where animals are believed to be 'shape-shifters', where their body can be inhabited or bewitched by a human spirit, usually as an aggressive act by a rival. In Mozambique and Tanzania, there are suspicions that some people use witchcraft to create 'people-lions' or 'spirit lions', which are used as agents to kill rivals (Dickman 2006; West 2001). In Sierra Leone, chimpanzees sometimes attack young people, and in some cases villagers believe that such attacks are the result of elite outsiders shape-shifting into chimpanzees and stealing body parts from their local victims (Richards 2000). Shape-shifting and bewitching often seems to have an association with species thought to be able to transgress accepted boundaries—this is the case with the spotted hyaena, as its unusual genitalia (where the female's

clitoris resembles a penis) has led to the species being viewed as a hermaphroditic deviant which can be bewitched by rivals (Dickman 2009). Primates are also often judged and feared due to their fact that they resemble humans but often transgress accepted boundaries or act in ways that are perceived as immoral. In south-east Asia, orangutans are viewed as ‘wild, rude and uncultured’ human counterparts (Knight 1999; Rijksen 1995), chimpanzees have been described as ‘thieves’ and ‘rapists’ in Uganda (Naughton-Treves 1997) and as having ‘low’ morality in Sierra Leone (Richards 2000), while in Japan, monkeys are rumoured to have sexually molested women out in the forest (Knight 1999).

Better knowledge about a species can be linked to improved attitudes—Slovakian students who did not believe in myths about bats and who knew more about their biology were significantly more positive towards bats than other pupils (Prokop et al. 2009; Prokop and Tunnicliffe 2008). However, there is not always a positive relationship between knowledge and attitudes—(Simons and Meyers 2001) found that even relatively well-informed people like forest agents held the beliefs described above about aye-eyes. There can also be an interaction between knowledge and personal experience—the most knowledgeable people regarding a species are often those who frequently come into contact with them (such as hunters or pastoralists), and are therefore more likely to have negative experiences (such as predators killing hunting dogs or attacking livestock) and report greater antagonism (Dickman et al. 2014; Heberlein and Ericsson 2008).

### **Vulnerability, Wealth and Income Sources**

Unsurprisingly, people react particularly negatively towards the presence of a species if they are especially vulnerable to its impacts. Vulnerability is often linked to wealth, because wealthier people can afford to invest in asset protection strategies such as employing herders, feeding guarding dogs, protecting crops and building well-constructed livestock enclosures (Naughton-Treves and Treves 2005). Even if wildlife damage still occurs despite these efforts, then an event in a wealthy household is less likely to be catastrophic (Dickman et al. 2013). This means that poverty-stricken households (who are often located in areas rich in biodiversity, including dangerous species; (Loveridge et al. 2010) tend to suffer from ‘compounding vulnerability’ due to their inability to either prevent wildlife damage or cope with its impact (Naughton-Treves 1997).

Wildlife-related activities can generate huge revenues, at least at a national scale (MTK 2008), and it is often assumed that if people receive some wealth from wildlife, they will be more positive towards the presence of wildlife and areas associated with them. Wildlife-related activities can generate substantial revenues, at least at a national scale (MTK 2008), and it is often assumed that if people receive some wealth from wildlife, they will be more positive towards its presence. This can be the case—in Botswana (Hemson et al. 2009) found that the dislike of living alongside lions and the National Park was less commonly reported amongst tourism employees than other people. In Western Uganda, tourism revenue sharing initiatives

around three parks (Kibale, Bwindi Impenetrable, and Mgahinga Gorilla National Park) generated US\$83,000 for local communities from 1995 to 1998, which was used to build 21 schools, four clinics, a bridge and a road (Archabald and Naughton-Treves 2001). This appeared to have an important effect in terms of attitudes, with 72 % of respondents saying that the initiatives had improved their attitudes towards the protected area (Archabald and Naughton-Treves 2001). However, a later study around Mgahinga National Park revealed that although financial flows to local communities from mountain gorilla (*Gorilla gorilla beringei*) tourism did reduce local negativity regarding the Parks' creation, they were insufficient to compensate them for the costs of park creation in terms of foregone agricultural production (Adams and Infield 2003). It is important to recognize that improved attitudes towards protected areas do not necessarily translate into improved attitudes towards wildlife species, especially conflict-causing ones. However, this can be the case—around the Community Baboon Sanctuary in Belize, people reported very positive attitudes towards both the protected area and its resident black howler monkeys (*Alouatta nigra*), despite some crop-raiding and disquiet over the level and distribution of benefits from the sanctuary (Alexander 2000). Moreover, studies have shown that people who report negative attitudes and experiences towards protected areas are more likely to negatively perceive the wildlife within the protected area and react accordingly (Chardonnet 2002; Mukherjee 2009; Western 1982).

