

Protection of Endangered Species: Socio-economic Impact of Human Wild-life Conflict in India

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Abstract:

This paper describes the nature of the conflict between large mammals and people, provides ecological explanations for the origins of such conflicts, examines their implications and discusses measures that can help in minimizing the impact of animals on people. It illustrates these conflicts by focusing on the Asian elephant which is an herbivore and the tiger which is a carnivore.

I. INTRODUCTION

Evidence Human-wildlife conflict (referred to as HWC for the purposes of this research paper) is a rapidly growing concern to the life and ecosystem of many endangered species like elephants, tigers, leopards etc. HWC arises when in cases where there is a compulsion to share limited resources such as prey, livestock and land. These conflicts affect the population of these species but also have an environmental impact over the ecosystem-equilibrium and biodiversity.¹

World Wide Fund for Nature (WWF) defines human-wildlife conflict as-

“Any interaction between humans and wildlife that results in negative impacts on human social, economic or cultural life, on the conservation of wildlife populations, or on the environment.”

The definition given by the Creating Co-existence workshop at the 5th Annual World Parks Congress, Montreal expanded on human goals and needs of animals as provided-

“Human-wildlife conflict occurs 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.”²

The Yukon Government defines HWC in the context of damage to property as-

“Any interaction between wildlife and humans which causes harm, whether it’s to the human, the wild animal, or property.”³

It can be inferred from the above-mentioned definitions for Human-Wildlife Conflict that man-made laws are generally anthropocentric and cannot be trusted to be free of bias and come primary to the importance of

¹ T.N. Godavarman Thirumulpad v. UOI and Ors., A.I.R. 2012 S.C. 1254 (India).

² Francine Madden, Creating coexistence between humans and wildlife: Global perspectives on local efforts to address human-wildlife conflict, HUMAN DIMENSIONS OF WILDLIFE 9, 247-257 (2004).

³ www.env.gov.yk.co/wildlifebiodiversity/human_wildlife_conflict (visited on 3-3-2018).

animal rights.⁴ HWC come up as an expanding obstacle to conservation of wildlife and as the human population increases and development expands. HWC cost both human and animal lives and endanger sustainable development and conservation goals.⁵

Human-animal conflicts are common in various parts of India. Wild elephants reportedly kill more people than lions or leopards. Endangered elephants and tigers kill a person a day due to growing human hold over their natural habitat.⁶ Surprisingly, conflict involving leopards draw greater amounts of public attention out of all animals. Carnivores such as lions, tigers and wolves have been known to cause a large number of human deaths in the past but are now largely restricted in a closed range and their impact is not as widespread as elephants.⁷

This paper places special attention on Human-Elephant Conflict in India where increasing elephant population and no increase in forest are poses a threat to human beings. This leads to cases of human deaths, human injuries, cattle deaths, property damage and retaliatory killing of wild elephants.⁸

II. NATURE OF CONFLICT

Elephants come into conflict with human beings by destroying crops, livestock or property and sometimes even by killing people. This part of the paper describes the nature of conflict between large animals specifically elephants and people. Furthermore, it provides explanations for origins of such conflicts.

- **CROP AND LIVESTOCK DEPREDATION**

Many mammals including elephants are notoriously famous for damaging cultivated crops. The damage caused by wild pigs is the most widespread due to fragmented parties and a lot of pigs are killed for the same. Damage caused by elephants on the other hand is more localized and the amount is considerable. Cereal and millet crops are targets for elephants along with various fruits and legumes.⁹ It was estimated that economic loss due to elephants was in range from Rs 40,000 in Palamau, Bihar during 1969-70¹⁰ to Rs 6.5 million in South India¹¹ and greater in some North Eastern parts of the Country.¹²

⁴ *Supra note 2.*

⁵ Barua Mann, Human-wildlife conflict & 21st century conservation, Reading Group Outline, University of Oxford (2010).

