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A Study of Human Wildlife Conflict and Co- Existence in Jaipur, Rajasthan, India.

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ABSTRACT

An observational study was carried out for understanding human wildlife conflict; its impact on society and how human can co- exist with wild species. Study was based on the survey method and available data of past few years. Jaipur city and its outskirts villages (Total 87) were studied and attitudes of villagers were also recorded during study. Present study suggests some mitigation measures to reduce conflict between human and wildlife.

Keyword: *Conflict, Co- existence, Mitigation, Leopard.*

1. INTRODUCTION:

Human wildlife conflicts have been recognized as a serious problem in India. Conflict occurs in a variety of contexts, when wildlife species raid agricultural crops, damage property, kill people or livestock or spread diseases. Human and wild animals both are integral components of forest ecosystem. Their presence affects each other even in normal conditions. However, they live in harmony unless their interests come to conflicts and their activities start harming each other. Human wildlife conflict is an important threat to biodiversity conservation and economic development around the world, but especially in rural areas throughout many developing countries (Dickman, 2010; Woodroffe *et al.*, 2005).

Human Wildlife Conflict is defined as 'interaction between humans and wildlife where negative consequences, whether perceived or real, exist for one or both the parties when action of one has an adverse effect on the other party' (Conover, 2001). People living inside and around protected area can have great impact on ecosystem that is set to be protected. Human pressure has continued to threaten wildlife survival; habitat protection and biological diversity. The forest resources are degraded at higher rate in India (Kothari *et. al.*, 1989). Degradation of natural habitat is widely reported to be one of the most important reasons for the extinction of the wild species (Novacek and Cleland, 2001).

1.1 People`s attitude regarding Wildlife and Co-existence:

Understanding of the attitudes of local communities, particularly where their rural livelihoods are dependent on agriculture is vital for resolving wildlife-human conflicts, which otherwise can threaten the success of any conservation activity (De Boer and Baquete, 1998). Assessing attitudes and perception of human towards Wildlife provides insights on the degree to which people are willing to cohabit with wildlife (Carter *et al.*, 2013). Increased exposure to wildlife-related risks has been linked to negative attitudes of local people (Arjunan *et al.*, 2006)

Many studies have shown that attitudes are related to resource use interest but the link between attitudes and sustainable conservation practices is ambiguous (Holmes, 2003a). Assessing the resource use, interests of local communities could provide insights into their relationship with the protected area. Resource use interest could be approximately measured by assessing attitudes towards the protected area (Holmes, 2003b). To conserve the existing biodiversity the peoples' attitudes and feelings have to be taken seriously and action has to be taken to solve persisting problems. As these are the people living closest to the wild animals they are also a determining factor of preserving them for the next generation (Sekhar, 2003).

1.2 Study Area: The present study was conducted in Jaipur city 26.9260° N, 75.8235° E (Degree Decimal) which is located in eastern border of Thar Desert, a semi-arid land of Rajasthan, India. The city is surrounded by Aravali hills and altitude is 431m above sea level. Jaipur receives over 650mm of rainfall annually. Forest area of Jaipur spreads for around 948.68 sq km. The forest vegetation that accounts for 8.19% in Rajasthan is deciduous and has thorny trees, grasses and shrubs. There are about 250 species of avifauna including various migratory birds. There were approximately 35 leopards in Jaipur forest area (2018 census report) besides deer, blue-bull, fox, wolf, sambhar, hyena, jackal and several other species.

1.3 Methodology: To ascertain actual condition of conflicts, data were collected through interviews of forest officials and forest guards from every forest range in detail as well as through villagers of responding villages. Documentation of some case studies was also carried out. Stories regarding livestock which is being threatened/hunted by leopards were collected from villagers. Validation of the collected data was analyzed simultaneously. Interview is a widely used method for surveying of mammals, especially carnivores, and for understanding people's perceptions towards the conservation of predators (Conforti and Azevedo 2003). A structured survey instruction was prepared in the form of an interview-based schedule and information was collected from randomly selected household in the study area. Respondents were asked a series of questions about livestock rearing, depredation, number of livestock killed, location (inside village or outside village; in forest or grazing near village), date and time. Camera traps were used in conflict areas for confirming the presence of leopards. GPS was used for pinpointing the localities where leopards exist and where incidents of conflict occurred. For the study, both primary as well as secondary data were collected in depth.

