Human-Wildlife Conflict: An Interview with Dr. Michael Hutchins

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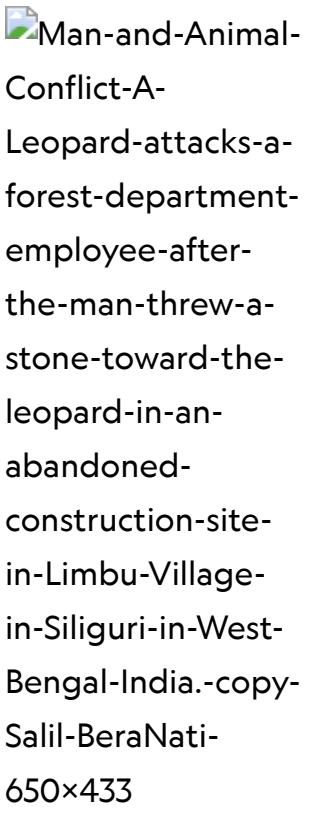
Jordan: Let's begin with a simple question: What do we mean by the term "human-wildlife conflict"?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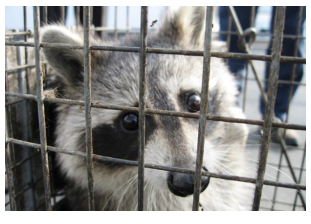
Michael: Simply put, a conflict may arise when the interests of humans and wildlife—real or perceived—do not coincide. Chief among these is competition between wildlife and humans for food. Taxa as diverse as elephants, gorillas, deer, waterfowl, passerine birds, such as starlings and blackbirds, rodents and insects can have devastating impacts on agricultural products and thus economies, both on the ground and in storage facilities (http://www.kiplinger.com/slideshow/business/T019-S001-10-bad-bugs-that-bug-us-most/index.html). Large carnivores, such as lions, jaguars, leopards, wolves, and crocodilians kill and eat domestic livestock. In some cases, wildlife may pose a threat not only to human livelihoods, but also to human lives and well-being. In Africa and Asia, elephants kill hundreds of people each year, as the latter attempt to protect their crops from these large, dangerous herbivores (http://news.nationalgeographic.com/news/2005/06/0603_050603_elephants.html). It is estimated that some 10-12,000 people die each year in India alone from the bites of venomous snakes (http://wellsking.tripod.com/Worldrec20.htm). In North America, fatal encounters between humans and grizzly bears, though comparatively rare, are well known (Herrero, S. 1985. *Bear Attacks: Their Causes and Avoidance*. Piscataway, NJ: Winchester Press.)

Conflict can also occur when wildlife—both native and introduced—impacts human infrastructure and economies. An excellent example is the flooding damage to homes, municipal water systems and timber production that occurs when beaver dams impede drainage (http://icwdm.org/handbook/rodents/beavers.asp). Introduced species are also responsible for huge economic losses. A great example is the destruction of homes in the southern United States due to the introduction of the Formosan termite, a social insect that eats wood (http://eol.org/pages/463846/details). Similarly, the introduced brown tree snake on Guam causes an estimated $1-4 million in damage to the island's electrical infrastructure annually (http://www.fort.usgs.gov/resources/education/bts/impacts/economic.asp).

Sometimes human-wildlife conflict occurs when wildlife becomes an annoyance (http://en.wikipedia.org/wiki/Nuisance_wildlife_management). This might range from offensive smells coming from the accumulation of bat guano in one's attic to raccoons or black bears turning over garbage cans and spreading their contents across your lawn to deer or rabbits eating your expensive ornamental plants or produce grown in a backyard garden.

In the final analysis it is difficult to blame wildlife for human-wildlife conflict, because the animals are simply, doing what animals do. On the other hand, if humans view wildlife as pests, as damaging to their livelihoods, or as a danger to their community or family, then wildlife is going to lose. The challenge for conservationists is to somehow change those attitudes by offering practical and effective solutions.

Jordan: The interactions between humans and wildlife and the perceptions of wildlife held by various stakeholders can heavily influence management and policy programs aimed at conserving imperiled species. What is this "human dimension" or "people" side of wildlife resource management?