⁶ Agence France-Presse, Elephants and tigers kill one human a day in India, as growing population squeezes habitat, THE TELEGRAPH, Aug 1, 2017, <https://www.telegraph.co.uk/news/2017/08/01/elephants-tigers-kill-one-human-day-india-growing-population/>.

⁷ *Id.*

⁸ K. Senthilkumar et al., Human-Elephant Conflict: Case Study From Tamil Nadu, 5 INTERNATIONAL JOURNAL OF SCIENCE, ENVIRONMENT AND TECHNOLOGY, 445-448 (2016).

⁹ Mishra, J., An Assessment of Annual Damage to Crops by Elephants in Palamau District, Bihar, JOURNAL OF THE BOMBAY NATURAL HISTORY SOCIETY, 68, 307-10 (1971).

¹⁰ *Id.*

¹¹ Sukumar, R., The Asian Elephant: Ecology and Management, Cambridge University Press, Cambridge, U. K. (1989).

¹² LAHIRI CHOUDHURY & D. K., AN INTERIM REPORT ON THE STATUS AND DISTRIBUTION OF ELEPHANTS IN NORTHEAST INDIA, IN THE STATUS OF THE ASIAN ELEPHANT IN THE INDIAN SUB-CONTINENT (IUCNISSC Report) 43-58 (J. C. Daniel ed., Bombay Natural History Society, Bombay 1980).

In addition to eating crops, elephants may also damage or destroy wholly the houses and other property of people occasionally. Carnivorous predators on the other hand feed upon domestic livestock by entering the vicinity of human settlement or when these animals move out for grazing. Compensation was paid by Bandipur Project Tiger authorities and Melghat Project Tiger for loss of about 600 and 300 cattle respectively.

- **LOSS OF HUMAN LIVES**

The incidence of human beings killed by large animals is of far greater concern than the loss of crops and livestock. Wild elephants kill 30 to 50 people on average in South India, around the same in West Bengal, 5 to 10 in Uttar Pradesh and over 50 in Assam. About 45 percent of these incidents occurred within settlements when elephants raided crops and the remaining 55 percent occurred in forests and jungles.¹³

Man eating tigers have been a problem historically in Central India and Bengal killing around 60 people every year. Most of the victims are fishermen and honey collectors. In the rest of the country around 10 people have been killed yearly. However due to elimination of over 90 percent of the population of tigers, these rates have come down substantially.¹⁴ The Asiatic lion has been confined to the Gir Sanctuary, Gujrat and have been a threat to human life only in the recent years.

- **ECOLOGICAL PERSPECTIVE OF HUMAN-WILDLIFE CONFLICT**

The basic causes of destructive behavior of animals can be deduced from the ecological theory and study of society of these animals. They can be explained as [i] immediate compulsion for action and [ii] in an evolutionary sense.

- **RESOURCE AND HABITAT DEPLETION**

The need for forest land for settlement, agriculture, building dams and other forms of development is answered by occupying forest land. This is leading in continuous shrinking of first reserves and compresses wildlife beyond supportable capacity. As this capacity is exceeded the interactions between humans and animals intensifies in a number of ways. To increase the lengths of boundaries of human settlement means more frequent contact with wild animals due to chance alone. Large animals such as tigers and elephants move large distances periodically or even daily. This is because small habitats are incapable of sustaining large animals. It is often the case that human beings settle along the migration paths of elephants and thus make them subject to damage before the animals find alternate routes or restrict their movement at all.¹⁵

¹³ *Supra* note 12.

¹⁴ MCDUGAL C., THE MAN-EATING TIGER IN GEOGRAPHICAL AND HISTORICAL PERSPECTIVE. IN TIGERS OF THE WORLD: THE BIOLOGY, BIOPOLITICS, MANAGEMENT AND CONSERVATION OF AN ENDANGERED SPECIES, 435-48 (R. L. Tilson & U. S. Seal ed., Noyes Publications, Park Ridge, New Jersey 1987).

¹⁵ Sukumar, *Supra* note 12.

