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Full Length Research Paper

Human-Monkey Interaction with special focus on Bonnet Macaque (*Macaca radiata*) in Huligadde grama, Hosanagara taluk, Shimoga district, Karnataka, India.

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ARTICLE DETAILS

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ABSTRACT

Conflict is a global issue, competition between humans and wildlife for food, habitat and other available resources crates conflict. Human and Bonnet Macaque interaction was carried out by direct observation and qquestionnaire survey method. Interacted with 75 people, males are more responded than female. Majority of the people are having the primary education qualification and only few people have completed post secondary education. 27% of people are purely depended on agriculture. Crop damage by Bonnet macaque was more than the other wild animals. People use many preventive measures to protect the crops, in that mirror is used to reflect the sunlight is very effective. According to survey the main reason for the crop damage is variety and easily availability of food in the farm land, hence the macaques get adapted. People in the study area are having the positive attitude towards the Bonnet macaque, treat them as god Anjaneya/ Hanuman and are having the ability to tolerate the conflict. Crops which are not feed by the macaques are suggested to grow and preventive measures which are physically and mentally less harm to the macaques were suggested to use.

1.Introduction

The human population explosion increasing the needs of humans like agricultural expansion, deforestation, technological development and other such things reduces the resource availability for wildlife. These human habitations attracts the wild animals for their basic needs (Soulsbury and White, 2015).The human wildlife interaction has evolved over a long period of time. There is a competition between humans and wildlife for the forest resources and food. (Knight, 2013). When humans enter the wildlife habitat and disturb the animals activity which causes the negative interaction between them and leads to human wildlife conflict (Gharti, 2023). This conflict arises when both competing for the same resources (Nyhus, 2016). Human wildlife conflict is a negative interaction between human and wildlife in which one activity of one has adverse effect on other (Conover, 2001). majorly conflict causing animals such as Tiger, leopard, sloth bear, asian elephants, wildboars, macaques, nilgai, wolves, Wild ungulates (Sekhar, 1998; Madhusudan, 2003; Karanth *et al.*, 2013; Lyngdoh *et al.*, 2014). Agricultural crop damage by the ungulates, primates, birds and rodantes (Mohan *et al.,* 2020)is one of the major issue in human wildlife conflict which decreases the yield. (Sekhar, 1998). The human monkey conflict in India is majorly because of habitat encroachment of forest areas. Scarcity of food inside the forest attracts the monkeys towards agriculture land, as the time goes they get adapted to the farm land and damage the crops more (Novak, 2021). Some species of macaques are in co-existence with the humans, Bonnet macaques are one among them. They are social and endemic to South India and prefer human dominated habitats covered with agricultural crops and other food sources (Sugiyama, 1971; Singh and Rao, 2004). Co-existence and strengthening of cultural believes of human towards wildlife plays an very important role in mitigation of human wildlife conflict (Knight, 2000). Current situation of human and monkey interaction focus on effective mitigation measures taken to alleviate the conflict and to address the possible solutions.

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2.Materials and Methodology

2.1 Study area

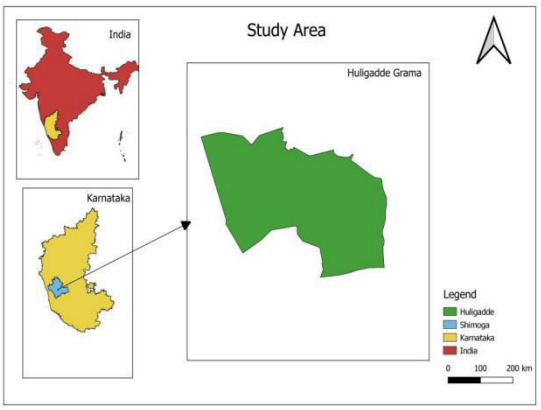


Fig 1: Map showing the location of the study area

The study was carried out in Huligadde grama and it comprises of four villages Huligadde, Tariga, Shivapura, and Gandralli located in Hosanagara taluk Shivamogga district (figure 1). The areas has predominant forest cover and villagers are agriculture dependent. The area possess 695.28 hectares dominated by mixed type of vegetation with evergreen trees and dry deciduous tress. Average annual temperature of the area ranges from maximum 37^{o} C to minimum 19^{o}C recorded and average rainfall is about 1500mm to 2000mm predominantly bu South west monsoon.

2.2 Methodology

2.2.1 Data collection: The study was conducted from January 2023 to March 2024 by Direct observation and questionnaire survey method (Vijaya and Lewis2018) to estimate the crop damage and to assess the farmers attitude towards macaques.

2.2.2 Questionnaire survey method: Random sampling method was followed for the survey of households, farmers and landlords. Survey was formally conducted in local language Kannada, only one response was taken from one house and considered as one unit. Informal interaction was made for all the family members and allowed them to share their experience and life time stories of wildlife conflict. The questionnaires were prepared in local language kannada which includes following aspects.

