

RESEARCH ARTICLE

STUDY ON COMPARATIVE ASSESSMENT OF HUMAN TOLERANCE TOWARDS WILDLIFE IN COIMBATORE DISTRICT (KARAMADAI, THONDAMUTHUR & PERIYANAICKENPALAYAM), TAMIL NADU

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ABSTRACT

Human Wildlife conflict is an emerged problem in wildlife today. Our study deals with assessing the tolerance level of human towards wildlife by taking some parts of Coimbatore like Karamdai, Thondamuthur and Periyanaickenpalayam as study area. These are areas where human conflict with wildlife and wildlife conflict with human are often seen. Conflict with animals like wild boar, peacock, elephant and deer are seen here. The aim of our study is to analyze the original tolerance level of people towards human wildlife conflicts, to compare the tolerance level of people towards different animals, to compare the tolerance level of on comparing with different groups on basis of age, gender, occupation, forest area coverage and losses faced. Our study was conducted on December 2018 and about 48 peoples are investigated in our study area. The voices of people were recorded in phone and tolerance percentages were given. The mean tolerance level of the people was found to be 58.75%. About 23% of people showed 90% level of tolerance. The comparative tolerance levels between different groups of people were discussed. The reasons behind the factors which determine the tolerance level of groups were also discussed.

Keywords: Human wildlife conflict, Tolerance level towards wildlife, Coimbatore.

1. INTRODUCTION

Human wildlife conflict is now an emerged problem in wildlife. Human wildlife conflict (HWC) is defined as occurring whenever an action by humans or wildlife has an adverse effect on the other (1). However since conflicts cannot occur between people and animals as animals cannot consciously engage in such conflicts (2) suggestions have been made to define HWC more broadly and consisting of two components. Impacts that deal with direct interactions between humans and wildlife; and Conflicts that centre on human interactions between those seeking to conserve species and those with other goals (i.e. biodiversity conflicts) (3). Biodiversity conflicts and HWC are predicted to increase globally. The main cause for the human wildlife conflict is the overlapping of human population with the wildlife. The several other reasons for human wildlife conflict are: Deforestation, Loss of habitat, Decline in prey, Injured or old animal and growing human population.

Human wildlife conflict is present all over the world and it affects people irrespective of caste, sex, nation, rich and poor. It is to be understood that every organism in the world has a

specific duty and occupies its own place. Biodiversity conflicts and human wildlife conflict are predicted to increase globally (4). They pose a challenge for conservation managers particularly in light of the rapid of biodiversity loss and the political consequences of failing to achieve millennium development goals (5).

Human wildlife conflict has occurred throughout man's prehistory and recorded history. Amongst the early forms of human wildlife conflict is the predation of the ancestors of pre historic man by a number of predators of the Miocene such as Saber-toothed cats, leopards, spotted hyenas amongst others (7). Historical records from Nile delta revealed that hippopotamuses raided crops while crocodiles attacked livestock. Egypt while elephants have been raiding crops across Africa and other parts of the world (8).

The famous Taung skull discovered in south Africa in 1924 belonged to a child victim of an eagle attacked that occurred some 2 million years ago (9). Such conflicts have negative impacts on conservation of wildlife populations are of their environment and social economic or cultural life of humans (10). Species involved may vary from grain eating sparrows or rodents to man eating

tigers affecting from marginal agro pastoralists of developing countries to elite section of the developed world. Recovery of declining population of many large mammals due to efficient wildlife management and large network of protected areas worldwide has also lead to increase the conflicts (11). Stochastic events such as fire and climatic change also augment conflicts situations Eg. Higher no. Of crisis of livestock depredation by wild predators during seasonal rains in Kenya while during dry season in Zimbabwe (12).

1.1. The Outcomes of the conflict are

(a) Injuries to people (b) Injuries to wildlife (c) Loss of human life (d) Crop damage (e) Livestock depredation (f) Animal deaths (g) Some of the Solutions advisable to manage conflict are: Fencing, Land use planning, Livestock protection, Avoid stepping out after dark and Human wildlife conflict in India. The drivers of these conflicts are well recognized (13), however the solutions are less apparent and depend on disciplinary focus areas and the methods used within frameworks. For example ecologists and wildlife managers typically prioritize management of wildlife populations and their impacts using scientific knowledge and ecological principles rather than focusing on the human dimensions (14). Ecologists and wildlife managers make three assumptions when managing HWC impacts: The level of wildlife damage is directly related to the level of conflict, the level of conflict elicits a response proportional to the level of damage, mitigation activities appropriate to the level of conflict and damage will result in proportional support for conservation (15).

