Conservation Science
Translating Knowledge into Actions

Patterns of Human-Wildlife Conflict and People's Perception towards Compensation Program in Nilambur, Southern Western Ghats, India

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Summary

Aim The aim of this research was to examine patterns of human-wildlife conflict and assess community perception towards compensation program implemented to ameliorate human-wildlife co-existence.

Location North and South Forest Divisions, Nilambur, South India.

Material and Methods Data were collected from the official archives of applications made by victims or their families at Divisional Forest Office, Nilambur North and South Forest Division, for the period 2010–2013. The data included (a) types of conflict, (b) wildlife species involved in the conflict, (c) dates of application made by applicants, (d) dates of final decision made by concerned authority and (d) relief amount sanctioned. People's perceptions towards compensation program were gathered using a questionnaire survey (n=179).

Key findings Crop damage was the most common type of conflict, followed by property damage, injury and death by wildlife attack. Crop damage was contributed mainly by elephant (*Elephas maximus*) (59%) and wild boar (*Sus scrofa*) (32%). The other wildlife species involved in conflict were bonnet macaque (*Macaca radiata*) (3.8%), leopard (*Panthera pardus*) (3.3%), Malabar giant squirrel (*Ratufa indica*) (0.47%), porcupine (*Hystrix indica*) (0.29%), Guar (*Bos gaurus*) (0.95%) and Sambar deer (*Cervus unicolor*)(0.29 %). On average, people took 13 days to claim compensation, which received decisions in 90 days. The majority of respondents (67%) were not satisfied with the compensation schemes. The main causes of such dissatisfaction were (a) allocation of insufficient money for the compensation (46.6%), (b) prolonged and difficult administrative procedures to make claims (20%), (c) people's convictions that compensation scheme does not eradicate the conflict (20%) and (d) disbelief on the officials involved in compensation program (6.6%).

Conservation implications Our results suggest that compensation program has not gained acceptance among local community as an effective strategy to mitigate human-wildlife conflict. Although it may reduce hostile attitude towards wildlife, alternative approaches are urgently needed that avoid conflicts.

Keywords: compensation, human wildlife conflict, Nilambur, Western Ghats

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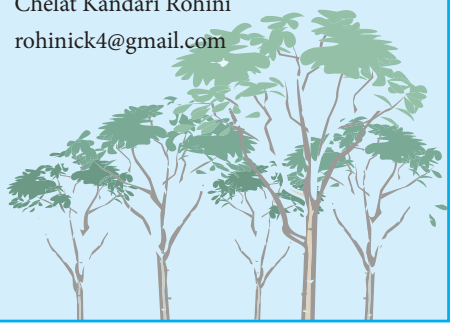

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Introduction

The Western Ghats, a biodiversity hotspot in a densely populated region, face multitudes of conservation challenges such as habitat fragmentation and degradation, ivory poaching and human–wildlife conflict (Balasubramanian et al. 1995, Silori and Mishra 2001, Baskaran et al. 2007, Baskaran et al. 2012). Human-wildlife conflict implies any interaction between human and wildlife that results in negative effects for human or wildlife populations (Madden 2004). People living in a close proximity to forests suffer losses from wildlife which include economic losses resulting from crop damage, property damage and livestock depredation, human death and injury. Expansion of human population and subsequent habitat loss and fragmentation has contributed for an increased intensity of human-wildlife conflict, especially in the tropics (Sukumar 1991). Apart from economical loss, psychological stress—loss of sleep, fear to travel through roads adjacent to forest areas and subsequent reduced human activity such as poor attendance in schools — accounts a lot of cost although it is difficult to quantify (Hoare 2012). Consequently, people develop negative attitude towards wildlife and its conservation initiatives (Ogra 2008). Various measures have been used to support the victims aiming to improve the community support for wildlife conservation such as monetary compensation for losses.