1. Socioeconomic aspects: Age, gender, education qualification, agriculture experience, occupation, crops grown, secondary source of income
2. Conflict aspects: Conflict animal, crops get damage, season of crop damage, attacks on other aspects (house, dogs, humans)
3. Reason for crop damage (based on people perspective)
4. Mitigation measures followed and their outcome
5. People perspective on Bonnet macaque and its conflict

2.2.3 Direct observation: This was carried out by directly observing activities of macaques in respective regions. Direct evidences of conflict were collected by taking the photographs with the help of Nikon d5200. Spot visit to the conflict areas based on survey report was also made. Mitigation measures which they followed were noted and photographed for the evidence.

3. Result and Discussion

During the study 75 locals were surveyed with the proper questionnaire format and their responses were recorded. Age group between 41 to 50 were more responded which followed by 51 to 60 and least number of respondents were 21 to 30 age group. Number of male respondents were more (40) compared to female (35) because males were frequently visit the agricultural land than the females. About 32% of them were having primary education 28% were having early and secondary education only 12% were having post secondary education. In the interviewed people with 31 to 40 years of agricultural experiences were more (25%) followed by 21 to 30 years (23%) and people with more than 40 years of agricultural experience were less (12%). More than 25% were majorly depend only on agriculture for the source of income and above 15% were daily wage workers, who frequently visit others farm land for the work. Few people were not depend on agriculture and some of them were having the secondary source of income other than agriculture. The socio-economic aspect of the people such as age, gender, education qualification and occupation reflect the complexity of conflict (Lute *et al*., 2016).

People in the area following multi cropping system in their farmland. Majority of them grown cocoa, banana, pepper, coffee, cordomam, turmeric and ginger along with arecanut. Arecanut is getting raid and damaged more by the macaques which is followed by banana, coconut (tender coconut) and pepper (leaf and young fruit). Ground nut and ginger get less damage because people depend only on them are very less. Jackfruit varieties were also get highly damaged by macaques during fruiting season but people only depending on it were very less. Crop damage by the Bonnet macaque is serious issues in various parts of India (Saraswat*et al*., 2015) which focus on the feeding pattern and agricultural crop damage by

the Rhesus macaque at Himachal Pradesh. Crop raiding by Primates of Africa where they observed that Primates feed more on maize and bananas, if the alternative food crops like Papaya and watermelon were given raid on maize and bananas get reduced. This highlights he importance of multi-croping system to reduce the conflict (Naughton-Treves *et al.,* 1998). During the study we suggested to grow the crops which are not feed/ less feed by Bonnet macaque (Clove, betal leaf etc)