In contrast, a development paradigm that typically prioritizes human well-being highlights the costs associated with conserving biodiversity (16) and emphasizes solutions that primarily focus on increasing human well-being. More recently, inter-disciplinary and transdisciplinary approaches, which recognize the complexity of social-ecological systems (SES) (17), have been proposed (18). Understanding the attitudes of stakeholders living in proximity to wildlife are recognized as essential for informing the design of wildlife management and HWC interventions (18). Accordingly, the attitude concept has been at the centre of attempts to predict and explain human behaviour (19). Although attitudes do not always predict behaviour because an attitude seldom includes all the specific characteristics of a specific situation (19), positive attitudes towards an object or behaviour are necessary conditions for behaviour. For example, people who have a positive attitude towards hunting may not always

partake in hunting but people with a negative attitude towards hunting will never hunt (19). In HWC attitude research provides insight on stakeholder preferences for diverse management options; indicate support for desired population sizes for a species, the extent of damage stakeholders are willing to tolerate and the desirability of different species on private or communal land (20). With such information conservation managers can predict and design interventions more likely to be supported by stakeholders thereby preventing or reducing the emergence of potential conflicts. In addition, when the drivers of these preferences are understood, interventions can be more appropriately designed (19). Some of the animals which are often indulged in the conflict in our area with the human are discussed below. They are: (a) Wild Boar, (b) Elephant, (c) Peacock and (d) Deer.

1.1.1. WILD BOAR

The wild boar belong to genus *Sus* and species *scrofa* i.e., *Sus scrofa*. It is a very big menace for agricultural lands that it totally destroys the land by damaging the total tilling of land as its dentition are well adapted for it. It mainly feeds on grasses and some cereals. The farmers reports that wild boar is big menace that it totally destroys the crop and the crop touched by wild boar is not even eaten by the cattle due to its characteristic smell. It has always been associated itself with man and successfully utilises the human altered landscape.

1.1.2. ELEPHANT

Elephant is a keystone species, In India elephant belongs to genus *Elephas* and species *maximus* *Elephas maximus*. It is an endangered species where they are poached for ivory and for other reasons. It has been working animals since at least the Indus valley civilization. It is also seen that elephants are used in warfare too. Elephant disperses the seeds, provides path for animals in the forest and many other ecological niches. There are only 27,312 numbers of elephants in India by 2017 (Synchronised elephant population estimation in 2017 August conducted by Ministry of environment, forest and climate change by Govt. of India). They also infest the crops or sometimes kill the human when they arrive into residential area.

1.1.3. PEACOCK

They are of about three species and of them 2 are Asiatic species one belonging to Indian sub-continent *Pavo cristatus* and other is green peafowl *Pavo muticus*. Both are endangered. This species are also poached or hunted for its colourful

feathers. This species are also killed by destroying its natural habitat. They also feed on agricultural lands and sometimes they are killed by using the poison due to its loss inflicted on crops. It is also a devotional animal and national animal of India. They are omnivorous in feeding habit.

1.1.4.DEER

Deer is a type of animal which show highly diversified. Sambar deer and the spotted deer are which predominantly found in our study area. It is also considered as Keystone species since its habitat directly affects the plants and animals. They bite the plants stem and sometimes seed on fruits found in it. They are also affected by poaching for its horns and destruction of habitat.

OBJECTIVES

- To analyze the original tolerance level of people with wildlife.
- To compare the tolerance level of people towards different animals.
- To compare the tolerance level of people affected by the following factors:Age, Gender, Occupation, Forest area coverage and Losses faced

2. MATERIALS AND METHODS

We directly investigated the rural peoples of our study area and their information is recorded in a voice recorder in the phone. The people were chosen at random within our study area. The individual of every village was investigated directly.Their investigations were recorded in cell phone using voice recorder app.Then it is heard again and the tolerance level was given on the basis of (i) The way he responded to us when the question about wildlife is asked (ii) The way he considers the wildlife (iii) The protection measures adopted by him for agriculture and household areas (iv) The steps taken by him against or in accordance with wild animals.As we investigated people directly, no ethical clearances were required.The tolerance levels were collected and the results were compared.