Michael: The human dimension of wildlife management and conservation has become a critical aspect of our field (http://joomla.wildlife.org/index.php?option=com_content&task=view&id=859&Itemid=354; Decker, D., Riley, S.J., and Siemer, W.F. 2012. *Human Dimensions of Wildlife Management, 2nd edition*. Baltimore, MD: Johns Hopkins University Press). This is not surprising given the fact that human populations continue to expand, pushing wildlife into increasingly smaller areas of "natural" habitat and bringing humans and wildlife into more frequent contact.

In today's world, for many species, we can expect human-wildlife-conflict to increase in direct proportion to conservation success. For example, incidences of human-bear conflict have risen in the Greater Yellowstone Ecosystem with the recovery of the grizzly bear population, necessitating more active management (http://www.msnbc.msn.com/id/43209413/ns/us_news-environment/t/more-grizzlies-meeting-humans).

How animals are perceived by humans is a major factor contributing to the development of wildlife management and conservation policy. Generally, the greater the negative impact wildlife has on human lives and livelihoods, the greater the perception of wild animals as "pests", as opposed to valued components of our environment.

In 2005 and beyond, I was involved in the development of the Human-Wildlife Conflict Collaboration (HWCC), a consortium of several organizations and experts seeking to find solutions to this growing problem (http://humanwildlifeconflict.org/). The basic concept behind HWCC was to share information and improve responses to human-wildlife conflict through consultation, not only among wildlife professionals and between their organizations, but also with economic and social development organizations, land use planners, agribusiness, and other key decision makers. The primary focus of HWCC in recent years has been the development of an interactive workshop that applies techniques used to resolve human-human conflict to human-wildlife conflict. This generally involves getting key decision makers together and identifying the real reasons behind the conflict, exploring possible solutions, gaining trust, and consensus building (http://humanwildlifeconflict.org/Training.htm). Based on evaluations and testimonials by participants, the workshops have been successful, but it remains to be verified that this is resulting in effective on-the-ground action.

Jordan: Negative human-wildlife interaction, more commonly referred to as "human-wildlife conflict" occurs worldwide. Such conflict occurs in developing regions of the world as well as in more developed areas. Here in North America, advances in wildlife management practices often prevent or subvert (thwart) would-be negative interactions between people and free-ranging wildlife. Can you explain some of the success we have had here in the United States with regard to mitigating human-wildlife conflict? How far do we have to go?

Michael: As with virtually anything involved with conservation, there have been some successes and some failures. There are many potential responses to human-wildlife conflict. Some involve addressing the issue *a priori*, that is, before the negative interactions occur. These are essentially preventative measures. Solutions can also be *post hoc*, meaning that the problem is addressed after the negative interactions occur. Examples of *a priori* approaches include the proper containment or protection of human food sources so that wildlife cannot access it. This ranges from rodent- and insect-proof grain storage containers to predator-proof fences that keep livestock safe. The use of domestic dogs to protect domestic livestock from predators has also become increasingly popular worldwide (http://www.sciencewa.net.au/topics/agriculture/item/1658-guardian-dogs-successful-in-predation-prevention-on-livestock.html; http://www.thefreelibrary.com/Effectiveness+of+livestock+guarding+animals+for+reducing+predation+on...-a079902407). In Brazil, electric fences have been used to prevent livestock predation by jaguars on small farms (http://www.catsg.org/catnews/03_specialissue/jaguar_brazil/Silveira_et_al_2008_Livestock_predation_in_Brazil_s.pdf). Fences are being considered as a way to keep lions and people apart in Africa (http://www.bbc.co.uk/news/science-environment-21687176). These are non-lethal approaches; however, depending on the circumstances, lethal approaches also have been utilized. For example, modern rodent and insect control often involves the use of traps and pesticides (http://en.wikipedia.org/wiki/Pest_control). Wide-scale culling of coyote populations throughout the western United States by USDA APHIS Animal Services has been the source of considerable controversy (http://www.predatordefense.org/USDA.htm). Clearly, predator control is a complex and difficult issue, which may vary from circumstance to circumstance. A similar controversy is now playing out as the numbers of wolves increases across the western and north-central U.S. Large predators are key to the health of functioning ecosystems, as they keep prey populations in check (Unger, K. 2008. Managing a charismatic carnivore. *The Wildlife Professional* 2(4) 30-33). Overpopulation of herbivores can result in over-browsing and grazing and alter the composition of entire plant communities. So the basic question becomes: how many coyotes or wolves are too many, and how can populations be managed sustainably, while still maintaining the tenuous balance between humans and large carnivores?