Competition between people and wildlife for resources may also occur indirectly. Large numbers of domestic livestock held in the vicinity of wildlife areas compete with the herbivores for forage. There have been no quantitative studies to clearly evaluate the impact of livestock on wildlife populations in India but this can be often deduced from subjective observations. Overgrazing by livestock reduces the amount of forage available for wild herbivores both directly and indirectly by causing adverse changes to soil properties through trampling. Ungulates such as deer, antelopes and gaur, which have a high degree of food niche overlap with livestock, seem to be the most affected by this competition. Reduction in ungulate prey for the carnivores would force them to hunt domestic livestock. When wildlife populations exceed the carrying capacity of their habitat, either due to reduction in its area or reduction in food resources through competition from people, they would tend to spill over into settlements, if their numbers are not being correspondingly reduced artificially or by natural processes. A natural reduction in a population may occur through lower fertility and or higher mortality, although in large mammals there is usually considerable time lag before this actually takes place. On the other hand, more commonly the reduction has occurred through hunting (as of the tiger) or capture (as of the elephant).¹⁶

III. OPTIMUM FORAGING THEORY AND CONFLICT

Ecological theory predicts that animals would tend to feed in a manner that maximizes their nutrient (energy, protein, minerals, etc.) intake in the minimum possible time.¹⁷ A tiger should, therefore, hunt prey that will provide it sufficient meat (that is, nutrients) with the least possible effort. It is easy to see that cattle, adapted to a relatively secure life under domestication, would fall prey to a carnivore far more easily than their wild cousin, the gaur, or the fleet-footed antelopes.

A study on crop raiding by elephants showed that cultivated grasses such as paddy and finger millet provide more protein, calcium and sodium than the wild grasses consumed during the corresponding season.¹⁸ It is important to realize here that the proximate reason for elephants to prefer cultivated crops is their higher palatability. Succulent finger millet plants or sweet sugar canes would surely appeal to the elephant's palate much more than fibrous and siliceous grasses found in the wild. Herbivores are also able to detect minerals such as calcium and sodium by taste; hence they often eat soils rich in such minerals. But such an ability to seek out the most nutritious plants or parts is also adaptive in that it promotes better health and ultimately better reproduction. Thus, crop raiding by elephants or predation on domestic livestock by tigers can be thought of simply as an outcome of their foraging strategy shaped by evolution. This has important implications in planning for the control of such depredations. A certain level of depredation would still persist even if the wildlife species concerned had adequate food resources in the wild.

¹⁶ Sukumar, *Supra note 12*.

¹⁷ Pyke G. H. et al., Optimal Foraging: A Selective Review of Theory and Test, *QUARTERLY REVIEW OF BIOLOGY* 52, 137-53 (1977).

¹⁸ Sukumar, *Supra note 12*.

IV. MANAGEMENT OF ANIMAL-HUMAN CONFLICTS

The impact of wildlife on people has to be minimized through a variety of methods, ranging from creating wildlife proof barriers to selectively culling offending individuals to providing a measure of social security for people.

- **Barriers To Wildlife Movement**

Physical barriers to prevent animals from crossing into human settlements may be feasible only in few cases. A barrier against elephants would be very expensive to create. Trenching the boundary of cultivation with forest is the most common method used in the country, but the costs may range from Rs 25,000 to 50,000 per kilometer.

There would be additional maintenance costs. If a trench is even slightly shallower than the minimum depth of 7 feet needed to keep away elephants, a large bull might negotiate it. Even otherwise elephants might cross a trench by digging the soil with their feet, or more commonly the trench eventually fills up with soil washed down by rain. In actual practice most trenches fail due to improper maintenance, unless they surround a small piece of land.