2. RESULT AND DISCUSSION:

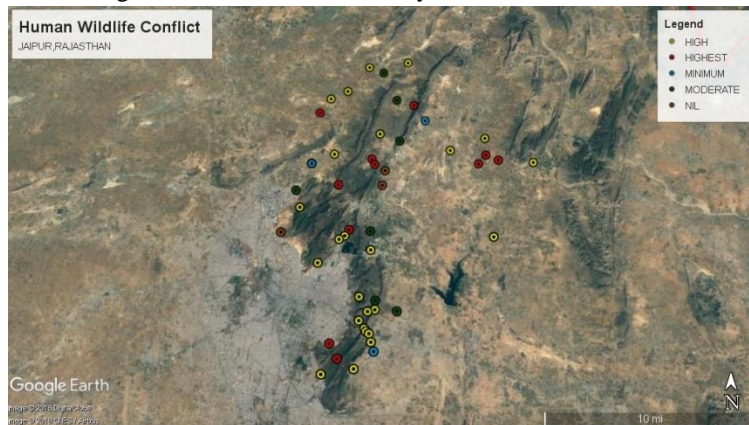
A total of 87 villages were studied during present work in Jaipur district. Out of these, 23 villages were surveyed which are multifariousness in contact with Human wildlife conflict. In Jaipur city, most of the human-wildlife conflicts were triggered by cases of livestock depredation and terror caused by the appearance of carnivores in human settlements. Nine main types of interactions between humans and wildlife in Jaipur have been discovered in which Livestock depredation accounts on the top in typology types (with 73%), which is followed by straying of wild animals in human settlement (6%), got into the grip of vehicles (6%), electrocution injury (5%), human attack (4%), fell down in well (2%), injured by villagers (2%), trapped or captured (1%) and got into the wire accounts less than 1%. Major species involvements in Human Wildlife conflict in jaipur are Honey Bagger (*Mellivora capensis*), Hyena (*Hyaena hyaena*), Jackal (*Canis aureus*), Jungle cat (*Felis chaus*), Langur (*Semnopithecus dussumieri*), Leopard (*Panthera pardus*), Mongoose (*Herpestes edwardsi*) Rhesus macaque (*Macaca mulata*), Wolf (*Canis lupus pallipes*). The number of cases of human wildlife conflict has been increasing from last five years. During this period a total of 20 cases of attacks on human have been recorded, in 2013 there were 5 attacked, 2014 it were 2, 2015 it were 5, 2016 it was 1 and 2017 it were 7. All the attacks were done only by a single carnivore species i.e. Leopard. The incidents of conflict were recorded across 10 villages/areas. The highest frequency of conflict between human and leopard occurred in Narpatiyawas village which is situated near Jamwaramgarh Wildlife sanctuary.

2.1 Livestock Depredation: The most abundant livestock, reared by local community are goats. Grazing in the form of herds is wide spread near forest areas of Jaipur. A total of 239 livestock were killed by carnivores in a period of last eight years (2011-2018.) Goats were most vulnerable to carnivore attacks. The predation rate on goats was highest (81%), followed by cows (9%), dogs (5%), pigs (4%) and buffaloes (1%). A total of four species were responsible for livestock depredation in Jaipur, namely Leopard, Hyena, Wolf and Jackal. Among all, leopard has highest rate of predation on livestock (96.65%), which is followed by Jackal (1.67%), wolf (1.25%) and hyena (0.42%). The intensity of depredation was also studied during different months of the year. The frequency of livestock depredation was higher during the month of November (15%) followed by January (13%), August (12%), September (11%) and October (10%)

Various types of reactions were observed from study areas after seeing any wild species in the village. Villagers show a total of 16 types of reactions as observed from survey. In some, activity is done singly or with combination of two or more than two types, some rapidly followed reactions are Use of Lights, Use of Sounds (Noise by fire crackers), Use of sticks, Use of stone, Keeping dogs, Use of fire, Call forest department and No reaction. 27% respondents use light when they see any wild animal by throwing beam of light on animal, so it can go away which is followed by producing of sound by the means of fire crackers sound, drum sound or self producing noise which accounts 25%. 10% respondents use combination of sound as well as by sticks; use of light and sound accounts 9% and combine use of sound, stick and stone accounts 7%.