There has been some good news. Negative interactions between bears and humans in our national and state parks and wildlife refuges have been greatly reduced due to the development of improved methods of containing and disposing of garbage (http://www.bearsmart.com/becoming-bear-smart/community/waste-management). Garbage had been a major attractant to bears, which placed them into close proximity to humans, thus increasing the probability of negative encounters. The development of bear-proof containers has helped to alleviate this problem, as has improved regulations and public education. Restrictions on the public feeding of wildlife have been particularly important. Public feeding, when the public wishes to interact directly with wildlife, thus bringing them into closer proximity, is particularly problematic. Not surprisingly, when people feed wild animals, the animals come to perceive humans as a source of food. Over time, this can lead to habituation, wherein the animals become increasingly comfortable around humans and do not view them as a threat. While some people would see this as a positive outcome, it is, in fact, when animals become the most dangerous. When animals have a healthy fear of people, they keep their distance and negative interactions are less frequent, only occurring during rare chance encounters. In the case of many animals, such as wolves and coyotes, the habituation process is known to follow a predictable pattern. First, the animals are attracted to humans by the presence of food, which brings them into close proximity. If these initial

interactions are positive, the next stage often involves "testing", wherein the animals may approach even closer and perhaps nip at humans, assessing their reactions. The final stage might involve an all-out attack, wherein the animals treat humans as prey (Geist, V. 2008. The danger of wolves. *The Wildlife Professional* 2(4): 34-35).

Regulated hunting is another way to prevent human-wildlife conflict, not only in that it reduces the numbers of problem animals, and perhaps even more importantly, prevents animals from becoming habituated to and thus more dangerous to humans. In southern Florida, for example, negative interactions between humans and alligators are comparatively rare given the large populations of both. This is despite the fact that recreational activities involving water are very popular and bring humans and alligators into potential contact. What allows this tenuous balance to be maintained? Three factors seem to be particularly important: (1) a ban on public feeding of alligators, reinforced through public education and law enforcement; (2) quick assessment of and removal of problem animals; and (3) a regulated hunting season (http://edis.ifas.ufl.edu/uw230). All of these help to prevent the association between humans and food, hence also reducing the chance of habituation and maintaining a healthy fear of humans in alligators. Negative interactions still occur and people do not always follow the rules; however, in the absence of active management, the situation could be much worse.

Another example of conflict is bird-aircraft collisions; birds, such as the ubiquitous Canada goose, can threaten human safety and lives when they collide with flying aircraft in the vicinity of airports. The Federal Aviation Administration (FAA) maintains a database on wildlife strikes on aircraft. From 1990 to 2007, the number of recorded strikes on civilian aircraft went from 1,759 to 7,666, respectively. The entire database contains records of 82,057 strikes, of which the vast majority involved birds (97.5%). Around 12% (9,814) of these strikes caused damage to the aircraft, and in 2,700 of these incidents, the damage was considered substantial.

How are wildlife managers dealing with this real and growing threat? They have several tools at their disposal, the success of which varies with the circumstance. "There is no 'silver bullet', no one technique or strategy that can be used everywhere. The preferred technique for keeping geese away from airports depends on identifying characteristics of the site that are most attractive to geese, such as security (e.g., cover), food availability, nesting sites and water, and then choosing techniques that reduce the desirability of that site from the animals' perspective. This might, for example, involve reducing goose-grazing activity in an area by providing an alternative feeding site and then hazing the geese off the site, as for example, by using trained dogs, where grazing is unwanted. However, unless the original site is made permanently less attractive (e.g., by reducing grassy areas), this will not be a long-term solution. In some situations, especially those that involve a high risk to human safety, wildlife professionals have recommended lethal control, such as hunting or live-capture and euthanasia to reduce goose numbers. For example, following the recent US Airways incident at LaGuardia Airport in which a bird-aircraft collision brought down a large jet, New York City ordered as many as 2,000 geese rounded up and euthanized by the U.S. Department of Agriculture's Wildlife Services. These geese were living in public parks and other open areas near the city's two busy airports.