- **Psychological Warfare**

Animals learn much of their behavior during their lifetime and it may be possible to deceive them into learning to fear people or objects that protect them. The most successful example of this 'psychological warfare' is the imaginative use of electrified dummies and masks against tigers in the Sundarbans of West.¹⁹ Tigers were conditioned to associate humans with pain by allowing them to attack electrified day models placed in natural settings inside the jungle. These dummies resembling fishermen and honey-collectors are dressed in used clothing to give them a human smell and wrapped in wire. The wire is connected to a 12-volt battery through an energizer which delivered a current of 230 volts. Man-eaters attacking the dummies receive a shock but a safety fuse and a low current of 20-25 milliamps ensure that this is not fatal to the animal.²⁰ The incidence of man-eating reduced by half, from an average of 45 per year during 1975-82 to 21 per year during 1983-85. Since then the tiger has been tricked by another simple, cheap device—a mask resembling a human face worn at the back of the head. Tigers generally attack their victims from behind, catching them off-guard. A mask worn in this fashion gives the predator an impression that it is being watched and hence it may be reluctant to attack. Some 2500 masks made of a rubberized plastic were distributed during November 1986-October 1987 among honey-collectors, fishermen and wood-cutters permitted to work inside the buffer zone of the Sundarbans reserve. Not a single person using the mask fell

¹⁹ SANYAL, P., MANAGING THE MAN-EATERS IN THE SUNDARBANS TIGER RESERVE OF INDIA—A CASE STUDY, IN *TIGERS OF THE WORLD: THE BIOLOGY, BIOPOLITICS, MANAGEMENT AND CONSERVATION OF AN ENDANGERED SPECIES*, 427-34 (R. L. Tilson & U.S. Seal ed., Noyes Publications, Park Ridge, New Jersey 1987).

²⁰ *Id.*

victim to a tiger. On the other hand, all the 30 people killed during this period were not using a mask. Although it is too early to say whether the tiger can be continued to be fooled in this manner, the success of these techniques is remarkable.

- **Habitat Management**

The impact of wildlife on people can be ameliorated to some extent by proper management of its habitat. Such management has to be balanced between the needs of wildlife and people. Land-use for agriculture or other forms of development near wildlife areas has often proceeded in a haphazard fashion. To take an example the cultivation of sugar cane near forest often draws prey animals and tigers behind them. Tigers may even give birth in sugar cane fields which resemble their natural tall grassland habitats. The stage is thus set for confrontation between tigers and people. Sugar cane is also too great a temptation for elephants. Not only should attention be paid in future to the type of agriculture being encouraged near wildlife habitats but also to maintaining the integrity of the habitat. It is better to have a single compact block of natural habitat for wildlife with the minimum interface with human settlement, rather than have a fragmented habitat of equal area interspersed with cultivation. This may inevitably mean that some settlements in certain problematic areas have to be translocated.

- **Animal Population Management**

Wildlife populations that come into severe conflict with human interests may have to be directly managed to keep their levels below tolerable limits. This will involve removal of problem animals from the population. A proper understanding of the demography of the species is important if one is to ensure that a viable population is maintained. One example of how elephant populations can be managed to minimize conflict and yet maintain their viability can be outlined from a synthesis of our knowledge of social organization, demography and population genetics of the species. It is dear that the adult male elephants are inherently more predisposed to raiding crops as a consequence of social organization. The removal of an adult male elephant from the population would have a far greater effect in reducing crop-damage (by a factor of 20 in economic terms) and saving human lives than the removal of an elephant from a family herd. Our understanding of demographic processes in such polygynous species also show that the loss of a certain proportion of males is not likely to affect the intrinsic rate of growth of the population.²¹ The removal of females from the population would certainly reduce its growth rate. Hence, the selective culling of male elephants identified as inveterate crop raiders or rogues would be the best form of population management. Some of this culling can simply be capture for domestication. A successful example of this is the capture of nine elephants by chemical immobilization in the Kattapura Forest Reserve of Karnataka during 1986.²² All

²¹ Sukumar, *Supra note* 12.

²² Appay-ya, M. K., 1989 Destroy the Jungle, Move the Elephants, Sanctuary/9 (No. 3), 48-51.

the elephants were males which had moved into this small forest patch, isolated by a reservoir, and were in regular conflict with nearby settlements.