2.1 Study area

We conducted our studies inside Coimbatore. We chose 3 panchayat unions namely. Karamadai, Thondamuthur and Periyanaickenpalayam Among these 3 panchayat unions, 15-20 persons were investigated in a minimum of 3 villages per panchayat. These panchayat unions and the village were chosen on the basis of its vicinity to the forest and arrival of conflict with wild animals there.

2.1.1Karamadai

Karamadai is a very big panchayat union on population with 1,37,448 peoples by census report of 2011 (21). It accommodates about 17 villages. Among them 3 villages namely Marudhur, Nellithurai, and Thekkampatti are considered for our study. Marudhur has a population of 9491, Thekkampatti with 12,414 and Nellithurai with 2518. These areas where selected on the basis of its proximity to forest and occurrence of wildlife animals there. (Fig 1)



Fig. 1. Study area showing Karamadai Village

2.1.2Periyanaickenpalayam

Periyanaickenpalayam is situated in the Mettupalayam road. This panchayat union consists 1,01,930 peoples by census report of 2011. It accommodates about 9 villages. Among them 3 villages namely Pannimadai, Somayampalayam and Veerapandi are considered for our study. Pannimadai has a population of 13,785, Somayampalayam with 14,787 and Veerapandi with 7528. These areas where selected on the basis of its proximity to forest and occurrence of wildlife animals there. (Fig.2)



Fig. 2.Study area showing Periyanaickenpalayam Village

2.1.3 Thondamuthur

Thondamuthur is a suburb of Coimbatore city. This panchayat union consists of 10 villages with a total population of 66,080 by census report of 2011.Among them 3 villages namely Ikkaraibooluvampatti, Madavarayapuram and Narasipuram are considered for our study. Ikkaraibooluvampatti has a population of 6,361, Madavarayapuram has a population of 6,365 and

Narasipuram with 3078. These areas were selected on the basis of its proximity to forest and occurrence of wildlife animals there (Fig 3).



Fig. 3. Study area showing Thondamuthur Village

3. RESULTS

The study was conducted in December 2018. We interviewed about 48 individuals. The sex, occupation, area, age and finally the tolerance level in percentage were listed as follows: (Refer the below).

Table 1. Showing tolerance level of people, age, occupation, and gender and area.

S NO	AREA	AGE (inYears)	SEX		OCCUPATION	TOLERANCE LEVEL IN%
			M-Male	F-Female		
1	Madavarayapuram	35	F		Shopkeeper	80
2	Narasipuram	32	M		Farmer	30
3	Narasipuram	32	M		Shepherd	80
4	Narasipuram	58	F		Shepherd	90
5	Narasipuram	72	M		Daily wage	80
6	Ikkaraibooluvampatti	29	F		Washing clothes	80
7	Ikkaraibooluvampatti	67	M		Shepherd	90
8	Ikkaraibooluvampatti	48	M		Farmer	20
9	Ikkaraibooluvampatti	25	F		Farmer	20
10	Ikkaraibooluvampatti	62	F		Homemaker	70
11	Madavarayapuram	20	M		Daily wage	80
12	Ikkaraibooluvampatti	45	M		Washer man	80
13	Narasipuram	65	M		Farmer	70
14	Madavarayapuram	34	M		Hotel	70
15	Madavarayapuram	28	M		Mason	80
16	Pannimadai	25	M		-	50
17	Pannimadai	27	M		-	50
18	Pannimadai	52	F		Daily wage	80
19	Pannimadai	40	F		Shopkeeper	80
20	Pannimadai	75	F		Farmer	60
21	Pannimadai	35	M		Tailor	70
22	Veerapandi	35	F		Homemaker	20
23	Veerapandi	40	M		Daily wage	20
24	Veerapandi	68	F		Shopkeeper	70
25	Veerapandi	50	M		Farmer	30
26	Veerapandi	75	F		Shepherd	50
27	Veerapandi	85	F		Shepherd	50
28	Veerapandi	50	F		Homemaker	50
29	Somayampalayam	25	F		Farmer	90
30	Somayampalayam	67	F		Shepherd	60
31	Somayampalayam	33	M		Ironing man	80
32	Somayampalayam	43	M		Shopkeeper	70
33	Somayampalayam	40	F		Homemaker	60
34	Marudhur	65	F		Homemaker	70
35	Marudhur	45	F		Homemaker	90
36	Marudhur	70	M		Farmer	30
37	Marudhur	45	M		Daily wage	50