Around Indonesia's Komodo National Park, research revealed that despite a generally high level of local support for tourism and the Park, people who received income from tourism were actually significantly less likely to support conservation of the Park, possibly because of negative interactions with the Park or its authorities (Walpole and Goodwin 2001). Inequitable distribution of benefits is always a concern regarding revenue-sharing initiatives (Archabald 2000) and can have a marked impact in terms of attitudes towards the park and its wildlife. Marginalized groups are often less likely to be in positions to receive benefits from activities such as tourism, so tend to be more negative—this has been found in locations as diverse as Nepal's Chitwan district (Carter et al. 2014) and Tanzania's Ruaha landscape (Dickman 2009).

### ***Relationship between Reported Attitudes and Response to Conflict***

Attitudes can be a good barometer of action taken in response to conflict—amongst Kenyan Maasai, the strongest predictor of actual lion-killing behaviour was attitudes towards lions (Hazzah et al. [under review](#)). However, there are many cases where there seems to be a mismatch between the reported attitudes of a species and the action taken (or lack thereof) in response. Frequently, people seem to respond more harshly than seems justified—in Namibia, farmers reported removing an average of 14 cheetahs (*Acinonyx jubatus*) annually, even where they were not considered problematic (Marker et al. 2003). In China's Sichuan Province, researchers



found that although attitudes towards Asiatic black bears (*Ursus thibetanus*) were influenced by problems with them, the killing of bears was actually more common in areas without reported conflict (Liu et al. 2011). Interestingly, in Kalimantan, only 7 % of people who reported that they had killed orang-utans said that they did so for self-defence or because they considered the animal a pest, with 41 % saying they did it for an ‘unknown reason’ (Meijaard et al. 2011).

Conversely, there are instances where relatively few people admit to killing conflict-causing animals, compared to the number who cite problems with them—in Tanzania’s Ruaha landscape, nearly all villagers surveyed (94 %) viewed large carnivores as problematic, but only 7.3 % reported having killed one (Dickman et al. 2014). There is often likely to be a marked under-reporting of real killing levels, due to fears of consequences from the authorities or conservation agencies (Fredriksson 2005; St John et al. 2011), but in some cases, the tolerance for conflict-causing species appears to be genuine. In Indonesia’s Lore Lindu National Park, Tonkean macaques (*Macaca tonkeana*) are often a serious pest to farmers, but there is marked reluctance to confront or kill them (Riley 2010). Similarly, in rural Japan, monkeys can cause significant economic damage to farmers, but research revealed that a quarter of people believed that damage imposed by monkeys had to be tolerated to some extent (Knight 1999).

Many of the factors mentioned in the section above, such as fear, myths and inter-group conflicts, can also have substantial bearings on whether or not people actually take action in response to conflict, as well as the level of that response. Fear often tempers the desire to act against conflict-causing species—in Tanzania, fear was one of the major reasons why people did not engage in lion hunts, even though almost 90 % viewed lions as problematic (Dickman 2009). In Indonesia, villagers reported an unwillingness to harm crop-raiding monkeys because of a fear that it would incite retribution from the primates (Riley 2010). Similarly, inter-group conflicts can lead to the ‘scapegoating’ of wildlife described below. However, additional factors also play an important role in determining the response to conflict, such as religious and cultural beliefs, and the relative costs and benefits of, for instance, killing wildlife in response to conflict. These issues are often interwoven with one another, but we have tried to tease out some of the key issues below.

## Religious and Cultural Beliefs

There are many instances where wildlife imposes substantial costs on local people, and yet the response seems unusually muted. This might be because of independent personal beliefs held by the individual concerned, or because of rules and tenets imposed by religions which someone adheres to. The relationship between religious beliefs and actions towards wildlife can be complex. White (1967) suggested that Christianity undermines conservation through its doctrine of man’s dominion over nature, while in Indonesia, Lee et al. (2009) found that Christians have a higher propensity to hunt wildlife than do Muslims. It has been suggested that the stronger people’s orientation towards domination of wildlife, the more likely their attitudes

and actions will prioritize human well-being over wildlife, often resulting in wildlife killing (Teel et al. 2010). This was supported by a study in Kenya, which revealed that Maasai who were evangelical Christians were much more likely to report a higher propensity to kill predators than those who attended other churches or none at all (Hazzah et al. 2009).

However, in other cases, religious and cultural beliefs can reduce the chances of wildlife killing. For example, a long list of primate species, including chimpanzees, redtail monkeys (*Cercopithecus ascanius*), rhesus monkeys (*Macaca mulatta*) and baboons (*Papio* sp.), are often serious pests in rural agricultural communities across Asia (Knight 1999). Despite the damage caused, various local beliefs can have protective effects for primates—in several places, including Sulawesi and Thailand, there are beliefs that people can turn into monkeys, and that the kinship between the two groups entitles the primates to protection, even if they cause problems (Riley 2010; Tambiah 1969). Interestingly, the basis of this protection (the similarities between humans and primates) is the same one that underlies the fear in other locations of primates as transgressive shape-shifters (see section ‘Myths and Knowledge’).