Beyond a certain point the distorted sex ratio, with a predominance of females, caused by selective removal of males may lead to genetic problems such as loss of variation and inbreeding depression if population sizes are small.²³ In southern India the high rates of poaching of male elephants for tusks has created some of the most unequal sex ratios known for elephant populations anywhere. Further culling of males here may not be justified

other than in exceptional cases. Other elephant populations such as those in northeast India have a high proportion of tusk less males (up to 80 per cent of the male segment). These can be expected to have a more equal sex ratio and hence can tolerate a certain amount of selective male removal.

V. APPROACHES TO RESOLVE INCIDENCES OF HUMAN-WILDLIFE CONFLICT

In this part of the paper I would discuss the strategies related to public relations that administration could equip in caring for people as well as wildlife.

Approaches to resolve incidences of HWC such as attacks on people or livestock generally use methods that address physical loss and tend to ignore the social, cultural and emotional trauma. To completely and permanently ease the impact of conflicts the wildlife agencies need to expand their approach to connect with the people who have suffered consequences of HWC. In this context the individual that represents the authority is seen as a custodian of wildlife and thus his inter-personal skills are of great significance. They have to take the role of a human being reacting and empathizing with the loss of a fellow human being.²⁴

Despite numerous science and communal conservation methods the enforcement and administration agencies lack resources and training to deal with fellow humans. There is a need for training in conflict mediation. After years of focus on effective protection of wildlife areas, studies are now focusing on community-based conservation initiatives. The current system needs to be proactive towards engaging with stakeholders as environmental agents rather than seeing them as threats to the environment or mere bystanders and reacting only when damage has been caused.²⁵

- **MEDIATING AND EMPATHIZING**

It is scientifically proven that people base their behavior towards wildlife majorly on social factors than realities of threats from wildlife.²⁶ There are a number of factors that shape a person's decision towards

²³ Sunquist, M. E., 1981 The Social Organization of Tigers (Panthers tigris) in Royal Chitwan National Park, Nepal, Smithsonian Contributions to Zoology, 336, 1-98.

²⁴ Human-Wildlife Conflict in India Addressing the Source, Jennie Miller, John D C Linnell, Vidya Athreya, Subharanjan Sen Economic & Political Weekly NOVEMBER 11, 2017 vol LII no 45 (23-25)

²⁵ *Id.*

²⁶ 13 DICKMAN & AMY J, COMPLEXITIES OF CONFLICT: THE IMPORTANCE OF CONSIDERING SOCIAL FACTORS FOR EFFECTIVELY RESOLVING HUMAN-WILDLIFE CONFLICT, ANIMAL CONSERVATION 458-66 (5th ed. 2010).

engaging with the environment. For instance, his social network, gender, financial condition, cultural and communal beliefs etc. In India one social factor that shapes the behavior of rural people towards the environment is their relationship with the local authorities such as the Forest Department.²⁷ Whether or not the people trust their local forest guard plays an important role in choosing if they want to engage in government programmes or not.

The authorities that respond to situations involving loss to people, often engage with people who are in extreme emotional trauma due to sudden loss of a family member, a vital resource or a source of income.²⁸ In these cases, trust, respect, sensitivity towards the cultural backgrounds and the amount of empathy the professionals can show form crucial components of the relationship between two human beings and moreover it forms part of a process of conflict mitigation. Transparency and efficiency in the legal and financial system that assists victims of HWC is also of great importance to keep them in control and under assurance of the next steps of conflict mitigation.

Maintaining trust and transparency is not easy. The Forest Department regularly faces the problem of dealing with these situations. Enhancing staff training in public relations will create strong relations with locals and officers that will help mitigate or prevent conflict situations. With advanced training in mediation and conflict intervention, the Forest Department authorities will expand their skills to prevent growth of conflicts and will help the victims to receive necessary care and resources. The Forest Department is already overstretched in the latter's aspect and it will be a tedious task to add new skills as such requires intense training. However, such an investment will produce long term benefits.