38	Nellithurai	48	M	Farmer	50
39	Nellithurai	52	M	Daily wage	20
40	Nellithurai	20	M	Daily wage	70
41	Nellithurai	51	M	Daily wage	40
42	Nellithurai	57	M	Farmer	30
43	Thekkampatti	38	F	Homemaker	70
44	Thekkampatti	65	F	Farmer	60
45	Thekkampatti	70	M	Farmer	60

S.NO	TOLERANCE LEVEL IN %	NUMBER OF PEOPLE
1	10	0
2	20	5
3	30	5
4	40	2
5	50	7
6	60	5
7	70	9
8	80	11
9	90	4
10	100	0

46	Thekkampatti	28	M	Farmer	40
47	Thekkampatti	70	F	Farmer	80
48	Thekkampatti	72	F	Farmer	30

MEAN TOLERANCE LEVEL =59.375%

Fig. 1. Showing frequencies of people exhibiting different tolerance level

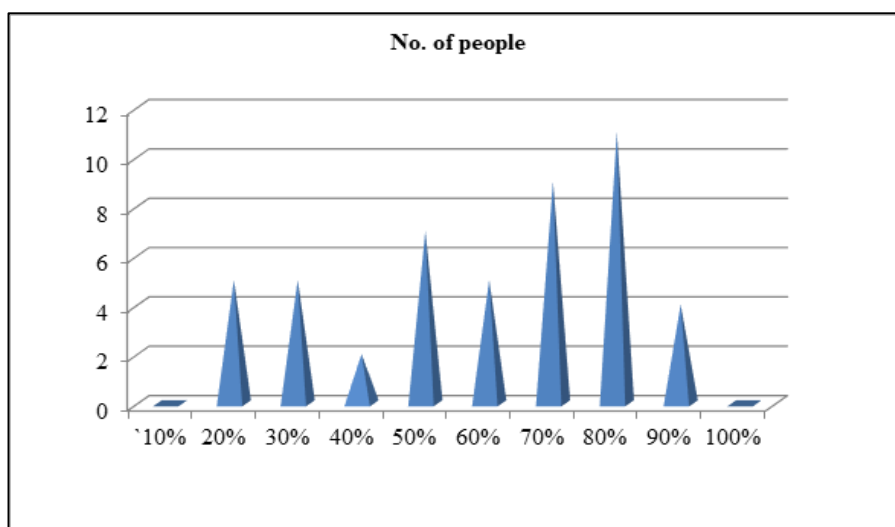


Table 2. Showing mean tolerance level of 3 different panchayat unions.

S.NO	PANCHAYAT UNION	MEAN TOLERANCE LEVEL IN%
1	KARAMADAI	52.65
2	PERIYANAICKENPALAYAM	57.77
3	THONDAMUTHUR	68

Fig. 2. Comparing mean tolerance level of 3 different panchayat unions.



Table 3. Showing mean tolerance level of male and female

S.NO	GENDER	MEAN TOLERANCE LEVEL IN%
1	Male	55.3
2	Female	64

Fig. 3. Comparing mean tolerance level of male and female



Table 4. Showing mean tolerance level of two different age groups

S.NO	AGE	MEAN TOLERANCE LEVEL IN %
1	BELOW 50 YEARS	60.75
2	ABOVE 50 YEARS	57.75

Fig. 4. Comparing mean tolerance level of two different age groups i.e., above 50 years and below 50 years.

