

Nature, Culture, and Conflict or Coexistence of Wildlife and People

By

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Introduction:

I am visiting Japan after a gap of 16 years, but the honor of receiving the International Cosmos Prize has made this long wait especially worthwhile. During this past decade and a half, my country India has changed almost beyond recognition in some respects. Over the next week I will have some time to observe how Japan has changed during this period. Between this ancient land of India and the modern industrial society of Japan are the rich tropical forests of South and Southeast Asia, home to the elephant and the tiger, the two animals that perhaps, more than other creatures, have captured the imagination of people worldwide. This land of the elephant and the tiger has also changed, and is changing rapidly, as is the relationship between humans and nature.

Humans are a part of nature but, more than any other species, have acquired through cultural evolution the power to transform the natural world beyond recognition. Nothing is perhaps as dynamic in the living world as the relationship between humans and the rest of nature. Ever since early man evolved in the savannas of East Africa, a habitat teeming with large potentially dangerous carnivores such as the lion or large herbivores such as the elephant, he was pitted against these stronger creatures. Human skills and intelligence would have been strained to the utmost in this interaction with wildlife; for instance, avoiding falling prey to carnivores would have been a major preoccupation. Humans not only transformed the natural habitat as they spread across the continents, but also either eliminated these creatures or learnt to coexist with them.

My lecture today is about contemporary man, in all his diversity from hunter-gatherer through pastoral and agricultural to urban-technological society, and the antagonistic relationship with many wildlife species. Understanding this interaction, and promoting coexistence between humans and wildlife are imperative if we are to conserve a part of our natural world. Whatever the historical antecedents of the interaction between wildlife and humans, we have to now see this in the modern context of a global village or a global city in which the products of modern technology have penetrated the remotest societies in tropical America, Africa or Asia, leave alone the more developed temperate world.

Direct conflict between wildlife and humans occurs when animals inflict damage on agricultural crops and property, spread diseases, and kill livestock or, worse, attack humans. You can imagine the devastation that a herd of elephants or even a large bull can cause to a field of maize or sugar cane in a single night's raid. Damage to crops by elephants runs into millions of dollars each year across Asia and Africa. Much has been written about man-eating tigers. In the early part of the 20th century, tigers killed over 1000 people each

year in India alone. If we go back another century we find that perhaps similar numbers were being killed annually in Indonesia as well. While the elephant and the tiger perhaps represent the most spectacular instances of conflict, other animals such as primates, antelope, deer, wild cattle, wild pig, rhino, lion, leopard, grizzly bear and wolf are also in conflict with people. This conflict is not only a rural phenomenon but increasingly an urban one too; for instance, leopards come into conflict with the citizens of Mumbai, the commercial capital of India, while elephants and people are in conflict in the suburbs of Bangalore (the city I live in), the Information Technology capital of Asia.

Even two or three decades ago, there was insufficient appreciation among conservation practitioners about the problem or the need to find solutions to wildlife-human conflicts. Today it is very clear that long-term conservation of wildlife and their habitats can be achieved only if we are able to win the support of local people who share these habitats and resources, and whose voices for respite from conflict are being increasingly heard by governments and the international conservation community. Otherwise, wildlife would suffer as people injure or kill them to protect their property or lives.

Ecological basis of wildlife-human conflicts:

Before we go on to explore how such conflicts can be reduced, or even eliminated, let us examine the causes of conflict in ecological terms. There are perhaps as many myths in the literature about why animals come into conflict with humans as there are in the popular imagination. For instance, elephants raid agricultural fields only because they are hungry, or tigers take to man-eating only because they are wounded and unable to hunt. There may be grains of truth in these perceptions, but much of this is scientifically untenable. One of the most persistent myths I have heard is the metaphor of hungry elephants ravaging the farms of hungry farmers in populous Asia. Anyone who has seen these elephants know that many of them are quite well-fed creatures! Some of the conflict can be simply explained as due to the elephant's fondness of liquor brewed by people and stored inside their houses.

I shall explore the underlying causes of conflict with two species I am more familiar with - a herbivore (the elephant) and a carnivore (the tiger). I shall bring in other examples as appropriate.