Compensation programs are designed to provide relief, mainly economic support of varying degree, which work by evaluating and offsetting monetary cost to victims (Madhusudan 2003, Ogra and Badola 2008, Karanth 2013). Studies in South India have shown that elephant damage to crop accounted about 30% annual household income (Madhusudan 2003). Studies on the assessment of the effectiveness of compensation schemes are limited (Madhusudan 2003) though its importance was widely recognized (Ogra and Badola 2008, Karanth et al. 2012). Thus, usefulness of such program for ameliorating human-wildlife co-existence is highly debated (Sukumar 1991, Sekhar1998, Madhusudan 2003). Compensation program is useful to identify conflict areas, species responsible for conflict and the extent of conflict (Hoare 1995). However, whether compensation promotes tolerance and lowers retaliation against wildlife in the long term or raises expectations and hostility are poorly known (Agarwala et al. 2010, Gubbi 2012).

As government continues to spend a large amount of funds for compensation scheme, it is essential to understand people's perception. This paper aimed at understanding people perception towards compensation program and identifying losses associated with human wildlife conflict. This includes crop loss, property damages, problems caused by direct encounter with wild animals and livestock depredation. Understanding these factors are critical to improve the efficiency of the compensation scheme, to consider if there exist any demand for an alternate scheme to acquire a better co-existence through people's support and acceptance towards wildlife conservation.

Materails and methods

Study area

The study area lies within the administrative jurisdiction of North and South Forest Divisions (NSFD), Nilambur, a part of Nilgiri Biosphere Reserve (NBR) (**Figure 1**). NSFD are part of Eastern Territorial Forest Circle, one of the five territorial forest circles of Kerala. There are

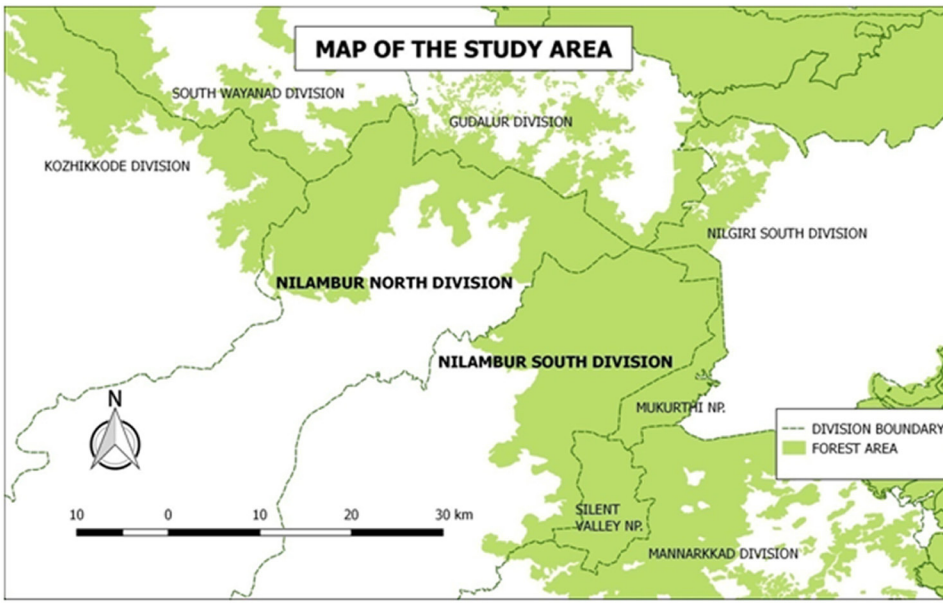

Figure 1. Map showing Nilambur North and South Forest Division and nearby protected areas

six forest ranges in NSFD : Vazhikadavu, Nilambur, Edavanna, Karulai and Kalikavu. The first four are under the Nilambur North Forest Division and the last two are a part of Nilambur South Forest Divisions. New Amarambalam Reserve Forest (NARF) is a part of the Nilambur South Forest Division and is a core area of the NBR. The area supports a good population of elephant, including several endemic mammals of the Western Ghats such as Lion-tailed macaque (*Macaca silenus*), Nilgiri langur (*Trachypithecus johnii*) and Nilgiri tahr (*Nilgiritragus hylocrius*). This region has been identified as an important biodiversity area by the Department of Forest and Wildlife. The area has been to upgrade the protection status (Sharma et al. 2002).