Cultural taboos also prohibit the killing of snow leopards in areas of rural Nepal, where the cat is viewed by local Buddhists as associated with the ‘mountain god’ (Ale 1998). In those places, retaliatory killing for snow leopard depredation is relatively uncommon, because attacks are thought to be divine retribution for bad actions on the part of the herder, so they are to blame instead of the predator (Ale 1998). However, religious beliefs do not always prevent the killing of wildlife. Around the Kibber Wildlife Sanctuary in the India trans-Himalaya, local households lost 18 % of their livestock to predators over an 18-month period, which amounted to half their annual average yearly income (Mishra 1997). Almost all of these losses were thought to be due to snow leopards, with a few due to other predators like wolves. Both the snow leopard and the Tibetan wolf are protected under Indian law, but the responses towards the species were markedly different—while snow leopards were almost never killed, wolves were killed every year in a dramatic fashion. Despite their Buddhist beliefs, villagers located wolf dens, removed the pups and paraded them around the villages before killing them, often with dynamite (Mishra 1997). Other than the cultural reasoning for this targeted killing, wolves could potentially have been easier to find and kill than the elusive snow leopard. Nevertheless, this kind of ‘contagious’ conflict, where one species gets blamed for the actions of another, has been documented elsewhere (Dickman et al. 2014) and might be of particular concern where one species is protected by cultural beliefs.

### Scapegoating of Wildlife

The kinds of inter-group conflicts mentioned in section 1b can not only influence attitudes towards certain species, but also markedly intensify the responses taken against them. In Kenya, Maasai communities around Nairobi National Park perceived that the Government prioritized wildlife over their cultural values and needs,

and this anger eventually resulted in Maasai warriors killing over half the lions in Nairobi National Park (Anonymous 2003). In Japan, macaques are often killed by local people, and while they do indeed raid crops, this monkey culling has been described not as an effective pest control measure, but rather a ‘sacrifice’ which has the aim of making farmers feel better (Koganezawa 1991), cited in (Knight 1999). The monkeys are also thought to be scapegoats for rural village declines—people are encouraged to vent their frustration and anger by killing monkeys, rather than focusing on the state’s role in the breakdown of nationally sponsored rural development initiatives (Maita 1989) cited in Knight (1999).

In some cases, the ‘scapegoating’ of wildlife can be quite extreme—until 1998, an annual pigeon shoot was held in Hegins, Pennsylvania, where thousands of pigeons were killed in a single day (Hoon Song 2000). Ostensibly, the shoot was a form of problem animal control due to crop losses caused by pigeons. However, research revealed that crop damage was negligible and that thousands of pigeons were in fact brought in and released specifically for the shoot (Hoon Song 2000). It emerged that the pigeons had come to represent the spread of urbanity and moral decay in rural areas, so killing them was an important symbolic act (Hoon Song 2000). These cases highlight that human responses to wildlife are sometimes far more to do with human–human conflict than with the actions of the actual species concerned.

## Rewards and Incentives

Whether or not someone acts on their attitudes, and takes action against a species, is likely to be strongly influenced by what that person would gain or lose by doing so. In some cases, there are direct economic rewards for killing wildlife, as exemplified by lion-killing in Tanzania, which is the most important country in the world for lions (with perhaps 40 % of the remaining population; (Riggio et al. 2013). The Sukuma are Tanzania’s most populous cattle-raising tribe and yet traditionally, they rewarded young men with valuable gifts (usually of cattle) in return for killing lions which threatened their livelihood and today, even in areas where there is virtually no livestock loss to lions, the community rewards still provide sufficient economic incentive to drive lion-killing (Fitzherbert et al. 2014). In southern Tanzania’s Ruaha landscape, the situation is very similar—young men from the Barabaig tribe are rewarded with wealth (in the form of gifts of cattle from other Barabaig households) for killing lions, and this helped drive very high rates of lion-killing around Ruaha National Park (Dickman, pers.obs.).

These community rewards are not limited to African tribes—in Nepal, people who killed wolves were rewarded with money (Mishra 1997), while in Japan, killing black bears still results in bounty payments, which helped incentivize the killing of over 70,000 bears there between 1946 and 1994 (Knight 2000). Similarly, Liu et al. (2011) concluded that in China, although human–wildlife conflicts shaped people’s attitudes towards bears, it was the presence of strong economic incentives (illegal trade in bear parts) rather than attitudes which prompted illegal killing.

Rewards are often not purely economic, though—with the Barabaig and other groups such as the Maasai, lion killers received cultural rewards as well as wealth, such as community accolades, attention from women and elevated social status (Hazzah 2011). Many thousands of miles away, in the Pantanal region of Brazil, similar cultural rewards incentivize jaguar hunting, where killing the cats is viewed as an innate component of ‘panteineiro’ culture and social identity (Marchini and Macdonald 2012).