47% of all respondents were reported to show positive attitudes toward wild animal, 39% of all respondents were reported with negative attitudes toward wild animals and only 14% were neutral. Positive attitude towards wildlife of villagers is high, which is a good indicator for wild animal. There were some reasons observed behind the wild animal movement inside the village during the survey which were, in search for Food as well as water (35%), in search for water only (29%), in search for food only (17%), Don't Know (10%), Lose the path (8%), Absence of boundary wall (2%).

2.2 Hot spot areas: To find out major and minor conflict zones in study area, a scale of conflict zones has been prepared on the basis of carnivores activities(Fig 1). This scale has five categories i.e. from one to five and each category has been shown with specific colour. On the basis of scale of conflict zones, all 87 villages were studied carefully. Out of total villages, 12 villages were considered under conflict zone one i.e. 'Highest zone', 34 under conflict zone two i.e. 'High zone', 19 comes under conflict zone three i.e. 'moderate zone', four villages come under conflict zone four i.e. 'minimum zone' and 18 villages come under conflict zone five i.e. nil. Only conflict zone one and two together cover half of the study areas which is 52.87% of total study areas (map1).



Map1-Hot spots of Human wildlife conflict zones in Jaipur.

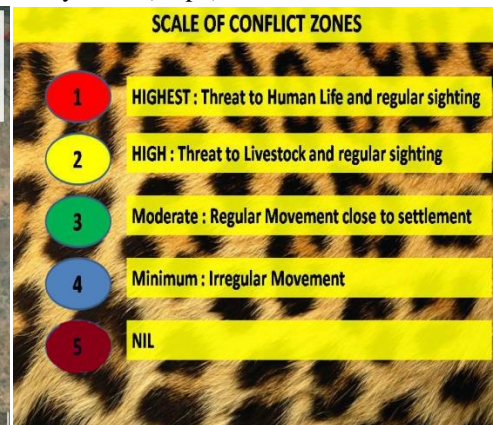


Fig 1- Scales of conflict zones.

2.3 Mitigation Measures: To reduce leopard dependency on livestock, metal sheds for cattle can be used which are safe during leopard attacks. Fencing is useful for large mammals, it is also made of barbed wire and can be used as hedge in agriculture farm, house etc. Halogen light fixing in attack prone zone can reduce the attack and movement of carnivores in area. 'I Cow' Technique, in this technique the structure of eyes is painted on the rump of cattle

which dwell near the forest area. The outcome was that the cattle with eyes painted on their rump were not attacked by leopards. This idea is already present in nature; many animals use such mechanism to defend themselves from the enemy. Animals like Spectacled Cobra (*Naja naja*), Four-eyed butterflyfish (*Chaetodon capistratus*), Owl Butterfly (*Caligo beltrao*), etc use this technique to confuse their predator.

3. CONCLUSION:

Human wildlife conflict in Jaipur is increasing day by day as a result of shrinkage of habitat and construction of roads. Due to construction of road, separation of Jhalana forest area from Galta forest areas, which were used as a corridor for wild animals restricted the movement of wild animal especially leopard within a patch which has enhanced conflict rate. Livestock depredation by leopards (*Panthera pardus*) is one of the global key conservation issues in landscapes with limited wild prey resources. The present study revealed the pattern associated with human-wildlife conflict. Goat was more vulnerable than large-bodied cattle. Factors associated with livestock depredation included decline of natural prey, lacking herding and guarding practices, especially during nighttime. Local people repeatedly use pastures where leopards are seen to hunt. It has been concluded that scarcity of water and food inside the forest are the main reasons which are forcing wild animal to move outside protected areas. Villagers suggested several possible ways to conserve forest as well as wildlife like construction of proper boundary walls and plantation etc.

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