

Assessment of livestock pennings on Vulture conservation in Sigur Plateau, Tamil Nadu, Southern India.

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Abstract

The Sigur plateau is situated in the Nilgiri district, Tamil Nadu, South India. In Sigur Plateau there are four species of vultures found and among them three species of vultures are migratory. The study was conducted during September to December 2017 and was aimed to explore the impacts of livestock population on vulture conservation. We interviewed 102 livestock holders with two sets of questionnaire, one was "Precise and Closed" and other "Broad and Open ended". The present study revealed that the villagers bury some of the livestock carcasses (25%) and the remaining (75%) carcasses were thrown out and made available for natural disposal. Unfortunately the carcasses were not thrown far away from the villages and therefore these carcasses were not accessible to vultures. Data on the carnivores' damage on livestock revealed that Tiger, Leopard and Wild dogs caused more damages to the livestock. Data on the use of diclofenac among the cattle holders showed that most of them (n=150) were aware of the harmful effects of Diclofenac to vultures. Steps must be taken to create awareness on vulture conservation among the public, especially among the young growing generation.

Key words: Awareness, Diclofenac, Livestock, Sigur plateau, Vulture Conservation

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INTRODUCTION

Vultures play a vital role in environmental health by scavenging meat from carcasses. Being a scavenger in habit vultures avert spread of dangerous diseases such as anthrax and rabies (Prakash *et al.*, 2003), which could cause havoc to the wild animals, livestock and human. Therefore the vultures play an important role in the terrestrial ecosystem as a scavenger. The decline (>95%) of the *Gyps* vultures was first recorded in Keoladeo Nation Park, Rajasthan (Prakash, 1999). It has also been reported that the 90% of three critically endangered *Gyps* vultures have declined throughout India. Since the early 1990s *Gyps* vulture populations have collapsed across the Indian subcontinent (Prakash *et al.*, 2005). Populations of three species are known to have been more affected, *viz.*, White-rumped, Long-billed and Slender-billed vultures and the populations have declined by more than 97% since 1992 (Prakash *et al.*, 2003). In Sigur plateau there are six species of vultures namely White-rumped, Long-billed, Red-headed, Egyptian, Himalayan Griffon,

Eurasian Griffon and Cinereous vultures (Ramakrishnan *et al.*, 2010, 2012, 2013; Samson *et al.*, 2015; Samson and Ramakrishnan, 2014; Sashikumar, 2001; Subramanya and Naveen, 2006; Venkitachalam and Senthilnathan, 2015; Venkitachalam and Senthilnathan, 2016;) were recorded. The Sigur Plateau of the Nilgiris north division forest harbours four species of vultures which are seen commonly (Samson *et al.*, 2014). Studies in the past clearly exposed that the Diclofenac had a critical role in the decline of vulture population across India. On the contrary Ramakrishnan *et al.* (2010) found that the Diclofenac was not a culprit for declining vulture population in the Moyar Valley which is a continuous tract of Sigur plateau. It is the need of the hour to ensure whether there is any chance of Diclofenac usage in livestock practice could influence the vulture preparation at landscape level. Since it was not possible to cover the entire landscape by this short term study, the Sigur plateau of the Nilgiris part alone was focused. This study was carried out in fringe areas of the Sigur plateau to assess the livestock population status and its impacts on culture conservation.

Study Area

The Sigur plateau is situated in the Nilgiri district, Tamil Nadu and South India. It covers an area of 778.8 square kilometers. It comprises about 448.3 km² reserve

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forest of the Nilgiris North Forest Division and 321 km² Mudumalai Tiger Reserve and about 16.2 km² of private lands. The average elevation of the Sigur plateau is 280 meters (919 ft). The boundaries of the Sigur plateau are Bandipur National Park to the northwest, Mudumalai Tiger Reserve to the west, and Sathyamangalam Tiger reserve and Nilgiris East slope range to the east. The north side of the plateau is defined by the Moyar valley and the 260 metres (853 ft) deep Moyar Gorge. South of the Sigur plateau is the higher Nilgiris plateau. The Sigur plateau is notable as an important wildlife corridor which is maintaining connectivity between the Western Ghats and the Eastern Ghats and *vice versa* to sustain elephant and tiger population and their genetic diversity. It is an important link between several adjacent protected areas shaping the Nilgiri Biosphere Reserve (NBR), the largest protected forest area in India. This area supports over 6,300 elephants and tiger, which represent the largest single population of Asian elephant and tiger in India. The five major streams in Sigur plateau are Moyar River, the Sigur River, the Avarahalla River, Kedarhalla River and Gundattihalla River, which originate in the Nilgiris plateau. The Sigur plateau is an important watershed area for the Moyar River and its ecological health is important to many people as they dependent on Moyar (Fig 1).