However, there can also be valuable incentives for tolerating wildlife, which are often economic. Incentive-based schemes have gained popularity over the years as an attempt to increase local attitudes towards predators and provide conservation benefits to the affected communities. Direct ‘performance payments’ are the clearest example of this, where payments are made to individuals or groups contingent upon specific conservation outcomes, such as the maintenance of a species in a particular area (Dickman et al. 2011; Zabel and Holm-Muller 2008). In Sonora, Mexico, where private ranchland is important for the local jaguar population, the Northern Jaguar Project placed camera-traps on ranchland. They rewarded ranchers with cash payments of between US\$50 and US\$300 for photographs of jaguar, puma, ocelot (*Leopardus pardalis*) or bobcat (*Lynx rufus*), providing a direct economic incentive to tolerate the presence of these species on private land (Nelson 2009; Nistler 2007). At a larger scale, the Swedish government initiated a performance-payment scheme in 1996 in order to help conserve national populations of wolverines (*Gulo gulo*), lynx (*Lynx lynx*) and wolves, which create substantial conflict with Sami people due to depredation upon reindeer (*Rangifer tarandus*). The payment, made by the state, was calculated depending upon the number of certified carnivore reproduction events on Sami villages’ reindeer grazing land, and in 2007, the payment for each certified reproduction of wolverine or lynx was US\$29,000. The number of wolverine reproductions in the reindeer area has now exceeded the target of 90 per year, and although it is hard to prove a direct causal relationship with the performance payment initiative, it does suggest success (Zabel and Engel 2010). Of course with any incentive-based scheme, one of the major challenges is ensuring financial sustainability.

## Rules and Penalties

The rules governing action taken towards a species (such as killing them) and the resulting penalties can play an important role in determining behaviour. These penalties can be diverse, with just some examples including imprisonment and/or fines (Hazzah et al. 2013; Murphy and Macdonald 2010; St John et al. 2011), community exclusion (Lingard et al. 2003), retaliation by either the species concerned or the ancestral or spirit world (Knight 1999; Kohler 2000; Riley 2010). There can be marked differences in adherence to rules depending on their origin, in particular whether they come from within the community concerned, or are imposed externally. In Madagascar, the endemic radiated tortoise (*Geochelone radiata*) has been legally protected since 1960, but nonetheless been in rapid decline across much of

its range, with people killing them for food and trade (Lingard et al. 2003). However, in approximately half the tortoise's range, the Androy people have taboos against eating them, mainly due a perception that they are 'unclean' (although there is also some suggestion of a link to ancestors), and this has had a marked protective effect (Lingard et al. 2003). Violations of the taboo are rare and usually result in community exclusion, with this threat appearing to be far more effective in regulating behaviour than the rules imposed by remote authorities (Lingard et al. 2003). Customary laws do not always guarantee more adherence than national laws—in Indonesia, respondents who reported that the orang-utan was protected by customary law were actually more likely to kill them than people who were uncertain or said they were not protected by such rules, while people who knew that they were protected by national law were less likely to kill them than other people (Meijaard et al. 2011). Similarly, even strong religious rules do not always guarantee adherence, as seen with the killing of wolves (and even occasionally snow leopards) by traditional Buddhist herders (Mishra 1997).

Even though people might be aware of the rules concerning a species, adherence to them will usually be influenced by the likelihood of getting caught. St John et al. (2011) found that approximately one in five farmers in north-eastern South Africa killed leopards despite their protection under the country's Biodiversity Act, suggesting that the national rules did not extend to actual protection on private farms. In the United States, the illegal killing of wolves has been termed the 'shoot, shovel and shut up' approach, with the chance of a transgression being detected relatively unlikely on remote ranches. In comparison, spiritual or customary laws in tightly-knit communities are presumably likely to be far more effective, as there is less opportunity for transgressions to go unnoticed.

There can be other types of penalties for action as well—in East African pastoralist landscapes, lion hunting is an important way of acquiring status and wealth, but it undoubtedly carries significant risk, with people being seriously injured and killed on hunts every year (Dickman, pers.obs.). The potential risks of engaging in lion hunts are sometimes enough to prevent people taking action, even in response to the depredation of highly valued cattle, as people cannot risk the personal and economic impacts that serious injury would incur.

## Conclusions for Conflict Mitigation in a Complex World

The examples above demonstrate that conflict is not a simple, linear relationship between damage, attitudes and actions—it is influenced by multiple diverse factors (Fig. 16.1), and means that there is no 'one size fits all' strategy for effective conflict mitigation. However, it is vital to investigate and understand which particular factors drive any specific situation, as that understanding is crucial for determining the most effective action. In some cases, conflict can be significantly reduced by lessening the damage imposed by wild animals, but in many scenarios, other issues such as inter-group conflict, local beliefs and the cost-benefit ratio of wildlife killing are even

more important than the ‘actual’ risk posed by the species. Furthermore, the case studies highlighted in this chapter show that even where a similar factor emerges in different contexts, its impacts might not always be the same, so solutions would need to be culturally and site-appropriate. For example, in some cases where rules seem important determinants of actions, it might be beneficial to utilize customary law, while in others educating people about national law might be more effective. Developing a deep understanding of the drivers of conflict can lead to successful strategies, as has been seen with the transformation of pastoralist warriors killing lions in East Africa (Hazzah et al. 2014). Up until very recently, young men killed lions to gain status, wealth and maintain their social role as community protectors by reducing the threat that lions posed to livestock. In this instance, human–lion conflict was driven not only by wildlife damage, but also by wealth (or lack thereof), local beliefs and community incentives. A conflict mitigation strategy called ‘Lion Guardians’ was developed to address all these factors—young warriors were employed to track lions and safeguard the community from attacks, enabling them to gain wealth and social status, and to fulfil their traditional roles in a different way (e.g. they help protect against stock attacks by warning of lion presence and helping reinforce enclosures, rather than by killing lions) (Hazzah et al. 2014). This approach, which provides a culturally appropriate platform for warriors to participate in actively conserving lions, has shown to reduce lion-killing by 99 % (Hazzah et al. 2014).