Conflict data

We obtained data on human-wildlife conflict from the Divisional Forest Office, Nilambur North and South Forest Divisions (NNSFD), for the period 2010–2013. The first author (CKR) visited at the NNSFD offices with permission from Divisional Forest Officers. The official archives were carefully reviewed to get following data: (a) types of conflict, (b) wildlife species involved in the conflict, (c) dates of application made by applicants, (d) dates of final decision made by concerned authority and (d) relief amount sanctioned. Data were not collected from incomplete applications (e. g., missing information). The guideline for making an application for compensation claim requires having supporting evidences such as land possession certificate and receipt of land tax. This helps to make sure that illegal settlers will not be able to make claims. The local officials verify the losses by inspectingfield, and forward detailed information to DFO office through concerned range offices. The divisional forest offices make final decision based on recommendation and supporting evidences. We collected 420 applications of compensation claims, constitute around 63% of the total claims made by farmers at the Divisional Forest Office, NNSFD, for the period 2010-2013.

Community Perception Data

There are about 38 forest fringe villages in the forest boundary of the two forest ranges viz Vazhikadavu and Karulai range. We conducted a questionnaire survey(n= 179 residents) from 17 forest fringe villages. Respondents were selected from households less than 300 m from the forest boundary by using purposive random sampling.

The questionnaire survey was performed through personal interviews. To assure independence of data, we interviewed people one at a time (Lammertink et al. 2003) and interviews lasted between 20-30 minutes. The survey included questions to gather following information: (a) type and extent of conflict, (b) participation in the compensation program and (c) effectiveness of the compensation program.

Results

Type and nature of human-wildlife conflict

Of the total 420 applications submitted for compensation, crop damage was the most sought after form of conflict (87.85%), followed by property damages (4 %), human injury (4 %), human death (2 %), and livestock depredation (2 %) (**Figure 2**). Of the total claims, elephants (*Elephas maximus*) accounted 58.8% of the conflict cases, followed by wild boar (*Sus scrofa*) (32.14%), Bonnet macaque (*Macaca radiata*) (3.8%), Leopard (*Panthera pardus*) (3.3%), Malabar giant squirrel (*Ratufa indica*) (0.47%), Porcupine (*Hystrix indica*) (0.29%), Guar (*Bos gaurus*) (0.95%) and Sambar deer (*Cervus unicolor*) (0.29 %).

Considering total crop damage and wildlife species involved, elephants were top conflict animal (61.24%), followed by wild boar (33.61%), Bonnet macaque (0.54%), Porcupine (0.54%) and Sambar deer (0.27%). In the case of property damages, 70.58% (n=12) of incidents were caused by elephants, 23.5% (n=4) by Gaur and 5.88% (n=1) of damages by wildboar.

There were 21 cases of human injuries, in which 33.33% (n=7) cases were caused by elephant, 47.61% (n=10) cases by wild boar and 19.04% (n=4) cases by leopard. Elephants were the most fatal wildlife which caused nearly 67% (n=2) of human death, followed by wild boar (33%) (n=1). Similarly, leopards were alone responsible for all livestock depredation cases (n=10) (**Table 1**).