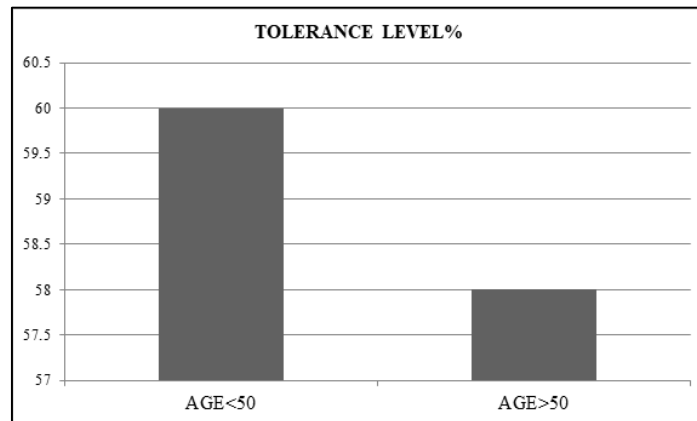


Table 5. Showing mean tolerance level of different occupations

S.NO	OCCUPATION	MEAN TOLERANCE LEVEL IN %
1	FARMERS	46.65
2	OTHER OCCUPATION (HOME MAKER, WASHHERMAN, etc.,)	65.15

Fig. 5. Comparing mean tolerance level of different occupations

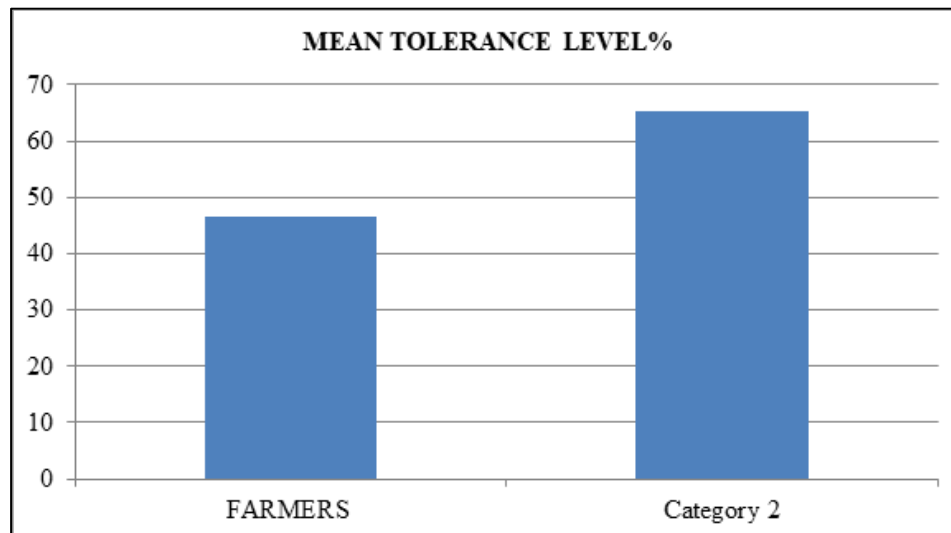


Table 6. Showing mean tolerance level of area at distance from forest

S.NO	AREA AT DISTANCE FROM FOREST	MEAN TOLERANCE LEVEL IN %
1	LESS THAN 5 Km	53.2
2	MORE THAN 5 Km	64.62

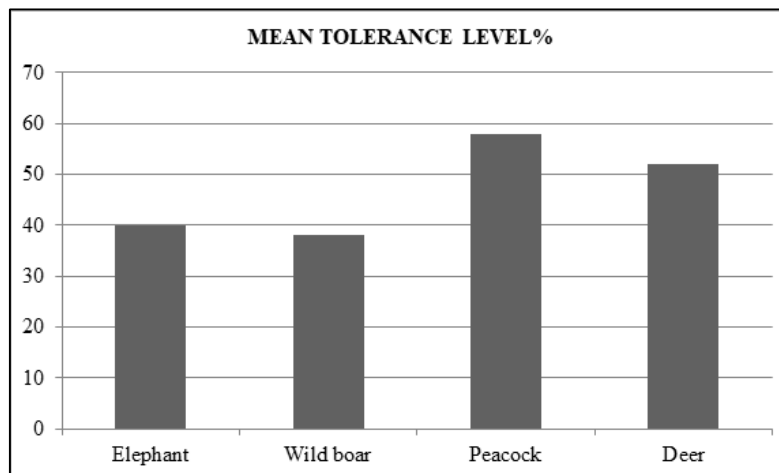
Fig. 6. Comparing mean tolerance level of area at distance from forest A - less than and about 5 Km; B- more than 5 Km



Table 7. Showing mean tolerance level of people towards different animals

Mean Tolerance level in %					
S.NO	WILD BOAR	PEACOCK	DEER	ELEPHANT	
1	20	30	30	30	
2	80	80	80	80	
3	30	80	60	60	
4	30	80	60	60	
5	40	40	40	40	
6	10	40	40	10	

Fig. 7. Comparing mean tolerance level of people towards different animals



4. DISCUSSION

We have interviewed about 48 individuals on December 2018 and gathered the above data. From the above results, It is found that tolerance level is affected by the following factors:-

- ❖ Gender
- ❖ Age
- ❖ Occupation
- ❖ Forest area coverage
- ❖ Animals
- ❖ Human and economic loss