METHODOLOGY

The study was aimed to explore the impacts of livestock population on vulture conservation. Two sets of questionnaire were developed for this study. One was "Precise and Closed" and other one was "Broad and Open ended". The people in this plateau are more literate, and hence the questionnaire was prepared to make them understand easily and the questions were asked in local language for easy communication. The respondents were briefed about the purpose of the visit and verbal consent was taken for voluntary participation in interviews. At least one adult (18 years old) was interviewed in his/her residence. Face to face interviews were made it easier to clear any ambiguity regarding the questions.

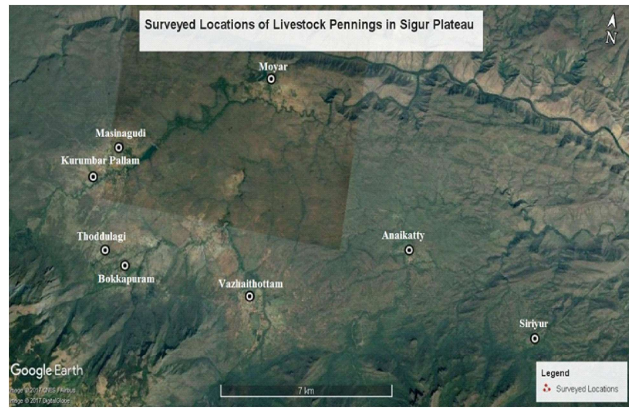
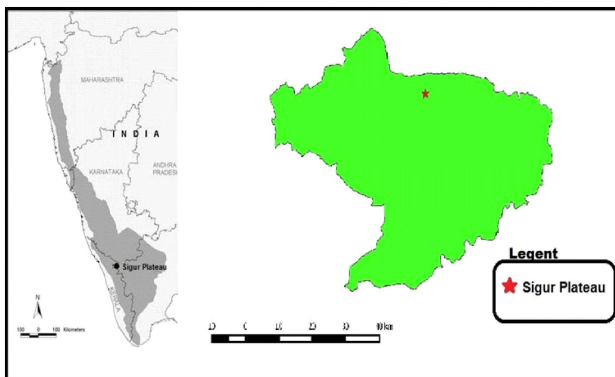


Fig. 1. Descriptive map of the study area, the Sigur plateau

The questionnaire had two sets of information i.e name, education, occupation, year of living, etc. were collected by using "Precise and Closed" from the respondents. These sets of questions were asked for direct answers from the respondent (Ramakrishnan *et al.*, 2014). Second set of information was collected through "≥oad and Open ended" questions given to the respondents an opportunity to express his/her views freely without any inhibition. These question sets were used to know the people's perception on vulture conservation in the Sigur plateau. Totally 172 livestock holders were interviewed in this study.

Totally 172 livestock holders were interviewed in eight villages in the Sigur plateau. Similarly, totally 2652 individuals of livestock were recorded. Of which, Cow (n=1646) was the maximum abundant livestock in the Sigur Plateau followed by Sheep (n=506), Goat (n=443) and Buffalo (n=57). Among the villages/settlements, Moyar village attributed highest numbers of livestock population (n=1135) followed by Vazhathottam (n=440), Anaikatty (n=426) and Sriyur (n=215). Lowest number of livestock population was recorded from Bokkapuram settlement (n=28) (Table I).

Out of 172 livestock holders females (n=92) were maximum, when compared to males (n=80), and the average age of the male respondents was 48.46±13.99 and the female respondents was 48.01± 13.39 (Table II).

Most of the livestock holders (n=100) were earning their annual income ranging from Rs. 10,000 to 50,000 which was followed by the people who were earning from Rs. 50,000 to 1,00,000 Rupees (n=67) and just 5 livestock holders were earning their annual income from Rs. 100000 to 200000 (Table 3).