Biologists, especially those who study evolution, are fond of invoking two types of causes - "proximate causation" of the immediate compulsion for a particular behavior, and "ultimate causation" or the evolutionary basis of that behavior. Historically, the conflict between elephants and agriculture must have begun 10,000 years ago at the dawn of agriculture itself in Asia. This conflict would have intensified with the gradual inroads made by agriculture and settlement into the elephant's natural habitat. Elephant lore from India, dating back to the 5th century BCE, alludes to conflict between elephants and agriculture. In the course of time one of the following would have been the outcome: the elephants would have shifted their home range partially or entirely to avoid conflict, the elephants would have

been eliminated, people would have abandoned the area to escape conflict, or elephants and people found a means to coexist at a tolerable level of conflict.

The strongest proximate correlate of conflict between elephants and agriculture is the degree of habitat fragmentation. The "hot spots" of elephant-human conflict, such as central India, the northern range in the Indian state of West Bengal, southern Vietnam or Sumatra, are also among the most fragmented and disturbed ones. It is easy to imagine how long ranging animals such as elephants are forced to come into conflict with agriculture as they move from one forest patch to another in densely populated and intensively cultivated landscapes. If increased fragmentation promotes conflict, then the solution is to reverse fragmentation.

I now return to the engaging metaphor of hungry elephants ravaging the cultivated fields of hungry people in Asia and Africa. It is certainly true that if humans degrade the elephant's natural habitat, in terms of depleting its forage resources, it would be forced to seek a part of its requirement from cultivated fields. However, the term "degraded" has sometimes been defined too loosely to mean any human transformation of the natural habitat. We have to define degradation through an elephant's eyes, not ours. In fact, the conversion of primary tropical forest to secondary forest actually benefits herbivores such as elephants through increase in carrying capacity; this is because "weedy" plants such as bamboos and other grasses invade these habitats and make them attractive for herbivores.

Depletion of the natural prey of large carnivores would certainly force them to seek some of their requirements from domesticated livestock or even human pets such as dogs. Because much of the conflict involves feeding by wildlife on what humans perceive to be rightfully theirs - crops and livestock - we need to turn to foraging theory to explore one of the ultimate causes of depredation. Humans have selectively bred plants for their superior palatability, digestibility and nutritive qualities. Why then should herbivores, whether it is elephant, rhino, deer or antelope, not be attracted to such tasty fare? Many studies in Asia and Africa have shown that cultivated crops are not only more palatable but also provide higher amounts of protein, carbohydrate and minerals. Added to this, crops are a concentrated source of forage for wildlife species that otherwise have to spend time searching for palatable species distributed patchily in their natural habitat. It thus makes eminent sense for foraging herbivores to seek their forage from cultivated land.

We can similarly argue that domesticated animals are far easier prey for carnivores than wild prey species. After all, humans have selectively bred livestock species for certain traits; as a result they have lost much of their natural instincts including the ability to escape from predators.

Biologist Milind Watve provided a brilliant explanation for man-eating by tigers. He began by asking the question: why do tigers not kill more people? After all, humans are pretty frail creatures compared to tigers, and should fall prey to them more often. He argued that burial practices by early humans resulted in "altered cost-benefit" for carnivores preying upon humans. It was no longer profitable for optimally foraging carnivores such as tigers to attack humans if they could not complete their meal without the dead body being retrieved

and buried by fellow humans. It is significant that most cases of man-eating by tigers today occurs in the mangrove habitats of the Sundarbans in India and Bangladesh, where fishermen venture alone for several days in boats and are therefore not discovered if they were to fall prey to a tiger. In such a situation, a tiger can complete its human meal.

The social system of a species may also predispose the male of the species to come into greater conflict with humans. Tigers are territorial animals with the home range or territories of males encompassing the home ranges of several females. Subadult males are usually forced to disperse from their natal range to the periphery, where they come into greater conflict with human settlements. Similarly, leopards that are relocated from their territories, whether it is scrub habitat near human settlements or small forest patches, to other areas come into conflict with people as they move back to their territories.

Many studies have now shown that in elephant populations living in relatively intact habitat, the males have far greater propensity to raid agricultural fields than do the female-led herds. Elephants are polygynous animals in which there is much greater variation in the reproductive success of males than of females. Males that come into "musth" have better access to estrous females for mating. Good nutrition and body condition are essential for male elephants to come into musth. It is thus possible that those "rogue" male elephants may only be manifesting a "high risk - high gain" behavioral strategy that has been molded by natural selection.