4.1. Gender

Out of 48 people surveyed 26 of them were females and remaining 22 are males. It is found that male possess low level of tolerance than females i.e., mean tolerance of males are 55.3% and that of females are 64%. This may be due to the psychological difference between the sexes and it also may be due to the lack of awareness of wild animal's arrival in females than males. Losses is also playing role in creating this difference. (Table 3)

4.2. Age

Out of 48 people surveyed 26 of them were aged less than 50 and remaining 22 were aged above 50. When we compare the tolerance level between two different age groups, it won't differ much (less than 50 years -60.75%, more than 50 years -57.75%). This small variation is due to the fact that people of all age groups are exposed to same problems, they all are facing same problems. We could also say that tolerance level is not affected much by age. (Table 4).

4.3. Occupation

Out of 48 people surveyed 15 of them were farmers and remaining 33 belongs to various occupations like washing clothes, shepherd, etc., Occupation plays a very important role in determining the tolerance level of individual that too it differs much between farmers and others. Loss is the factor playing an important role here in determining the tolerance on the basis of occupation. Farmers play a tremendous loss when their crops are raided by elephant or any other wild animals. It is very big for them to earn the investment and next only they think of profit. It also found that lots of Farmers have sold or left their land as such as they are unable to take out their investments. A farmer said that "If an Elephant comes to his land, about 20,000-30,000

rupees were lost". Another farmer said that "A wild boar came and raided his cropland and all the crops have been destroyed. I face total loss since cattle even won't touch the crops left by wild boar." We also heard a farmer saying that they are using some sort of explosives to kill wild boar. A lot of farm land has been left as such without doing agriculture due to the losses created by wildlife in agricultural land. Hence from the above statements and incidents, the highest variation of tolerance between farmers and others is inferred i.e., farmers possess a mean tolerance level of 46.65% and that of other workers were 65.15% (Table 5).

4.4. Forest area coverage

Out of 9 villages surveyed 4 villages namely Nellithurai, Veerapandi, Mathvarayapuram and Ikkaraipooluvampatti are situated at less than or about 5 Km from forest area comprising of 22 surveyed people, 5 villages namely Somayampalyam, Thekkampatty, Pannimadai, Narasipuram and Marudhur are situated at more than 5 Km from forest area comprising of 26 surveyed people. People who are near to forest face lots of conflict due to the frequent arrival of wild animals and the abundant amount of loss inflicted on them and therefore they possess lower amount of tolerance than those who are far away from forest areas. When we analyze the data it is also found that mean tolerance level of people in distance of less than 5 Km to the forest is 53.2% and that of more than 5 Km are 64.62%. (Table 6).

4.5. Animals

The main cause of difference in mean tolerance level between the different animals is losses caused by them. For Eg:- wild boar causes more loss than peacock and deer, therefore tolerance level greatly differs between them. Another cause for this variance is **Religious beliefs**. Though wild boar and elephant causes same amount of loss, elephant is considered as devotee or any other symbol which represents the shrines. Therefore people are more tolerant to elephant than wild boar. The above said is seen in also the case of deer and peacocks. Peacocks are considered as symbol of Lord Muruga in Taminadu. Therefore people are more tolerant to peacock than deer. Another cause for these variances is appearance of an animal. For Eg: Though deer causes heavy loss somewhat near to wild-boar but their tolerances differ much. This is due to the appearance of deer is considered beautiful or attractive than wild boar. The other cause is ability to prevent the animal. The loss of peacock is not much cared as there is no effective measure to prevent the entry of peacock. (Table 7).

4.6. Losses faced

Losses faced by the concerned people are the key factor or stimulant which derives other factors. Losses play a huge backdrop in all of the above factors.

5. CONCLUSION

We found in our project that people's tolerance level towards different animals are totally different and the people possess good tolerance level compared to the tolerance level which is shown by the medias. The media are exaggerating or magnifying the people's intolerance level. By our project finding we also conclude that this type of census must be carried out before displacing or transporting or attacking the animals present there, by the government. Government should take some adoptive measures to prevent wildlife as well as the farmers, they could use to alternative option like bio acoustics to prevent the entry of wildlife into resident areas which is effective and safe.