Among one hundred and seventy two respondents one hundred and eighteen respondents replied that livestock grazing as the only source of livelihood for

Table 1. Livestock population status with the respondents in the Sigur plateau

Name of the Villages/settlements	Number of Respondents interviewed	Livestock population				
		Cow	Buffalo	Goat	Sheep	Total
Sriyur	11	196	10	5	4	215
Anakatty	30	164	17	2	243	426
Vazhaithottam	22	346	20	62	12	440
Kurumbarpallam	7	76	-	19	11	106
Bokkapuram	5	20	-	8	-	28
Thottalingi	23	104	10	25	7	146
Masinagudi	16	121	-	20	15	156
Moyar	58	619	-	302	214	1135
Total	172	1646	57	443	506	2652

Table 2. Demography of people interviewed

Total number of responde	Age of Male (n=80)		Age of Female	
	Mean	SD	Mean	SD
172	48.46	13.99	48.01	13.39

them, while only fifty three respondents disagreed that livestock is the only livelihood for them (Fig. 2)

The people are holding the livestock mainly for dung (Rs.20,99,000/annual) followed by meat (Rs.10,11,000/annual), milk (Rs.1,90,000/annual) and for agriculture (Rs. 1,75,000/annual). One hundred and seventy two persons earned Rs. 33,00,0000/annum through dung, meat and milk altogether in an year (Table 4).

A total of two thousand three hundred and forty individuals of livestock were lost by one hundred and

Table 3. Annual income status (Rs.) of the livestock holders sampled

S. No.	Annual Income (Rs)	Number of respondents
1	10,000-50,000	100
2	50,000-1,00,000	67
3	1,00,000 - 2,00,000	5

seventy two livestock holders during a period of five years. Of which, most of the livestock (n=1729) were lost due to various diseases and six hundred and twenty one livestock were lost due to wild carnivores predation. In an average of about 468 livestock were lost every year. During a period of five years an average of 345.8 livestock were lost per year due to diseases and 124.2 were lost due to wild carnivores predation (Table 5).

During a period of five years totally 621 livestock belonging to 171 livestock holders were lost due to

Table 4. Income (Rs.)generated by the people from their livestock

Total number of Respondent	Total income earned per year	Agricultural	Milk	Dung	Meat
172	34,74,000	1,75,000	1,90,000	20,99,000	10,11,000

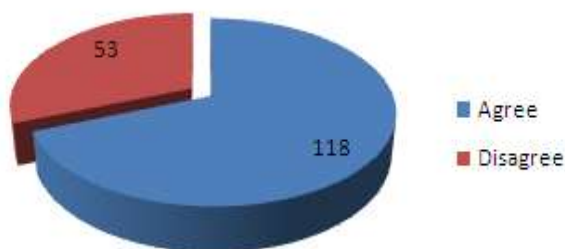


Fig. 2. Response of the live stock holders regarding the source of livelihood income

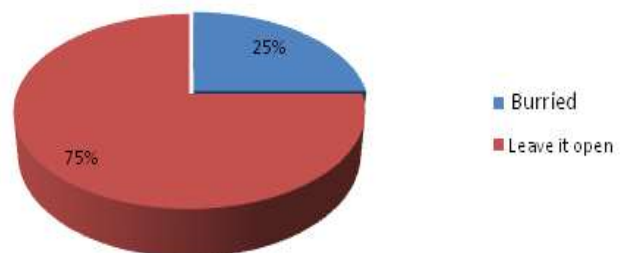


Fig. 3. Modes of disposal of livestock carcasses by the livestock holders

Table 5. Reasons for loss of livestock responded by the livestock holders

Total number of livestock holders interviewed	Total number of livestock lost for the past five years	Reason for loss of livestock	
		Diseases	Wild animal predation
172	2340	1729	621
Average per year	468	345.8	124.2

wild carnivore depredation . Of which, predation by tiger is the major cause for the loss of livestock (n=508) which was followed by Leopard (n=54) and Wild dog (n=59). In an average of about 101.6 livestock individuals were killed by Tiger, about 10.8 individuals were killed by Leopard and about 11.8 individuals were killed by Wild dog per annum (Table 6).

Modes of livestock carcasses disposal were determined by interviewing one hundred and seventy two livestock holders. Most of them (n=43) stated that they buried their livestock carcasses and (n=129). The livestock holders disposed them off in forest fringe areas for vultures (Fig. 3).

Medication procedures applied by the live stock holders to treat their livestock when they had become sick was interviewed. The interview was made with one hundred and seventy two persons. The result revealed that most of the people (n=139) did not know the medication procedure if their livestock fell sick. Most of them (n=170) brought their sick livestock to veterinary doctor for treatment. Considerable number of them (n=33) were known to treat their livestock by traditional methods and very few of them (n=2) were called quakes to treat their livestock (Table 7).

Awareness regarding the use of Diclofenac was interviewed with one hundred and seventy two livestock holders in relation to vulture conservation.

