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### TOWARDS SUSTAINABLE FOREST MANAGEMENT THROUGH ENHANCING SAFETY OF NATURE

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**Abstract.** Human-animal conflict is a major issue in human settlements around forests. Only sustainable forest development will help in mitigating this malady. The repercussions of human-animal conflict are far reaching and are mostly irreparable in nature. Depletion of forests and forest resources are a freighting reality. Extinction of many species, especially large carnivores stare on our faces. A positive attitudinal change towards sustainable development of forests will go a long way in its conservation. A few meaningful and whole hearted steps will facilitate harmonious human animal co-existence. The paper presents the unique story of peaceful co-existence of humans and wild animals in the Jawai forest region of Rajasthan, India. It also provides a few suggestions that can secure the peaceful co-existence of humans and wildlife.

**Key words:** Sustainable forest management, Wildlife security, Conservation, Human-animal conflict, Jawai

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**JEL codes:** Q00; Q01

#### 1. Introduction and review of literature

Sustainability is now a hot issue (Murali, Murthy and Ravindranath, 2006; Tvaronavičienė, 2014; Vaško and Abrahám, 2015; Stjepanović et al., 2017; Dobrovolskienė et al., 2017). It transcends areas and disciplines. Studies about sustainability has been undertaken in broad disciplines like agriculture production (Nagyová, Holienčinová, Rovný, Dobák, and Bilan, 2016) tourism (Vaško and Abrahám, 2015), industry and technology (Tvaronavičienė, 2014; Tvaronavičienė and Černevičiūtė, 2015), food safety (Volchik and Maslyukova 2017), forest management (Murali, Murthy and Ravindranath, 2002; Murali, Rao, Sudha, Sangeetha, Murthy and Ravindranath, 2003; Murali, Murthy and Ravindranath, 2006), social entrepreneurship (Sulphey and Alkahtani, 2017), higher education (Čirjevskis, 2015; Volchik and Maslyukova, 2017), etc. The present study attempts to present the unique case of Jawai region in Rajasthan, India. In this region the dwellers near the forests were able to secure peaceful co-existence with large carnivores due to sustainable forests management. There have been absolutely no known reports of human animal conflicts in the region.

Surging human population and the burgeoning settlements near wildlife territories often lead to human–animal conflict. This conflict is now a serious threat to long-term conservation of wildlife. The most common outcome of human-animal conflict is the lethal removal of the predator, either by the management agencies or the land

owners (Treves, Wallace, Naughton-Treves and Morales, 2006). Around the world, human-animal conflicts often lead to drastic decline in animal population and even extinctions (Fa and Brown, 2009; Loveridge, Sillero-Zubiri, Reynolds and Novaro, 2004; Schipper, et al. 2008; Wang, Frank and Seidensticker, 2010; Woodroffe and Ginsberg, 1998; Woodroffe, Thirgood and Rabinowitz, 2005). However, the decline in population is not limited to human conflicts. There are many instances when wild animals are hunted in large numbers for various reasons. For instance, Teichman, Cristescu and Darimont (2016) based on data of 30 years (from 1979 to 2008) in British Columbia; Canada found that a total of 8788 cougars were hunted/killed (5348 males and the rest females). During this period only 1238 were killed as a direct cause of conflict and a staggering 7550 died due to hunting!

Killing of wild animals take several forms, and often it's ecological and evolutionary consequences and repercussions could be severe than the actual type and number of predators killed (Krofel, Treves, Ripple, Chapron and López-Bao, 2015). The available accounts about human animal conflicts are staggering. Reports show that over 6,700 cheetahs have been killed by cattle rearers in a single decade (between 1980 and 1991) in Namibia (CITES, 1992). In the Siberian region Far East Russia, retaliatory killing account for near to half the mortality rates of tigers (Miquelle and Smirnov, 1999). In Uganda the chimpanzees are facing heightened threat due to conflicts, and extinction is staring on the species (McLennan, 2008). It is reported that the Falklands Wolf became extinct in 1876 due to conflict with humans (Sillero-Zubiri, et al., 2004). These misfortunes occur due to a variety of reasons. Some of them include severe range fragmentations and contractions.

Human-animal conflicts are also found to create social tensions and law and order issues around the globe. Be it in the Masai region of Africa, Sumatra of Indonesia, Amazon of Brazil, the Terai region of India, the Sunderbans of the India-Bangladesh region; these conflict strikes fear in the minds of humans. This fear is higher when the conflict is with larger animals like tiger, lion, bear, leopard, cheetah, cougar, rhinoceros or elephant.