There is no one silver bullet to achieving long-term coexistence between people and wildlife. Unfortunately, conflict is an inevitable reality with an increasing human population and the loss of natural habitat. It is likely that in most conflict scenarios, a multitude of different factors will come into play, making conflict a very complex issue to resolve. However, being aware of relevant drivers in any specific situation will help conservationists develop multifaceted and culturally appropriate mitigation initiatives to help encourage coexistence with wildlife in today’s ever more human-dominated world.

## References

- Adams WM, Infield M (2003) Who is on the gorilla’s payroll? Claims on tourist revenue from a Ugandan National Park. *World Dev* 31:177–190
- Ale S (1998) Culture and conservation: the snow leopard in Nepal. *Int Snow Leopard Trust News* 16:10
- Alexander SE (2000) Resident attitudes towards conservation and black howler monkeys in Belize: the Community Baboon Sanctuary. *Environ Conserv* 27:341–350
- Anonymous (2003) Maasai kill half the lions in Nairobi National Park. *Cat News* 39:5
- Archabald K (2000) Can revenue-sharing save wildlife? A case study of Jozani Chwaka Bay Conservation Area, Zanzibar, Tanzania. University of Wisconsin, p 95
- Archabald K, Naughton-Treves L (2001) Tourism revenue-sharing around national parks in Western Uganda: early efforts to identify and reward local communities. *Environ Conserv* 28:135–149
- Bagchi S, Mishra C (2006) Living with large carnivores: predation on livestock by the snow leopard (*Uncia uncia*). *J Zool* 268:217–224

- Balme GA, Slotow R, Hunter LT (2009) Impact of conservation interventions on the dynamics and persistence of a persecuted leopard (*Panthera pardus*) population. *Biol Conserv* 142: 2681–2690
- Barua M, Bhagwat SA, Jadhav S (2013) The hidden dimensions of human–wildlife conflict: health impacts, opportunity and transaction costs. *Biol Conserv* 157:309–316
- Browne-Nunez C, Treves A, MacFarland D, Voyles Z, Turng C (2015) Tolerance of wolves in Wisconsin: a mixed-methods examination of policy effects on attitudes and behavioral inclinations. *Biol Conserv* 189:59–71, <http://dx.doi.org/10.1016/j.biocon.2014.12.016>
- Butler JRA (2000) The economic costs of wildlife predation on livestock in Gokwe communal land, Zimbabwe. *Afr J Ecol* 38:23–30
- Carter NH, Riley SJ, Shortridge A, Shrestha BK, Liu J (2014) Spatial assessment of attitudes toward tigers in Nepal. *Ambio* 43:125–137
- Chardonnet P (2002) Conservation of the African lion: contributions to a status survey. International Foundation for the Conservation of Wildlife, France
- Chelliah K, Kannan G, Kundu S, Abilash N, Madhusudan A, Baskaran N, Sukumar R (2010) Testing the efficacy of a chilli-tobacco rope fence as a deterrent against crop-raiding elephants. *Curr Sci (Bangalore)* 99:1239–1243
- Conover M (2002) Resolving human-wildlife conflicts: the science of wildlife damage management. CRC Press, Boca Raton
- Dhanwatey HS, Crawford JC, Abade LA, Dhanwatey PH, Nielsen CK, Sillero-Zubiri C (2013) Large carnivore attacks on humans in central India: a case study from the Tadoba-Andhari Tiger Reserve. *Oryx* 47:221–227
- Dickman AJ (2006) Reported conflict between pastoralists and wildlife around the Ruaha National Park, Tanzania. In: Siegrist D, Clivaz C, Hunziker M, Iten S (eds) Exploring the nature of management. Proceedings of the third international conference on monitoring and management of visitor flows in recreational and protected areas. University of Applied Sciences Rapperswil, Rapperswil, pp 405–406
- Dickman AJ (2009) Key determinants of conflict between people and wildlife, particularly large carnivores, around Ruaha National Park, Tanzania. *Biological anthropology*. University College London, London
- Dickman AJ (2010) Complexities of conflict: the importance of considering social factors for effectively resolving human–wildlife conflict. *Anim Conserv* 13:458–466
- Dickman AJ, Macdonald EA, Macdonald DW (2011) A review of financial instruments to pay for predator conservation and encourage human-carnivore coexistence. *Proc Natl Acad Sci USA* 108:13937–13944
- Dickman AJ, Marchini S, Manfredo M (2013) The importance of the human dimension in addressing conflict with large carnivores. In: Macdonald DW, Willis K (eds). Key topics in conservation biology, vol 2. Oxford University Press, Oxford, pp 110–126
- Dickman AJ, Hazzah L, Carbone C, Durant S (2014) Carnivores, culture and ‘contagious conflict’: multiple factors influence perceived problems with carnivores in Tanzania’s Ruaha landscape. *Biol Conserv* 178:19–27
- Dirzo R, Young HS, Galetti M, Ceballos G, Isaac NJ, Collen B (2014) Defaunation in the Anthropocene. *Science* 345:401–406
- Entwistle AC, Stephenson PJ (2000) Small mammals and the conservation agenda. Conservation biology series. Cambridge University Press, Cambridge, pp 119–140
- Fitzherbert E, Caro T, Johnson P, Macdonald DW, Mulder MB (2014) From avengers to hunters: leveraging collective action for the conservation of endangered lions. *Biol Conserv* 174:84–92
- Fredriksson G (2005) Human-sun bear conflicts in East Kalimantan, Indonesian Borneo. *Ursus* 16:130–137
- Hazzah L (2011) Exploring attitudes, behaviors, and potential solutions to lion (*Panthera leo*) killing in Maasailand, Kenya. Nelson Institute of Environmental Studies. University of Wisconsin-Madison, Madison, Madison