Compensation procedure and community perception towards compensation program

Of the total people who applied for compensation, 66.6% rated compensation as an ineffective program because of (a) meager amounts sanctioned for

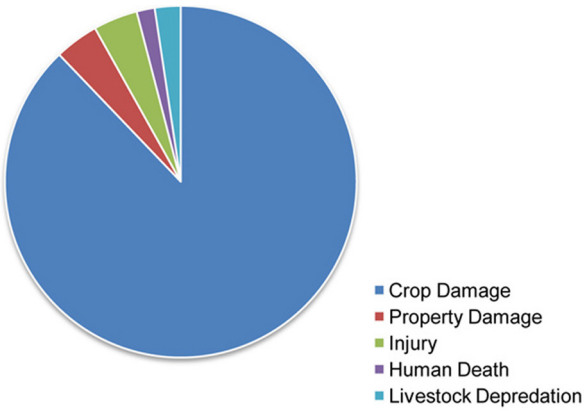

Figure 2 Type of damage by wildlife species during 2010-2013 in Nilambur North and South Forest Divisions.

Table 1 The extent of damage by wildlife (in percentage)

Wildlife	Crop damage	Property damage	Injury	Death	Livestock depredation
Elephant	61.24	70.58	33.35	66.66	—
Wild boar	33.61	5.88	47.61	33.33	—
Bonnet macaque	3.8	—	—	—	—
Leopard	—	—	19.04	—	100
Malabar giant squirrel	0.54	—	—	—	—
Porcupine	0.54	—	—	—	—
Gaur	—	23.5	—	—	—
Sambar deer	0.27	—	—	—	—

compensation (46.6%), (b) prolonged and difficult administrative procedure to make claims (20%), (c) people's understanding that compensation scheme will not eradicate the occurrence of conflict (20%), and (d) mistrust on the authenticity of the compensation program (13.2%). Those who did not apply for compensation (62.5% respondents) stated that their unwillingness to participate in the program was due to (a) prolonged procedure to make claims (58.8%), (b) insufficient relief amount (33.3%), (c) mistrust on the authenticity of the system (6%) and losses are difficult to quantify (2.3%).

Discussion and conclusion

Conflict with wildlife affects livelihood of rural farming communities, creates problems such as decreased food security, increased workload and economic hardship (Naughton-Treves et al. 1999, Hoare 2000, Ogra 2008). In order to improve the local community attitude towards wildlife conservation, monetary benefits are provided to the victims. Compensation had no effect in some parts of the world to reduce anti-wildlife sentiments (Naughton-Treves et al. 2003; Bulte and Rondeau 2005). Therefore it is important to assess of effectiveness of compensation payment especially in the biodiversity rich areas such as South India (Gubbi 2012).

People make an application for compensation only if they experienced a huge economic loss. Crop raiding is generally identified as the main form of conflict (Barnes 1996, Williams et al.2001). Intensity of damage per conflict incident is much higher for damage by elephants than with any other species (Naughton-Treves 1998). Wild boars are serious crop raider specially in villages near to fragmented forests (pers. observation). According to Karanth (2013) species involved in conflict influence whether people apply or not for compensation. In this study, more claims were made for elephant related incidents than wild boar related incidents. As elephants forage larger areas, damage to crops per raiding will be high. Moreover probability of property damage, accidental death and fatal injuries of farmers who were guarding crops will be high for the elephant related incidents.

Result indicates that majority of people do not find compensation as an efficient method. It was due to several factors such as the difficulty to submit application (e.g., (e.g., long distances from the villages to range offices and DFO offices make people difficult to spent time and money for travelling, as observed by Madhusudan (2003)). Poor access to forest offices and responsible staff, makes submitting compensation applications a tedious task (Madhusudan 2003). Some villagers are not aware about the procedure of submitting application as they were illiterate.

We observed that there was a delay in processing the claims and the average number of days taken to disburse compensation was 90 days. Delays in fund disbursal from the government, shortage of administrative staff may have impacted timely processing of compensation claims (Gubbi 2012). Even if the compensation amount is far away from the actual losses, timely payment can help in improving people's perception. Spiteri and Nepal (2008) reported that insufficient money discouraged people to apply for compensation. Delayed and low compensations have been reported as a determining factor of retaliatory attacks on wildlife by local community (Wakoli and Sitati, 2012). Lahkar et al. (2007) reported that comensation program failed to garner community support in Assam due to it "lengthy and faulty procedure". It is therefore important to train staff in forest department to facilitate people. It will ensure the trust among farmers towards the officials and increase the transparency and efficiency of the compensation program.