Antagonism and fear against the conflict causing animals could also lead to certain exaggerated perceptions, and a wide range of negative beliefs. This antagonism is often found to be embedded in the culture through certain constructs and stories, which have mostly nothing to do with reality. These stories are often reinforced through computer games and films (Dickman, 2013). There are lot of such stories from across the world. In Africa the local people believe, despite there being no evidence, that cheetahs kill and eat people (Dickman, 2008). In East Africa, particularly Mozambique, people believe in sorcery and have a peculiar belief about 'spirit lions'. They believe that the lion's body could be hijacked by evil powers and make them to kill members of the rival community and their cattle. Since it is impossible to distinguish a 'spirit lion' from the normal lion, due to fear, people kill any lion that they may encounter (West, 2001). A similar belief is prevalent in Sierra Leone (Richards, 2000). Here certain rural communities strongly believe that powerful enemies are capable of disguising in the form of chimpanzees to murder young members. They also believe that these people steal body parts from the murdered youth to prepare medicines that could help them gain economic and political powers. Another primate, the *Daubentonia madagascariensis*, popularly known as aye-aye, also evokes strong negative feelings among the rural natives of certain African countries. Since they consider aye-aye as an evil, they kill it on sight. There are also instances where a whole village is abandoned just because an aye-aye is sighted. They believe that if they do not do so, everyone in the village will fall sick and may even die (Simons and Meyers, 2001). These fears are not confined to developing world. Even in the developed world such perceptual errors persist. For instance, in Norway, near to half the population are afraid of wolves, though there is no documentary evidence to prove an attack on humans in the last two centuries (Linnell, Solberg, Brainerd, Liberg, Sand, Wabbaken and Kojola, 2003).

As stated elsewhere, human-animal conflicts also create social tensions. In the USA, the reintroduction of wolves leads to severe conflicts with ranchers and hunters. They bear a grudge against the government that their views were ignored in favour of other stake holders like environment and wildlife agencies, NGOs and urban dwellers (Nie, 2004). These tensions are intense near the borders of protected areas. The dwellers around the protected areas perceive that while they have to suffer the adverse effects from the wildlife, the benefits are reaped by the government and its agencies, tourists and other commercial organizations.

## 2. Reasons for conflict

There are many reasons for human-animal conflict. This is now a topic of deep research interest (Dickman, 2010; Teichman, et al., 2016; Woodroffe et al., 2005), and considerable literature has been accumulated about various aspects of human-animal conflict (Dickman, 2013; Durant et al., 2010; Hazzah, 2006; Hazzah, Borgerhoff, Mulder and Frank, 2009; Heberlein and Ericsson, 2008; Hockings, Yamakoshi, Kabasawa Matsuzawa, 2010; Inskip and Zimmerman, 2009; Lee and Priston, 2005; Mishra, 1997; Naughton-Treves and Treves, 2005; Packer, Ikanda, Kissui and Kushnir, 2005).

Traditionally, caused due to competition for space and fragmentation of forest areas, these conflicts often result in crop destruction, attack on livestock and other domestic animals, and injury or death of human beings. The attack on human beings is despite the fact that normally humans does not form part of carnivore diet (Balasubramaniam, Chavan, 2014). Raiding on crops has been another major issue since, in most instances; agriculture is done in the fringe areas of the forests through resorting to forest clearings. Added to this is the territorial behaviour of certain large mammals, and the fact that they roam across vast territories. They are also biologically programmed to roam large distances. It has been observed in India that elephants move hundreds of miles from West Bengal to Assam, and back regularly despite food being abundant in both areas. This is also the case of Gir Wildlife Sanctuary where Asiatic Lions cover hundreds of kilometres within the territorial limits of the sanctuary and outside.

### *Human Loss due to conflicts*

Human-animal conflict is severe in almost all continents. It is estimated that between 1990 and 2004, over 800 people have been injured or killed due to lion attack in Tanzania. Over 100 people are killed annually in Mozambique and Namibia, due to crocodiles. Evidences in India shows that over 400 people lose their life due to elephant attack. In Bhutan, destruction by the large predators – tigers and leopards result in loss of over two thirds of their total cash income to local villagers (Wang and Macdonald, 2006). It is estimated that villagers who reside around the Kibale National Park of Uganda loose considerable part of their crops, out of which 70% is due to damage caused by primates (Naughton-Treves, 1998). In southern Brazil, large number of sheep and goats are lost as a result of attack by cougar or mountain lions (Mazzolli et al., 2002). It is also a matter of deep concern that people who fall victims to wild life attaché belong to the lower strata of the society and are weak in terms of socio-economic status.

### *Mitigating human-wildlife conflict*

Mitigation of human-wildlife conflict is a matter of great significance. Effective steps towards mitigation depend largely on a deep understanding of the factors that drive towards the conflict (Inskip and Zimmerman, 2009; Sillero-Zubiri and Laurenson, 2001). The notion that wildlife should be confined to the forests, when forest land forms only a miniscule percent of the total land mass is one aspect that leads to conflict. As such attitudinal change among stakeholders, policy makers and media needs to be addressed with top priority. Further, the popular conception that forests are residual land should be changed, and a feeling has to be inculcated that they have their own rights and importance.