- Hazzah L, Borgerhoff Mulder M, Frank L (2009) Lions and warriors: social factors underlying declining African lion populations and the effect of incentive-based management in Kenya. *Biol Conserv* 142:2428–2437
- Hazzah L, Dolrenry S, Kaplan D, Frank L (2013) Access to parks during drought influences attitudes and behavior toward lion conservation in Maasailand, Kenya. *Environ Conserv* 40:266–276
- Hazzah L, Dolrenry S, Naughton L, Edwards CT, Mwebi O, Kearney F, Frank L (2014) Efficacy of two lion conservation programs in Maasailand, Kenya. *Conserv Biol* 28:851–860
- Hazzah L, Dolrenry S, Dickman AJ, Bath A (under review) From attitudes to actions: predictors of lion killing by Maasai warriors. *Conserv Soc*
- Heberlein TA, Ericsson G (2008) Public attitudes and the future of wolves *Canis lupus* in Sweden. *Wildl Biol* 14:391–394
- Hemson G, Maclellan S, Mills G, Johnson P, Macdonald DW (2009) Community, lions, livestock and money: a spatial and social analysis of attitudes to wildlife and the conservation value of tourism in a human-carnivore conflict in Botswana. *Biol Conserv* 142:2718–2725
- Hoon Song S (2000) The great pigeon massacre in a deindustrializing American region. In: Knight J (ed) *Natural enemies: people-wildlife conflicts in anthropological perspective*. Routledge, London, pp 212–228
- International Institute for Environment and Development (IIED) (1994) *Whose eden? An overview of community approaches to wildlife management*. IIED, London
- IUCN (2006) *Regional conservation strategy for the lion Panthera leo in Eastern and Southern Africa*. IUCN SSC Cat Specialist Group, Gland, p 60
- Jadhav S, Barua M (2012) The elephant vanishes: impact of human–elephant conflict on people’s wellbeing. *Health Place* 18:1356–1365
- Kaltenborn BP, Bjerke T (2002) The relationship of general life values to attitudes toward large carnivores. *Res Hum Ecol* 9:55–61
- Keller E (2009) The danger of misunderstanding ‘culture’. *Madagascar Conserv Dev* 4:82–85
- Knight J (1999) Monkeys on the move: the natural symbolism of people-macaque conflict in Japan. *J Asian Stud* 58:622–647
- Knight J (2000) Culling demons: the problem of bears in Japan. In: Knight J (ed) *Natural enemies: people-wildlife conflicts in anthropological perspective*. Routledge, London
- Koganezawa M (1991) Nihonzaru no bunpu to hogo no genjo oyobi sono mondaiten—Nikko o chushin ni [The present state and distribution of the Japanese Monkey and related problems: focussing on Nikko]. *Yasei dobutsu hogo: 21 seiki e no teigen* [Wild animal protection: a proposal for the 21st century]. Nihon Shizen Hogo Kyokai, Tokyo
- Kohler A (2000) Half-man, half-elephant: shapeshifting among the Baka of Congo. In: Knight J (ed) *Natural enemies: people-wildlife conflicts in anthropological perspective*. Routledge, London, pp 50–77
- Kruuk H (2002) *Hunter and hunted: relationships between carnivores and people*. Cambridge University Press, Cambridge
- Lee T, Sodhi N, Prawiradilaga D (2009) Determinants of local people’s attitude toward conservation and the consequential effects on illegal resource harvesting in the protected areas of Sulawesi (Indonesia). *Environ Conserv* 36:157–170
- Lee-Thorp J, Thackeray JF, van der Merwe N (2000) The hunters and the hunted revisited. *J Hum Evol* 39:565–576
- Lindquist G (2000) The wolf, the Saami and the urban shaman: predator symbolism in Sweden. In: Knight J (ed) *Natural enemies: people-wildlife conflicts in anthropological perspective*. Routledge, London, pp 170–188
- Lingard M, Raharison N, Rabakonandrianina E, Rakotoarisoa J-A, Elmqvist T (2003) The role of local taboos in conservation and management of species: the radiated tortoise in southern Madagascar. *Conserv Soc* 1:223
- Liu F, McShea WJ, Garshelis DL, Zhu X, Wang D, Shao L (2011) Human-wildlife conflicts influence attitudes but not necessarily behaviors: factors driving the poaching of bears in China. *Biol Conserv* 144:538–547