Table 6. Loss of livestock due to predation by various wild carnivores

Total Number of livestock lost due to varies wild carnivores predation	Name of the wild carnivores reasoned for livestock depredation		
	Tiger	Leopard	Wild dog
621	508	54	59
Average per year	101.6	10.8	11.8

Table 7. Medication procedures used by the live stockholders to treat their livestock

Medication procedures (n=172)		Medication procedure was done by (n=172)	
Known	Unknown	Doctor	Quake
33	139	170	2

The result revealed that most of them (n=100) knew about Diclofenac and considerable number of people (n=72) did not aware of Diclofenac. Similarly considerable number of the people (n= 72) did not have knowledge of Diclofenac. Most them (n=100) were aware of the fact that the diclofenac is a drug (n=30) and pain killer (n=20) . It is important to note that most of the people (n=150) thought that Diclofenac is harmful to vultures (Table 8).

Discussion and Conclusion

The distribution of vultures in Sigur plateau is sprinkled and it appears that the plateau was mostly used as a foraging and nesting sites by vultures (Ramakrishnan *et al.*, 2010 and Samson *et al.* , 2014). Ramakrishnan *et al.*, (2012) recorded all the six species of vultures in a single sighting from Sigur plateau at the carcass of a Spotted Deer killed by a tiger. These observations suggested that there is a relationship between this predator and its prey in Sigur plateau. Red-headed vultures are fresh carcass feeders in nature and the predator’s presence indicates existence of their prey (Chhangani, 2007; Ramakrishnan *et al.*, 2012; Samson *et al.*, 2016). Sigur plateau consists of non protected (Nilgiri North Division) and protected area (Mudumalai Tiger Reserve). Herremans and Herremans-Tonnoeyr, (2000) observed that vultures were at the highest density in the interface between protected and non-protected areas. In the present study also, vultures were seen most commonly in the fringe of the plateau near human settlements. According to Prakash *et al.* (2007), although thousands of vultures that stay in India, they are now extending very sparsely across a vast area. This is a dangerous state of affairs for such social birds, which construct nests and roost communally and rely on information expand from one another when searching for extensively dispersed food sources.

The present study recorded that the cattle population was higher than any other livestock population in the nine study villages surrounding Sigur plateau. The people are holding livestock mainly for dung followed by meat and milk. This was mainly because of high demand for dung in the upper Nilgiris especially for mushroom culture and tea and coffee estates. Mishra, (1995) stated that the cattle to be a “Dung producing machine” in and around Masinagudi village areas of the Sigur plateau. The statement of Mishra, (1995) was now evidenced by dung sale that cost Rs. 19,97,000/- per annum from 102 livestock holders in the study villages of Sigur Plateau. It is quite interesting to note that Rs. 9,16,000/- was earned by selling their livestock to the butchers for slaughter houses to nearest state of Kerala. Hence the cattle selling for meat was second position to dung. The revenue from milk production was very low (Rs. 1,87,500/-) because of these scrub

Table 8. Perception of live stock holders on the use of Diclofenac to treat the livestock with reference to vulture conservation

Do you know Diclofenac (n=172)		Diclofenac is (n=172)			Diclofenac is harm to vultures (n=172)	
Yes	No	Drug	Pain killer	No idea	Yes	No
100	72	30	20	50	150	22

cattle belong to country breed. The reserve forests are considered to be the Government properties, and the cattle owners enjoy the resources without spending much.

The present study concluded that some of the livestock carcasses (25%) were buried and the remaining (75%) of them were thrown out and made available for nature disposal. Unfortunately the carcasses were not thrown far away from the villages. Therefore these carcasses were not accessible to vultures. Data on the carnivore damage on livestock revealed that Tiger, Leopard and Wild dogs caused more damages to the livestock. Most of the tiger attacks were on cow/bull and buffalo. Ullash Karanth (2003) stated that livestock are easy prey for tigers when they graze inside the forest areas. Leopards and wild dogs were preferably feed on goat and sheep and young ones of cows and buffalos. Leopard and Wild dogs' body size is relatively smaller than tiger. Therefore their preference is always for smaller size of prey compared to tiger, because of the fact that lifting has been made easy.

The studies on the knowledge on Diclofenac among the cattle holders showed that most of them (n=150) were aware about Diclofenac. Most of the livestock holders were uneducated and they depend livestock grazing as their main livelihood. Sometimes they also earn money as agriculture labourers, which is an alternative livelihood. Davidar, (2002) stated that declining of vultures in the Sigur plateau was mainly due to retaliatory killing of carnivores by the local people. The respondents knew about the importance of vulture in the environment and they are of the opinion that the awareness of the vulture conservation is very important for public as well as for young growing generation too. But it is important to note that still the people would go for retaliatory killing due to their intolerance. Therefore strong, simplified and adequate compensation package is advised for the long run conservation of vultures in this region.

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