The dwellers around the forests, especially those in heavy-risk areas need to be educated about steps on preventing and mitigating human-animal conflicts. Evidences show that a robust monitoring system that records and disperses the required information about conflicts help in building an early warning and monitoring systems. Such warning and monitoring systems have worked wonders in countries like Indonesia, Kenya and Uganda and has helped in reducing animosity against wild animals (Balasubramanian and Chavan, 2014). An apt solution to this malady is the sustainable management of forests and forest resources. Now forest management is now not merely limited to timber oriented activities. Sustainable forest management to be successful in conserving the wildlife should be modelled on a “holistic ecosystem approach”. For this there needs to be an integration of the three aspects of production, protection and conservation. Further, a robust long-term monitoring, engagement and participatory system with the communities dwelling around the forests will help in considerably reducing the animosity against wild animals.

Certain socio-cultural factors also result in either conservation or attack on wild life. For instance, in Nepal there are certain Buddhist societies which believe that the snow leopard is associated with the mountain god. They further believe that any attack by snow leopards is some form of punishment as a result of human transgression. Due to this belief victims seldom resort to retaliation against the acts of such cats (Ale, 1998).

The following section presents a unique case of peaceful co-existence between the villagers in Jawai forest region in India and the wild animals including large carnivores.

### **3. The unique case of peaceful coexistence of the Jawai region**

The Jawai region is a dry deciduous area in the Pali district of Rajasthan in India. It is a rocky village situated in the Aravalli mountain ranges. The villages of Bera, Perwa and Sena are near to Jawai and form the region. The rocky villages are adjacent to a tiger pocket and are sparsely populated. The uniqueness of this region is that leopards wander in the villages without any conflict with the humans. It is estimated that there are around 40 leopards in the region. The area is also inhabited by sloth bears and certain other smaller animals. Though fragmented forests, and loss of habitat and prey has made these animals vulnerable and has compelled them to wander in human settlement areas; they do not face any resistance and have no conflict with the villagers. There has been practically no instance of leopard attack on humans in the area for a long time. The leopards of the region often watch people passing by like a domestic cat, staying at a distance in its comfort zone. The villages also provide the large carnivores their due rights. The presence of leopards is un-obstructive in nature and they are having a perfect coexistence with human beings. The carnivores usually prey on monkeys, nilgais (a type of antelope), peacocks, rabbits, etc. Occasionally they prey on livestock of the village too. However, these attacks are considered by the villages not as loss, but as their sacrificial offering.

This unique nature of the village has given its economy a boost with leopard safaris and jungle camps that has emerged in the village. Many villagers act as guides to tourists and earn a decent living. The leopards of Jawai have another unique behaviour. Though normally leopards take rest and consider themselves to be safe only when they are arboreal, the Jawai leopards have no issues in taking rest on big rocks, exposing themselves to humans and providing a spectacular visual feast to visitors and tourists.

This queer co-existence has not been achieved overnight. Certain socio-cultural factors and beliefs maintained by the villages has been the reason of this rate fete. The local people attach spiritual significance to the leopard. They believe that leopards are incarnations of the “Goddess of bravery”, and if they are harmed misery will befall them. As such they don’t mind losing a livestock and consider the preying by the leopard to be an offering to God. The safety and security enjoyed by the carnivores over the past many decades has made them to change their innate behaviours.

### **4. Can the unique nature of Jawai be replicated?**

Is it possible to replicate the unique nature of Jawai region to other areas to reduce human animal conflict? This is an aspect worth considering. Though it may not be possible to copy the Jawai system, definitely the “ingredients” and the spirit imbibed in their culture is a perfect mix that can bring in sustainable forest management. Not all dwellers will have the mind to consider carnivores as incarnations of God. However, the spirit of the Jawai region can be used by forest administrators in other areas to facilitate the conservation of forests and the wildlife. For instance if the local villagers in the vicinity of the forests are fairly and timely compensated for the loss of livestock, they may not consider a stray attack to be of any problem. Further, when there is no retaliation against the carnivores for their preying and with the abundance of food, they may not attempt to attack humans. This was successfully tried with respect to the ranchers of USA. Any loss of their cattle due to preying by carnivores was timely and fairly compensated by the local government and the stakeholders. Due to this they desisted from poaching on the carnivores, and there was a considerable reduction in the number of human-animal conflicts. They also accrued considerable indirect gains due to a host of ecosystem services obtained as a result of wildlife. Based on the learning from the peaceful co-existence of humans and carnivores,

and the sustainable management of the forests in Jawai, a few suggestions that can be implemented in other regions where conflicts exist are made.