Such training can be done similar to any other professional skills training. For instance, an NGO named Human-Wildlife Conflict Collaboration offers training to governments and individuals in conflict mitigation. Furthermore, state and national level forest services and departments have well-structured training programmes offering new lessons and insights from such NGOs that specialize in conflict mediation.

VI. OBSTACLES TO HUMAN-WILDLIFE CONFLICT MITIGATION

Conservation practitioners must assess whether existing mechanisms are effective or not. The Indian wildlife damage compensation system is very complex and slow. Many victims feel reluctant to engage with it.²⁹ Research from other countries shows that making financial investments in preventing conflict rather than reaching to conflict by compensating the victims bring longer lasting and greater benefits.

²⁷ Francine Madden, Creating coexistence between humans and wildlife: Global perspectives on local efforts to address human-wildlife conflict, 9 HUMAN DIMENSIONS OF WILDLIFE, 247-257 (2004).

²⁸ Mishra, *Supra note* 11.

²⁹ 143 MEGHNA AGARWAL ET AL., PAYING FOR WOLVES IN SOLAPUR, INDIA AND WISCONSIN, USA: COMPARING COMPENSATION RULES AND PRACTICE TO UNDERSTAND THE GOALS AND POLITICS OF WOLF CONSERVATION, BIOLOGICAL CONSERVATION 2945-55 (2010).

Communities may get rewarded for protecting natural resources at a definite level. This concept is known as “Performance Payment.”³⁰

Furthermore, certain groups of people are receptive to try new methods. For instance, in a study of area around Kanha Tiger Reserve people who lost their livestock for the first time are more willing to shift grazing grounds than people who lost livestock previously. This reduces the chances of educating victims and providing financial incentives to people for protection of livestock and thus avoiding any future retaliations against nature.³¹ Other techniques for livestock protection that have been in use for some time in India include housing smaller animals in predator proof shelters, feeding stock in closed stalls and use of guard dogs for their protection against predators.³²

In the case of threat from wild elephants, there are relatively new methods that can be used like solar powered flash lights. These lights deter wild animals and prevent crop damage rather than compensating them after the damage has been caused.³³ Any technique may be used (preventative or reactive), it must always include buy-in from the people who receive the benefit. This shifts responsibility from the funding authorities (for example, the forest department or a non-profit) to the people themselves.³⁴

VII. CONCLUSION

There is a pressing need both to conserve wildlife and to minimize its impact on human lives and property. We live in a rapidly changing society. On the one hand a highly materialistic culture is arising witness the advertising culture particularly over television which reaches a large section of the population while on the other the majority of people barely manage to survive. When the rich and middle classes are caught up in the consumerist boom will be too much to expect the poor to remain as silent spectators. Conflict over access to natural resources is bound to only increase in future. Conservation can succeed only if the legitimate aspirations of people dependent on forests for their livelihood can be met by the rest of society.

³⁰ Zabel, Astrid & Stefanie Engel (2010): “Performance Payments: A New Strategy to Conserve Large Carnivores in the Tropics?” *Ecological Economics*, Vol 70, No 2, pp 405–12.

³¹ 40 Miller et al., *EFFECTIVENESS OF CONTEMPORARY TECHNIQUES FOR REDUCING LIVESTOCK DEPREDATIONS BY LARGE CARNIVORES: WILDLIFE SOCIETY BULLETIN*, No 4, 806–15. (2016).

³² 11 Miller et al., *HUMAN PERCEPTIONS MIRROR REALITIES OF CARNIVORE ATTACK RISK FOR LIVESTOCK: IMPLICATIONS FOR MITIGATING HUMAN–CARNIVORE CONFLICT: PLOS ONE*, No 9, (2016).

³³ Kermeliotis, T, *Boy Scares Off Lions with Flashy Invention*, CNN, Feb 26, 2013, <http://www.cnn.com/2013/02/26/tech/richardturere-lion-lights/index.html>.

³⁴ Mishra, *Supra note* 11.