Compensation scheme largely failed to achieve people's acceptance due to several factors. Losses occur several times in a year and people find it practically difficult to complete all formalities of compensation repeatedly. Many of them believe that compensation can be made once a year, unaware about the recent amendment that made possible to apply four times in a year. Moreover, insufficient money, difficult procedures of making the applications and their verifications and late decision negatively affect the acceptance of the program. People even pointed about that they failed to submit claim due to the unavailability of application form in the offices. Thus it is necessary to make procedure available in the local context (Wilson et al.

2006, Madhusudan 2003).

In African countries such as Kenya and Zimbabwe the schemes were suspended due to widespread cheating on claims and lack of funds (Thouless 1995, Taylor 1993). Furthermore, some of the conflict related losses are difficut to quantify and compensated such as psychological stress (Hoare 1995, Bulte and Rondeau, 2005). It has been argued that compensation can also exerbate conflicts. Compensation scheme alone cannot gain acceptance as an effective program to reduce impact of conflict, which requires a well founded mitigation measure(Madden 2004, Ogra 2008). We therefore recommend to simplify the procedure. Allowing people to make application through local institutions (e.g., panchayath or agricultural department), for example, may make application process easier.

Policy makers have to acknowledge community perspective in the future policy making process. The present study provides baseline data for amendments of the existing regulations to achieve a win-win situation in India.

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References

Agarwala M, Kumar S, Treves A, Naughton-Treves L (2010) Paying for wolves inSolapur, India and Wisconsin, USA: Comparing compensation rules and practiceto understand goals and politics of wolf conservation. Biological Conservation, 143, 2945

Balasubramanian M, Baskaran N, SwaminathanS, Desai AA (1995) Crop raiding by Asian Elephants (Elephasmaximus) in theNilgiri Biosphere Reserve, South India, pp. 350–367. In: Daniel,J.C. & H.S. Datye (eds.). A week with elephants. Proceedings of the International Seminar on the conservation of Asian Elephant.Mudumalai Wildlife Sanctuary, June 1993. Bombay Natural HistorySociety, Bombay.

Barnes RFW (1996) The conflict between humans and elephants in the central African forests. Mammal Review 26:67–80

Baskaran N, Kannan G, Anbarasan U, Sukumar R (2007) Conservation of the Elephant Population in the Anamalais – NelliyampathisandPalani Hills (Project Elephant Range 9), Southern India. Final report to USFWS, Asian Nature Conservation Foundation, Bangalore.

Baskaran N, Anbarasan U, Agoramoorthy G (2012). India's biodiversity hotspot under anthropogenic pressure: A case study of Nilgiri Biosphere Reserve. Journal for Nature Conservation, 20, 56-61.

Bulte EII, Rondeau DANI (2005) Why compensating wildlife damages may be bad for conservation. Journal of wildlife management 69, 14-19.

Gubbi S (2012) Patterns and correlates of human–elephant conflict around a south Indian reserve. Biological Conservation, 148, 88-95.

Hoare RE (1995) Options for the control of elephants in conflict with people. Pachyderm, 19, 54-63

Hoare, R. (2000). African elephants and humans in conflict: the outlook for co-existence. Oryx 34, 134–38.