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REFERENCES

1. Conover, M. (2002). Resolving Human Wildlife Conflicts. The Science of Wildlife Damage Management. ISBN 9781566705387. Published August 28, 2001 by CRC Press. 440 Pages - 100 B/W Illustrations
2. Erkinaro, E., Heikura, K., Lindgren, E., Pulliainen, E. and Sulkava, S. (1982). Occurrence and spread of the wild boar (*Sus scrofa*) in eastern Fennoscandia. *Mem. Soc. Fauna Flora Fennica* 58: 39-47.
3. Redpath, S.M., Young, J., Evely, A., Adams, W.M., Sutherland, W.J., Whitehouse, A., Amar, A., Lambert, R.A., Linnell, J.D.C., Watt, A. and Gutierrez, R.J. (2013). Understand and managing conservation conflicts. *Trends Ecol Evol* 20(2): 100-109. DOI: 10.1016/j.tree.2012.08.021.
4. Balmford, A., Moore, J.L., Brooks, T., Burgess, N., Hansen, L.A., Williams, P. and Rahabek, C. (2001). Conservation conflicts across Africa. *Science* 291: 2616-2619.
5. Millennium Ecosystem Assessment, (2005). Ecosystems and Human Well-being: Opportunities and Challenges for Business and Industry. World Resources Institute, Washington, DC. Ecosystems and Human Well-being: opportunities and challenges for business and industry. pp. 1-39.
6. Smile and Shaun (2002). Killer Cats Hunted Human Ancestors: Three South African scientists believe they have identified several predators that preyed upon human ancestors millions of years ago. *National Geographic News*, 20.
7. Bernes R.F.W. (1996). The Conflict between human and elephants in central Africa, Mamal review. <https://doi.org/10.1111/j.1365-2907.1996.tb00147.x>
8. Berger, K.M. (2006). Carnivore-life stock conflicts: effect of subsidized predator control and economic correlates on the sheep industry, conservation biology. *Conserv. Biol.* 20(3):751-761. doi: 10.1111/j.1523-1739.2006.00336.x.
9. WWF, (2005). Human wildlife conflict manual wildlife management series, WWF-World wildlife fund for nature southern African regional programme officer (SARPO).
10. Saberwal, W.K., Gibbs, J.P., Chellam, R. and Johnsing, A.J.T. (1994). Lion human conflict in the Gir forest India.
11. Butlet, J.R.A. (2000). The economic costs of wildlife predation of livestock in Gokwe communal land. *Afric.J. Ecol.* Pp 23-30. <https://doi.org/10.1046/j.1365-2028.2000.00209.x>
12. Woodroffe, R., Thirgood, S. and Rabinowitz, A. (2005). People and Wildlife: Conflict or Coexistence.
13. Messmer, T.A. (2009). Human wildlife conflicts: emerging challenges and opportunities. *Human - Wildlife Conflicts* 3 (1): 10-17. <http://www.berrymaninstitute.org/journal/index.html>
14. Dickman, A.J. (2010). Complexities of conflict: the importance of considering social factors for effectively resolving human-wildlife conflict. *Animal conservation* 458-466. <https://doi.org/10.1111/j.1469-1795.2010.00368.x>

15. Brockington, D. (2002). Fortress conservation: The preservation of the Mkomazi Game Reserve, Tanzania. *Afric. J. Ecol.* 40(4): 415-416. DOI: 10.1046/j.1365-2028.2002.t01-4-00393.x
16. Berkes, F. and C. Folke, editors. 1998. *Linking Social and Ecological Systems: Management Practices and Social Mechanisms for Building Resilience*. Cambridge University Press, New York. *Conservation Ecology* 4(2): 5. URL: <http://www.consecol.org/vol4/iss2/art5>.
17. Decker, D.J., Organ, F.F., Smith, C.A., Riley, S.J., Jacobson, C.A., Batcheller, G.R. and Siemer, W.F. (2013). Impacts management: an Approach to fulfilling public trust responsibilities of wildlife agencies. *Wildlife Society Bulletin (2011-)* Vol. 38, No. 1, pp. 2-8
18. Heberlein, T.A. (2012). *Navigating Environmental attitudes*. Oxford University Press, 198 Madison Avenue, New York, NY 10016. pp 1-221. ISBN: 978-0-19-977332-9.
19. Kansky, R., Kidd, M. and Knight, A.T. (2014). A meta-analysis of attitudes towards damage-causing mammalian wildlife. *Conserv. Biol.* 28(4): 924-38. doi: 10.1111/cobi.12275.
20. Census of India conducted on 2011. Synchronized elephant population estimation in 2017 August conducted by Ministry of environment, Forest and climate change by Govt.of India.

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