Sometimes attempts to manage human-wildlife conflict *a priori* through lethal control have gone too far. Eradication of wolves to prevent livestock losses in the U.S. is a good example, as is the indiscriminant reduction of coyote populations across the west. Predator bounty programs nearly drove the wolf into extinction in the lower 48 states. A similar campaign in Australia resulted in the loss of the Tasmanian wolf (http://www.sciencedaily.com/releases/2013/01/130131095310.htm). Large carnivores are critical to functioning ecosystems and regulated hunting as a method of population and behavior management must be science-based and sustainable (Peek, J. (ed) Management of Large Mammalian Carnivores in North America. Bethesda, MD: *The Wildlife Society*). Rather than indiscriminate killing, new approaches have attempted to focus lethal control solely on problem animals. For example, the livestock protection collar is a relatively new tool used to selectively kill coyotes that attack sheep or goats. Collars are placed on pastured animals where coyotes are likely to attack. Each collar contains a small quantity (300 mg) of a toxin (Compound 1080). Because of their design and position on the throat, most attacking coyotes will puncture the collar and ingest a lethal dose of the toxicant. 1080 is slow acting, and a coyote ingesting the toxicant do not exhibit symptoms or die for several hours. As a result, sheep or goats that are attacked are usually killed. The collar is registered only for use against coyotes and may be placed only on sheep or goats.

New technologies may revolutionize our ability to manage human-wildlife conflict non-lethally, at least for some species. For example, Taser has now developed a wildlife product, which can be used as a powerful form of aversive conditioning (Lewis, L., Dawes, D., Hinz, A., and Mooney, P. 2011. Tasers for wildlife. *The Wildlife Professional* 5(1): 44-46). The devise has been used in Alaska on habituated bears and looks to be an extremely valuable new tool for wildlife management. In fact, large animals find the experience so distasteful that they appear to totally avoid the location of their experience and humans, in general, after only one application. Similarly, a young boy in Kenya recently came up with an innovation that could reduce human-lion conflict—LED lights that flicker on and off giving the impression of a person moving with a flashlight in hand. Since installing these around his family's livestock enclosure, there have been no losses to lions (http://www.nation.co.ke/News/Boy-scares-off-lions-with-flashy-invention/-/1056/1705682/-/mscvyx/-/index.html). In their efforts to keep elephants from decimating their crops, innovative African farmers have installed beehives on their farms. Bees, bee stings, and even the sound of bees are apparently distasteful to elephants, causing them to move away from the area (http://suite101.com/article/bees-frighten-african-elephants-and-they-run-away-a230538). Hot chili peppers have been used in a similar manner (http://news.softpedia.com/news/Elephants-and-Chili-Peppers-36035.shtml). Elephants find hot peppers unpalatable and, when planted as a buffer around crops, they can discourage elephants from foraging in the area.

Predator compensation programs are an example of a *post-hoc* (after the fact) approach to reducing human-wildlife conflict. Such programs involve monetary compensation to herders or ranchers for livestock killed by wild predators (http://controlpredators.com/special/9.html; http://maasailand.wildlifedirect.org/category/predator-compensation-fund/). The basic concept is that herders or ranchers that lose livestock to wild predators would not suffer any economic loss, which is a great idea in theory. However, there are some drawbacks to such programs. For example, in order to be compensated, the owner must prove that his or her animal was killed by a wild predator. Given the condition of the kill site or what is left of the carcass, if anything, this may be difficult.

Jordan: You have traveled extensively and have seen the plight of both people and wildlife as they attempt to coexist in an increasingly crowded world. Can you provide some examples of lesser-known negative human-wildlife interactions in some of the developing countries you have visited? Are we making any progress in reducing such conflict between people and wildlife in these regions?