- Loe J, Roskaft E (2004) Large carnivores and human safety—a review. *Ambio* 33:283–288
- Loveridge AJ, Wang SW, Frank LG, Seidensticker J (2010) People and wild felids: conservation of cats and management of conflicts. In: Macdonald DW, Loveridge AJ (eds) *Biology and conservation of wild felids*. Oxford University Press, Oxford, pp 161–195
- Maita A (1989) Sengo sanson Shakai no ‘mura kuzushi’ to shinrin kanri. In: Setsu U (ed) ‘Shinrin shakaigaku’ sengen (Declaration on ‘Forest sociology’). Yuikaku Sensho, Tokyo
- Marchini S (2014) Who’s in conflict with whom? Human dimensions of the conflicts involving wildlife. In: Verdade LM, Lyra-Jorge MC, Piña CI (eds) *Applied ecology and human dimensions in biological conservation*. Springer, New York, pp 189–209
- Marchini S, Macdonald DW (2012) Predicting ranchers’ intention to kill jaguars: case studies in Amazonia and Pantanal. *Biol Conserv* 147:213–221
- Marker LL, Dickman AJ, Mills MGL, Macdonald DW (2003) Aspects of the management of cheetahs, *Acinonyx jubatus jubatus*, trapped on Namibian farmlands. *Biol Conserv* 114:401–412
- McGuinness S, Taylor D (2014) Farmers’ perceptions and actions to decrease crop raiding by forest-dwelling primates around a Rwandan forest fragment. *Hum Dimens Wildl* 19:179–190
- McManus JS, Dickman AJ, Gaynor D, Smuts BH, Macdonald DW (2014) Dead or alive? Comparing costs and benefits of lethal and non-lethal human-wildlife conflict mitigation on livestock farms. *Oryx* 49(4):687–695
- Meijaard E, Buchori D, Hadiprakarsa Y, Utami-Atmoko SS, Nurcahyo A, Tjiu A, Prasetyo D, Christie L, Ancrenaz M, Abadi F (2011) Quantifying killing of orangutans and human-orangutan conflict in Kalimantan, Indonesia. *PLoS One* 6:e27491
- Mishra C (1997) Livestock depredation by large carnivores in the Indian trans-Himalaya: conflict perceptions and conservation prospects. *Environ Conserv* 24:338–343
- MTK (2008) Ministry of Tourism, Kenya. [http://www.tourism.go.ke/ministry.nsf/pages/facts\\_figures](http://www.tourism.go.ke/ministry.nsf/pages/facts_figures)
- Muhly TB, Musiani M (2009) Livestock depredation by wolves and the ranching economy in the Northwestern US. *Ecol Econ* 68:2439–2450
- Mukherjee A (2009) Conflict and coexistence in a national park. *Econ Pol Wkly* 44:52–59
- Murphy T, Macdonald DW (2010) Pumas and people: lessons in the landscape of tolerance from a widely distributed felid. In: Macdonald DW, Loveridge AJ (eds) *Biology and conservation of wild felids*. Oxford University Press, Oxford, pp 431–452
- Musiani M, Mamo C, Boitani L, Callaghan C, Gates CC, Mattei L, Visalberghi E, Breck S, Volpi G (2003) Wolf depredation trends and the use of fladry barriers to protect livestock in western North America. *Conserv Biol* 17:1538–1547
- Naughton L, Rose R, Treves A (1999) The social dimensions of human-elephant conflict in Africa: a literature review and case studies from Uganda and Cameroon. African Elephant Specialist, human-elephant task conflict task force of IUCN, Gland
- Naughton-Treves L (1997) Farming the forest edge: vulnerable places and people around Kibale National Park. *Uganda Geogr Rev* 87:27–46
- Naughton-Treves L, Treves A (2005) Socio-ecological factors shaping local support for wildlife: crop-raiding by elephants and other wildlife in Africa. In: Woodroffe R, Thirgood S, Rabinowitz A (eds) *People and wildlife: conflict or coexistence?* Cambridge University Press, Cambridge, pp 252–277
- Neff C (2012) Australian beach safety and the politics of shark attacks. *Coast Manag* 40:88–106
- Nelson F (2009) Developing payments for ecosystem service approaches to carnivore conservation. *Hum Dimens Wildl* 14:381–392
- Nistler C (2007) Seeing spots: the return of the jaguar. PERC reports 25. <http://www.perc.org/articles/article1016.php>
- Norton-Griffiths M, Southey C (1995) The opportunity costs of biodiversity conservation in Kenya. *Environ Econ* 12:125–139
- Packer C, Ikanda D, Kissui B, Kushnir H (2005) Lion attacks on humans in Tanzania. *Nature* 436:927–928
- Prokop P, Tunnicliffe SD (2008) Disgusting animals: primary school children’s attitudes and myths of bats and spiders. *Eurasia J Math Sci Technol Educ* 4:87–97