### **Suggestions and conclusion**

Sustainably managed forests provide a lot of ecosystem services like water, food, wildlife, recreation facilities and scenic beauty. Forests are considered as the lungs of earth. The wildlife is the custodians of the forests. They help in maintaining the healthy balance of the forests. Forests and wildlife is mutually dependant for existence and healthy growth. As such there is a definite need for sustainable management of forests.

The case of Jawai region is unique in nature. The peaceful co-existence enjoyed by the humans and wild life in this region is unparalleled. This co-existence has been developed over a period of time and not overnight. The villagers never attempted to offset the delicate equilibrium set by their ancestors. They never tampered with the fine balance with the forest land. Though this may not be replicable in other regions in toto, elements of the example set by the dwellers of Jawai can be implemented in other forest regions too. A few suggestions are presented below:

- 1. Sustainable development of forest areas:** Forest areas should not be considered as wastelands. Forests should be accorded their due importance, and be considered as an area that has its own rights. The World Commission on Forest and Sustainable Development (WCFSD) initiated by the United Nations Conference for Environment and Development (UNCED) has developed a set of criteria and indicators for sustainable forest management. Meticulously following the criteria will help in maintaining the self regeneration capacity of the forests, which will in turn help in mitigating human-animal conflict. Though not as per any criteria, the villagers of Jawai have traditionally adapted measures that helped them to be in harmony with the environment and forest. This helped them in having a peaceful co-existence with the wild animals, and the consequent booming economy.
- 2. Joint Forest Management (JFM):** JFM is the sustainable management of forests by the Government, the community and other stakeholders. Initiated voluntarily in many parts of the world, it is now doing wonders. This program if implanted wholeheartedly will help in utilizing the services of the local community in the management, restoration, regeneration and protection of the forests. This will have far reaching ecological impacts (Murali, et al. 2002, 2006). While implementing JFM, the unique socioeconomic and cultural realities should also be considered. JFM has been implemented with great success in many parts of the globe including India. It is estimated that JFM Committees in India are managing over 15 million hectares of forest across the country.
- 3. Securing timely compensation for any loss:** Creation of an effective mechanism whereby any loss due to preying by carnivores is fairly and timely compensation is an effective way of reducing the intensity of human-animal conflict. There are considerable evidences to this effect from various parts of the world. In the case of Jawai villagers the villagers attached spiritual significance to loss due to preying by leopards like the snow leopards of Nepal. They considered this spiritual importance as a fair compensation for loss of livestock, due to which no conflict arose between them and the carnivores.
- 4. Early warning and monitoring system:** Considerable evidences exist about the utility of a robust monitoring system that is capable of recording and dispersing information about conflicts (Balasubramanian and Chavan, 2014). Such a monitoring will help in building a sound early warning and monitoring systems to the dwellers in the vicinity of forests. Experiences from across the globe show that such an early warning and monitoring system is capable of reducing the animosity of humans against wild animals.
- 5. Reduction of demand on forests:** The dwellers in the vicinity of forests are to be enlightened about the need for efficient use of forests and forest resources. The villagers of Jawai region attached spiritual significance to the forest land and have a temple in the forest. Though they relied on the forests for grazing cattle and for fodder, all these activities were carried on in a sustainable manner, which was developed traditionally over the past many decades. They never attempted to exploit or offset the delicate equilibrium set over the past many years.
- 6. Payment for ecosystem services:** Payment for ecosystem services (PES) is an approach wherein the ecosystem service providers are paid or derive benefits from the consumers from the services provided. Nor-

mally five ecosystem services have been indentified – provisioning, supporting, cultural, regulating and bundled services (Sulphrey and Safer, 2015). In the case of Jawai, the villagers are providing cultural and bundled services by being custodians of the forest land and the prized wild life. Normally PES is made by Mitigation markets (like Clean Development Mechanism of Kyoto Protocol), Business-to-business markets, and Government payment markets (Salzman, 2005). The PES for the Jawai region is made by the tourists who flock to the village to see the carnivores, the spectacle of which is not available in any other place. Many villages, by acting as guides and operating camps are able to make out a living due to the unique culture of maintaining a harmonious co-existence with the carnivores.

Forests and wildlife are unique possession and assets of humanity. Its regeneration to its original position is in no way possible. The only alternative is to maintain whatever is presently available. An appropriate change in attitude and few wholehearted interventions will help in maintaining the fast depleting forests, which are considered as lungs of earth; as well as the wildlife that reside in them. Modern man is witnesses to innumerable extinctions, and if the trend in this direction is to be arrested, there is an urgent and definite need for a positive attitudinal change. Let us earnestly and honestly hope that the spirit of the settlers of Jawai region is transmitted to other areas, and there is a peaceful co-existence of all the creations on earth.

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