Michael: I've already given you several examples from around the globe, so instead I'd like to concentrate on why it is so difficult to address human-wildlife conflict in developing countries. In the developing world, many people live in poverty. Even those that are better off are highly dependent on their crops and livestock for their and their family's survival, particularly in rural areas. When hunger pangs arrive, they cannot simply saunter down to the local MacDonald's to order a hamburger and fries. When they leave their homes to travel by foot, they may be threatened by large, dangerous animals, which that have the ability to kill or seriously injure them or their family members. I've often wondered how relatively wealthy, good intentioned conservationists from developed countries would feel about having lions or leopards in their own back yards in areas where their children play? Yet, this is precisely what we are asking people in developing countries to do. Combined with a lack of adequate law enforcement, these factors make it difficult to address human-wildlife conflict in many areas of the world, as local people are often taking matters into their own hands.

So, how do we protect people and their crops and livestock from large carnivores and herbivores? How do we change people's perceptions of wildlife as "pests" to one of a valued commodity? I've mentioned some of the recent innovations that people are using as non-lethal alternatives for addressing the issue. However, economics has a role to play as well (http://www.sed.manchester.ac.uk/idpm/research/publications/archive/cc/cc_wp05.pdf). In Africa, wildlife tourism is a major source of income for local economies. In the past, however, local people (those living with the animals) derived little benefit from tourism, with the profits from these operations going to large companies based in other countries and operated by foreigners. In contrast, when local people are given a chance to make their own decisions (i.e., are empowered) and wildlife tourism has resulted in direct and measurable community benefits, such as improved health care, access to clean water, jobs and compensation, and others, the attitudes of people can be changed (http://www.awf.org/content/document/detail/3258). Wildlife can then be seen as a valued resource, one that warrants protection and conservation.

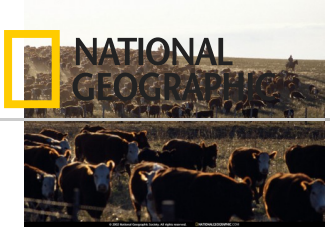
Jordan: Road ecology is an emerging field, but few people are familiar with this applied scientific discipline. Can you explain what it is and discuss some of what we have learned about managing wildlife in regard to our expanding network of roads here in North America and around the globe.

Michael: Yes, road ecology is a fascinating topic and one that has important implications for wildlife conservation. The construction of a system of roads that allow us to drive from place to place or transport goods can have a number of direct and indirect effects on wildlife. For animals, roads can present significant obstacles. Depending on the type of animal and amount of vehicular traffic present, roads can be risky to cross or completely impenetrable. As barriers to movement, roads disrupt natural migration and fragment habitats. Individual animals attempting to cross roads in order to migrate, find food or mates, or return to their breeding grounds are not always successful as evidenced by the vast number of dead animals found on or near roads. One clever author has published a field guide to identifying wildlife killed on or near roads: *Flattened Fauna: A Field Guide to Common Animals of Roads, Streets and Highways*. In the United States alone, there are an estimated 1.3 million deer-vehicle collisions annually, resulting in the loss of millions of dollars and in both human and deer lives. In some sense then, this could be perceived as a type of human-wildlife conflict.

Fortunately, there are many ways that the negative impacts of roads can be mitigated (http://www.wildlifeandroads.org/). For example, fragmented habitats can be reconnected by using over- or under passes that allow the safe movement of animals across roads. Fencing can also be used to direct animals to safer places to cross or prevent wildlife-vehicle collisions in areas of highest risk. There has also been a movement to plant native vegetation around roads and in the medians. This provides habitat for small mammals, birds and insects, such as butterflies. That being said, such projects are expensive and many U.S. states have made only rudimentary progress toward these goals. In developing countries, such efforts are often non-existent.

Jordan: In the minds of the general public, the notion of human-wildlife conflict often conjures up aggressive encounters between humans and wild carnivores, but these interactions are actually quite rare in North America relative to some other places around the world, where wild carnivores often seriously injure or kill humans and are later killed as retribution. Can you elaborate on the human-wild carnivore conflict and discuss the implications for carnivore conservation and wildlife conservation in general?

Michael: Large carnivores represent some of the most complex challenges when it comes to human-wildlife conflict. First, as apex predators, with comparatively, large home ranges, they require a great deal of space. Second, they also require healthy prey populations in order to sustain them. When natural prey populations dwindle, the animals will seek other alternatives, including domestic livestock and



even humans. Third, they are highly mobile and can travel long distances in a relatively short time span. Last, but not least, they are stealthy, powerful and efficient killers, which pose a direct threat to both humans and their domestic livestock and pets. If large carnivores, such as lions, grizzly bears, and tigers are going to survive into the future, then it is critical that every effort be made to promote coexistence and prevent negative interactions—a goal that is becoming increasingly difficult in a world dominated by human influences. A major question becomes how can we maintain the tenuous balance that exists between large carnivores and humans?