- Prokop P, Fancovicova J, Kubiátko M (2009) Vampires are still alive: Slovakian students' attitudes toward bats. *Anthrozoos* 22:19–30
- Quammen D (2003) *Monster of God: the man-eating predator in the jungles of history and the mind*. Norton, New York
- Richards P (2000) Chimpanzees as political animals in Sierra Leone. In: Knight J (ed) *Natural enemies: people-wildlife conflict in anthropological perspective*. Routledge, London, pp 78–103
- Riggio J, Jacobson A, Dollar L, Bauer H, Becker M, Dickman AJ, Funston P, Groom R, Henschel P, de Iongh H, Lichtenfeld L, Pimm S (2013) The size of savannah Africa: a lion's (*Panthera leo*) view. *Biodivers Conserv* 22:17–35
- Rijksen HD (1995) Forest men and man. In: Corbey R, Theunissen B (eds) *Ape, man, apeman: changing views since 1600*. Department of Prehistory, Leiden University, Leiden
- Riley EP (2010) The importance of human-macaque folklore for conservation in Lore Lindu National Park, Sulawesi, Indonesia. *Oryx* 44:235–240
- Scarce R (1998) What do wolves mean? Conflicting social constructions of *Canis lupus* in “border-town”. *Hum Dimens Wildl* 3:26–45
- Siex KS, Struhsaker TT (1999) Colobus monkeys and coconuts: a study of perceived human-wildlife conflicts. *J Appl Ecol* 36:1009–1020
- Simons EL, Meyers DM (2001) Folklore and beliefs about the aye aye (*Daubentonia madagascariensis*). *Lemur News* 6:11–16
- Sitati NW, Walpole MJ (2006) Assessing farm-based measures for mitigating human-elephant conflict in Transmara District, Kenya. *Oryx* 40:279–286
- St John FA, Keane AM, Edwards-Jones G, Jones L, Yarnell RW, Jones JP (2011) Identifying indicators of illegal behaviour: carnivore killing in human-managed landscapes. *Proc R Soc B Biol Sci* 279:804–812
- Starr C (1969) Social benefits vs. technological risks. *Science* 165:1232–1238
- Tambiah SJ (1969) Animals are good to think and good to prohibit. *Ethnology* 8:423–459
- Teel TL, Manfredo MJ, Jensen FS, Buijs AE, Fischer A, Riepe C, Arlinghaus R, Jacobs MH (2010) Understanding the cognitive basis for human-wildlife relationships as a key to successful protected-area management. *Int J Sociol* 40:104–123
- Thirgood S, Woodroffe R, Rabinowitz A (2005) The impact of human-wildlife conflict on human lives and livelihoods. In: Woodroffe R, Thirgood S, Rabinowitz A (eds) *People and wildlife: conflict or coexistence?* Cambridge University Press, Cambridge, pp 13–26
- Walpole MJ, Goodwin HJ (2001) Local attitudes towards conservation and tourism around Komodo National Park, Indonesia. *Environ Conserv* 28:160–166
- West H (2001) Sorcery of construction and socialist modernisation: ways of understanding power in postcolonial Mozambique. *Am Ethnol* 28:119–150
- Western D (1982) Amboseli National Park: enlisting landowners to conserve migratory wildlife. *Ambio* 11:302–308
- White LJ (1967) The historic roots of our ecologic crisis. *Science* 155:1203–1207
- Wilson MA (1997) The wolf in Yellowstone: science, symbol, or politics? Deconstructing the conflict between environmentalism and wise use. *Soc Nat Resour* 10:453–468
- Woodroffe R, Thirgood S, Rabinowitz A (2005) The impact of human-wildlife conflict on natural systems. In: Woodroffe R, Thirgood S, Rabinowitz A (eds) *People and wildlife: conflict or coexistence?* Cambridge University Press, Cambridge, pp 1–12
- Zabel A, Engel S (2010) Performance payments: a new strategy to conserve large carnivores in the tropics? Institute for Environmental Decisions, Zurich
- Zabel A, Holm-Muller K (2008) Conservation performance payments for carnivore conservation in Sweden. *Conserv Biol* 22:247–251
- Zimmerman A, Walpole MJ, Leader-Williams N (2005) Cattle ranchers' attitudes to conflicts with jaguar *Panthera onca* in the Pantanal of Brazil. *Oryx* 39:406–412