Wildlife species that are in conflict with humans are also amongst the most intelligent in the mammalian world. In creatures such as tigers or elephants, learning plays a very important role in the development of behavior. Thus, elephant calves learn from their mothers as to what are the plants that can be or should be eaten, while tiger cubs learn from their mothers the strategies of hunting their prey. Crop raiding by elephants or man-eating by tigers could be behaviors that are culturally transmitted in populations. This is a subject that is difficult to study and needs much more investigation.

Adverse climate may trigger conflict. The intense drought of 1982 in southern India, and the drought of 1987 in the subcontinent, both resulting from El Niño events, seemed to have triggered the dispersal or movement of entire elephant clans from their original home to distant new habitats. Intense conflict ensued as a result. Similarly, the drought of 1987 was accompanied by an escalation in conflict between Asiatic lions and livestock herders living in the vicinity of Gir National Park in western India. Over evolutionary time such dispersal behavior would have been adaptive, but today this is distinctly maladaptive when wildlife is confined to small islands amidst a sea of humanity. This factor may become important in the coming decades in the context of global climate change and increased variability in extreme climatic events predicted by various models.

The relationship between native peoples and animals

Human response to conflict is rooted in complex cultural attitudes to animals that have been shaped through a long history of interactions. Religion, local environment and

ecology, economics, and social organization all play a role in shaping human attitudes to various animals and their depredations. Thus, the reaction of farmers to elephant depredation in parts of India where the animal is considered sacred would be quite different from that of villagers in regions where the animal's flesh is consumed, or in other parts of Asia where the animal is merely considered to be an agricultural pest. The resistance to reintroduction of wolf in Yellowstone National Park in the USA provides a good case study of how economic interests, however minor, could play a major role in influencing attitudes towards animals (and more generally towards nature).

How have societies or peoples with differing forms of livelihood, hunter-gatherer through pastoral and agricultural production to modern industrial urban society dealt with conflict? This is obviously too vast and complex a subject to be dealt with in this lecture. I shall only explore this briefly.

We have to go back to the evolution of socio-cultural and religious systems of beliefs in early humans and how this had a bearing on their relationship to nature or indeed to their own evolution. I have mentioned the origin of mortuary practices among early humans. This could have been a significant step in humans attaining partial freedom from the fear of predation by large carnivores.

Nature worship and animistic beliefs are common in the so-called "primitive" societies that still maintain an intimate relationship with their environment. As an example let us take the various cults of the tiger that have prevailed across the range of this almost mystic animal. Indigenous people who shared the tiger's habitat held the creature in reverential awe, a supernatural being whose soul could pass on to humans. From India to Indonesia, the tiger has been associated with shamans and an elaborate system of ritual developed around the animal. Thus, the tiger was rarely killed even when it was marauding a village. When a tiger had to be killed there was elaborate ceremony to propitiate the spirit of the dead creature, else the creature return to take revenge. The important point is that the traditional interaction of humans and tigers in Asia's dense tropical jungle stopped with the occasional killing of an offending animal or maybe even an innocent creature. Coexistence between man and animal was possible under such circumstances, especially when human densities were much lower than today.

The colonial experience in Asia and Africa brought about fundamental changes in the human-wildlife relationship and influenced the local perceptions of conflict. Local kings and rulers have always hunted animals, but only some of them; for instance, royalty in India never hunted the elephant. The impact of such hunting in early times would have also been rather limited. Hunting for "sport" (the so-called big game hunting) became a major preoccupation of colonial rulers. Historian George MacKenzie interprets big game hunting as a "contemporary rediscovery of medieval chivalry" linked to ritualized warfare and killing, and symbolizing "manliness". Africa and Asia were teeming with "lawless beasts" and who could better control such lawlessness? Sport hunting of creatures such as the tiger and the elephant also symbolized the conquest of vast "uncivilized" territory. Colonial powers thus went on a hunting spree, and local rulers, not to be outdone, often joined in this frenzy.

From "sport hunting" it was only a step further to "bounty hunting". Rewards were now offered to the common man for producing evidence of killing of everything from tigers to wolves. The resulting slaughter was enormous. Historian Mahesh Rangarajan estimates that the numbers of animals killed through all forms of hunting between 1875 and 1925 in India was 75,000 tigers, 100,000+ leopards and 200,000+ wolves, numbers that far exceed the present-day populations of these species. Bounty hunting thus changed both the legality and scale of hunting from Indian royalty and the colonial rulers to the populace at large; this was a paradigm shift in the human-animal relationship. Ironically, this reduced the incidence of wildlife-human conflicts substantially.