You are correct in stating that the problem of human-large carnivore conflict is minimal in North America when compared to other areas of the world. Let's take tigers as an example. Tigers have been responsible for the deaths of more humans than any other large carnivore. In the Sundarbans, an area of thick mangroves and swamp forest, lying between India and Bangladesh, 50 people were killed by tigers in 2009-2010 (http://zeenews.india.com/news/south-asia/bangladesh-witnesses-record-high-deaths-in-tiger-attacks_644856.html). Historically, these figures have been even higher. In In 1975-1985, 425 people were reportedly killed by tigers in the Indian Sundarbans and another 187 were killed by tigers in Bangladesh (McDougal, C. 1991. Man-eaters. Pp. 204-207 in Seidensticker, J. and Lumpkin, S. (eds.) *Great Cats: Majestic Creatures of the Wild*. Emmaus, PA: Rodale Press). I often wonder whether we would still have grizzly bears in North America if the toll on human life were that substantial.

So, what is the solution? Though the immediate answer to a man-eater always used to be a bullet, this is changing. Current Indian wildlife protection laws state that animals must be saved unless the tiger is a repeat offender and no hope exists for rehabilitation. Sometimes man-eaters are live- captured and translocated to other more remote reserves, though the success of this is often minimal, with the newly introduced cats being killed when crossing into the territory of an existing tiger.

One idea is to set aside the Sundarbans as a reserve and limit the number of people that can enter. But portions of the Sundarbans are already tiger reserves with no permanent human settlements. Nonetheless, thousands of people still feel the need to travel into the area to collect resources, such as fish, honey and wood. There have even been attempts to "train" tigers not to attack people. In one experiment, human figures were erected and hooked up to a battery, so that when tigers attacked they received a powerful shock. In another, the Indian government issued groups of workers masks to be worn on the back of their heads, and surprisingly, because tigers prefer to attack prey from the back, the idea worked. After a year no attacks had been reported upon those wearing masks. In contrast, thirty people not using the new system had been attacked and killed (http://www.nytimes.com/1989/09/05/science/face-masks-fool-the-bengal-tigers.html). It was noted that tigers followed some mask wearers for many hours, but without attack. But, the tigers eventually adapted and the method was less successful; in one later fatal attack on a mask wearer the tiger attacked from the side rather than the rear. Some researchers have suggested that the risks of tiger attacks on humans in the Sundarbans has been overblown (http://www.sciencedaily.com/releases/2013/01/130121103331.htm). Perhaps, however, this is a difficult argument to make to the families of those that are, in fact, killed by tigers. In some areas, tigers themselves have altered their activity patterns (become more nocturnal) in order to avoid humans and human-tiger conflict (http://www.sciencedaily.com/releases/2012/09/120903153958.htm).

By far the best way to decrease human-tiger conflict is to give the animals large reserves that have plenty of prey, thus decreasing the potential for human-tiger encounters. Recently, the incidence of tiger attacks on people in Sumatra has risen significantly with the continued destruction of rainforests by the pulp and paper industry and the subsequent reduction of tiger habitat (http://news.mongabay.com/2013/0110-dead-tigers-dead-people-sumatra.html). However, setting aside vast tracts of land has become increasingly difficult in countries like India and Bangladesh that have rapidly growing human populations. Unfortunately, tigers will still venture onto the periphery of their range and enter plantations and other areas that are frequented by people. In such cases, conflicts will be inevitable. Public education (http://www.sciencedaily.com/releases/2012/07/120731111416.htm), as well as new innovative techniques may help to reduce the risk, but will likely not eliminate it. Human-wildlife conflict will likely continue to be one of the most significant impediments to the conservation of large carnivores worldwide. Fortunately, recent analyses suggest that as a result of better law enforcement, public education and management, tiger numbers are holding their own or increasing (http://www.sciencedaily.com/releases/2012/12/121226153034.htm).

MEET THE AUTHOR