Hoare RE (2012) Lessons from 15 years of HEC mitigation management considerations involving biological, physical and governance issue in Africa. Pachyderm, 51, 60-74

Karanth KK, Gopalaswamy AM, Prasad PK, Dasgupta S (2012) Patterns of human-wildlife conflicts and compensation: Insights from Western Ghats protected areas. Biological Conservation, 166, 175-185

Karanth KK (2013) Patterns of human-wildlife conflicts and compensation: Insights from Western Ghats protected areas. Biological Conservation, 166, 175-185

Lahkar B, Das J, Nath N, Brahma N, Sarma P (2007) A study of habitat utilization patterns of Asian elephant Elephas maximum and current status of human elephant conflict in Manas National Park within Chirang-Ripu Elephant Reserve, Assam. A technical report prepared by Aaranyak.

Lammertink M, Nijman V, Setiorini U (2003) Population size, Red List satus and conservation of the Natunalaef monkey Presbytisnatunae endemic to the island of Bunguran, Indonesia. Oryx, 37, 472-479

Madden F (2004) Creating coexistence between humans and wildlife: Global perspectives on local efforts to address human–wildlife conflict. Human Dimensions of Wildlife, 9, 247–257

Madhusudan MD (2003) Living amidst large wildlife

livestock and crop depredation by large mammals in the interior villages of Bhadra Tiger Reserve, South India. Environmental Management, 31, 466-475.

Naughton-Treves L (1998) Predicting patterns of crop damage by wildlife around Kibale National Park, Uganda. Conservation Biology, 12(1), 156-168.

Naughton-Treves L, Rose, R., and Treves, A. (1999). The social dimensions of human–elephant conflict in Africa: a literature review and two case studies from Uganda and Cameroon. IUCN, Gland.

Naughton-Treves L, Grossberg R, Treves A (2003) Paying for tolerance: ruralcitizens' attitudes toward wolf depredation and compensation. Conservation Biology, 17, 1500–1511.

Ogra M and Badola R(2008) Compensating human–wildlife conflict in Protected AreaCommunities: ground level perspectives from Uttarkhand, India. Human Ecology, 36, 717–729.

Ogra MV (2008) Human-wildlife conflict and gender in protected area borderlands: a case study of costs, perceptions, and vulnerabilities from Uttarakhand (Uttaranchal), India.Geoforum 39, 1408–1422.

Sekhar NU (1998) Crop and livestock depredation caused bywild animals in protected areas: the case of SariskaTigerReserve, Rajasthan, India. Environmental Conservation, 25, 160–171.

Sharma JK, Nair KKN, Mathew G, Ramachandran KK, Jayson EA, Mohanadas K, Nandakumar, UN, Nair PV (2002) Studies on the biodiversity of New Amarambalam Reserve Forests of Nilgiri Biosphere Reserve No. 247

Silori CS, Mishra BK (2001) Assessment of livestock pressures inand around the elephant corridors Mudumalai Wildlife Sanctuary,southern India. Biodiversity and Conservation, 10, 2181–2195.

Sukumar R(1991)The management of large mammals inrelation to male strategies and conflict with people. BiologicalConservation, 55, 93–102.

Spiteri A, Nepal SK (2008) Distributing conservation incentives in the buffer zone of Chitwan national park, Nepal. Environmental Conservation 35, 76–86.

Taylor RD (1993) Elephant management in Nayaminyami District, Zimbabwe: Turning a liability into an asset. Pachyderm, 17, 19-29.

Thouless CR, Sakwa J (1995) Shocking elephants: fences and crop raiders in Lakipia district, Kenya. Biological Conservation, 72, 99-107.

Wakoli EN, Sitati N (2012) Analysis of temporal and distribution patterns ofelephant attacks on humans and elephant mortality inTransmara District, Kenya.Greener Journal of Environment Management and Public Safety, 1, 27-37.

Williams AC, Johnsingh AJT, Krausman PR (2001) Elephant-human conflicts in Rajaji National Park, northwestern India. Wildlife Society Bulletin, 29, 1097–1104.

Wilson SM, Madel MJ, Mattson DJ, Graham JM, Merrill T(2006)Landscapeconditions predisposing grizzly bears to conflicts on private agricultural landsin the western USA, Biological Conservation, 130, 47–59.