With conservation measures in post-Independent India, the increase in certain wildlife populations concurrent with significant conversion of natural habitat for development, has resulted in the perception of increased wildlife-human conflicts.

From conflict to coexistence

In the modern world, society has a responsibility to help minimize the impacts of wildlife on the lives of the poorer sections of society - the marginal farmers and villagers who share the habitats of these creatures. I believe that we have to take a pragmatic approach that combines economic incentives with cultural pride, and traditional knowledge with modern technology to promote coexistence between humans and wildlife.

Solutions to minimizing wildlife-human conflicts have to be species-specific as well as region-specific, and have to be firmly grounded in good science. Solutions also have to make economic sense. In this concluding section of my talk, I can only make brief mention of various approaches to mitigating conflicts.

Wildlife-proof barriers such as "game fences", electric fences and ditches are the most common barriers being used to keep animals away from our settlements and crop fields. With intelligent creatures such as elephants the success of such barriers is limited. Elephants learn to break fences with their tusks, which are poor conductors, or even push trees over fences. They also dig loose soil into ditches and negotiate them.

Governments in countries such as India and Kenya have been deploying such barriers on a large scale but one reason for their failure has been the non-participation by local communities whose fields and settlements these are supposed to protect. The reason is very simple - people tend to look a gift horse in the mouth. However, when a farmer invests some of his time or resources, he is far more likely to participate meaningfully in schemes to control wildlife depredation.

We should never underestimate the importance of traditional knowledge in dealing with problems relating to wild animals. Recently, on a visit to Kenya I learnt that some farming communities used red chili powder and tobacco around their fields to keep away marauding elephants. Dr Noah Sitati converted this idea to deliver a potent concoction through an amazingly simple means - mixing chili powder and tobacco with waste oil and smearing this on a rope strung around maize fields. Limited experiments show that African

elephants do keep away from such fields. We are now deploying this method on a larger scale at several places in India to see if Asian elephants too can be fooled through such simple methods.

If we are to be pragmatic, some form of population management through removal of offending animals is needed to reduce conflict and win the cooperation of people for broader conservation goals. Thus, bull elephants that kill people have to be captured, while tigers that turn maneaters may have to be captured or eliminated. We have to use both the knowledge of local people in identifying such individuals, and modern science (for instance, DNA techniques) where possible.

Sometime a flash of inspiration can work wonders. A bright mind at a science club in the Indian city of Kolkata suggested many years ago that people venturing into the forest could wear masks at the back of the head. Tigers generally attacked people from behind, and a mask could fool them into thinking that a human was facing them. Incredibly, this simple and cheap method worked wonderfully for people venturing into the mangrove jungles of the Sundarbans, until a superstitious belief led to people discarding their masks. Tigers are today conditioned to avoid fishermen through shocking them with electrified dummies.

We should try and adapt modern technology to our advantage in dealing with intelligent, charismatic creatures. My team has also been experimenting with the use of GPS-based satellite telemetry to set up an "advance warning system" for "rogue" elephants in the Indian state of West Bengal. Locations are plotted daily on maps and sent out through email to wildlife authorities to help them keep track of these notorious elephants and possibly pre-empt any trouble. The technology has to still improve before it will be adequate for this purpose, but this should happen within the next decade.

Much of the conflict can be traced to poor land-use planning or the absence of a land-use policy in many countries. To control conflict with the larger mammals such as elephants and tigers we need to reverse the process of habitat fragmentation. Wildlife corridors for the free movement of long ranging animals become crucial in this context. In India there are elaborate plans for elephant corridors but we need the resources to make these happen.

We also have to move from short-term planning to long-term strategic planning at the scale of landscapes for conserving wildlife and avoiding conflict. This would be an integrated plan that includes agriculture, forestry, tourism and wildlife conservation. Ultimately, conservation has to be seen by local people as being beneficial to them rather than just denying them access to natural resources. Only then would their cultural pride in their natural heritage overcome their fear of living in perpetual deprivation. I am convinced that elephants and tigers have survived in India, a land of over a billion people, only because they are considered sacred, and it is important to reinforce this belief.



My dream has been the harmonious coexistence of people and elephants here, and I intend to continue to pursue this dream. Thank you.