Fig 2 : Occupation of the people n the study area

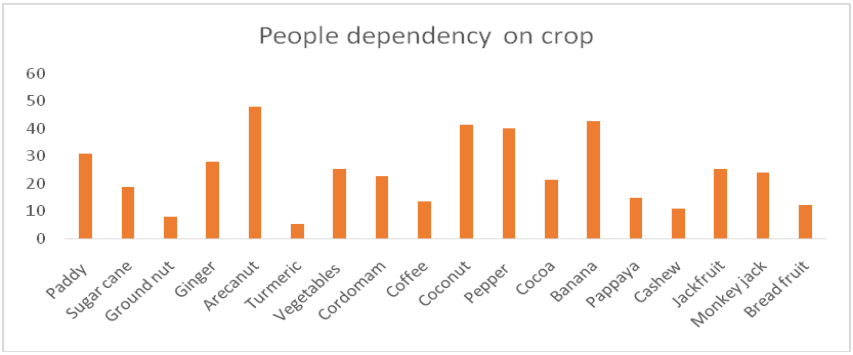


Fig 3 : People dependency on crop

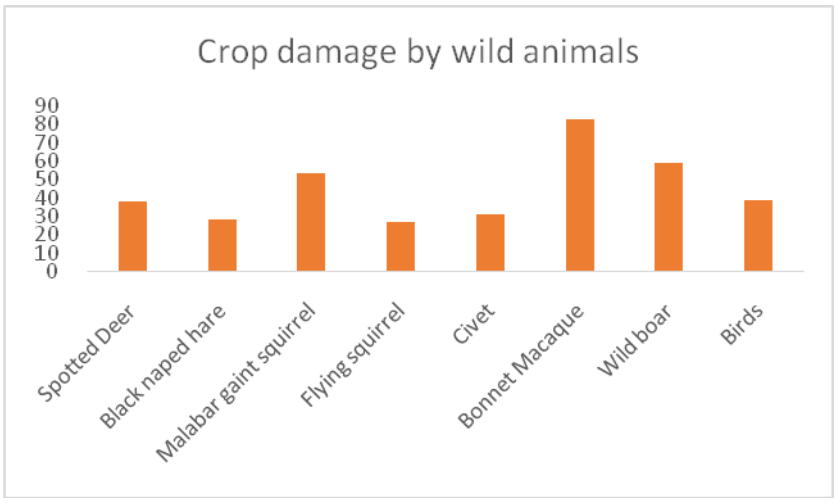
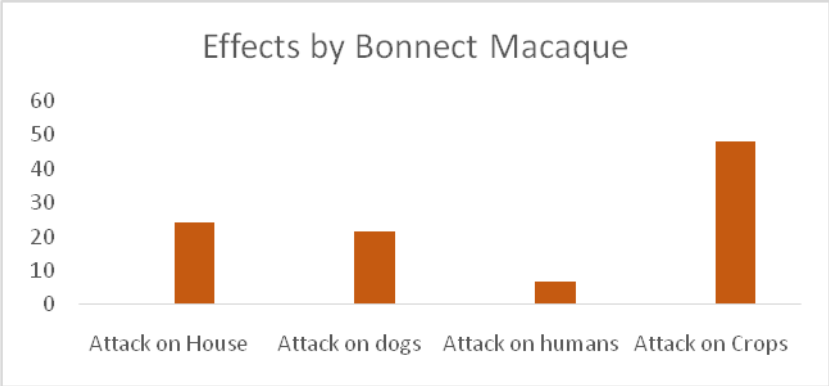


Fig 4 : Percentage of crop damage done by wild animals

Study was mainly on human monkey conflict but the area is also having conflict from other wildlife species. Survey report confined that the area get crop damage by other animals also but the intensity of crop damage by other animals was less compared to bonnet macaque. Instead of feeding, macaques damage the crop more.



Fige 5 : Effect caused by the Bonnet Macaque

The survey report reveals that macaques attacks more on agricultural crops compared to their raid on houses, dogs and human attacks were very less only 2 responses were recorded.

Bonnet macaque attack on house

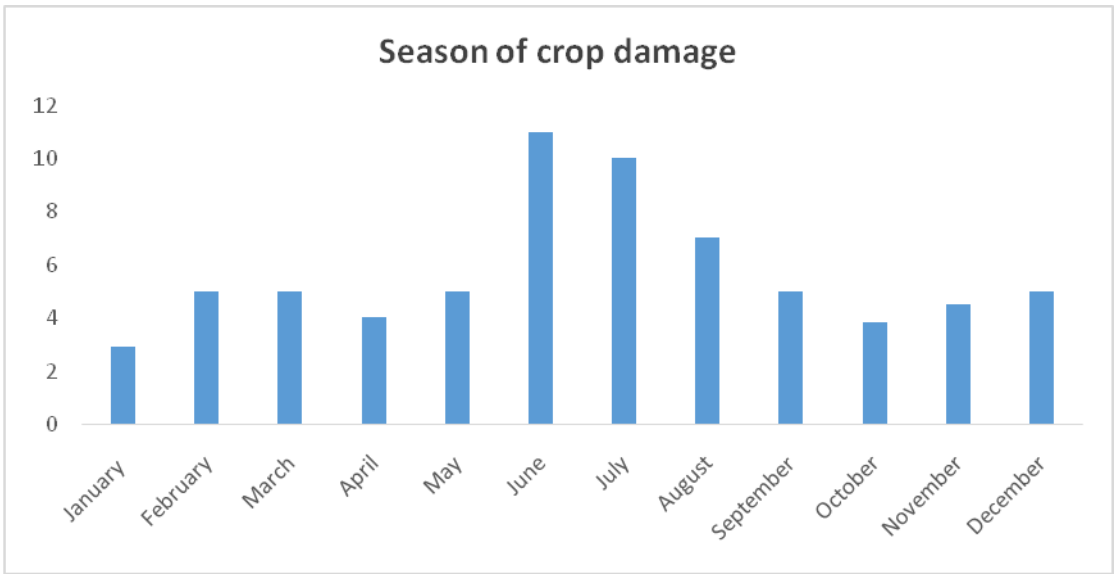


Fig 6 : Season of crop damage Bonnet Macaque

Macaques damage crop more in the month of June and July because of heavy rain in the study area and sacrecity of food inside the forest makes macaques to attack on crops plants. During this month farmers plant the young saplings of agricultural crops like Arecanut, Banana, Cocoa, coffee, cordamum and coconut which also stimulate the crop raid. Crop damage starts get decreasing in the months of August, September and October. Again starts increases in November and December at that month almost all the crops get yield. Crop raid is very less noted in the month of January because at this

month almost all the crops get harvested and food availability is very less inside the crop land. Modification of crop pattern and monkey-loath crops helps to reduce the crop ride (Priston & Underdown, 2009).

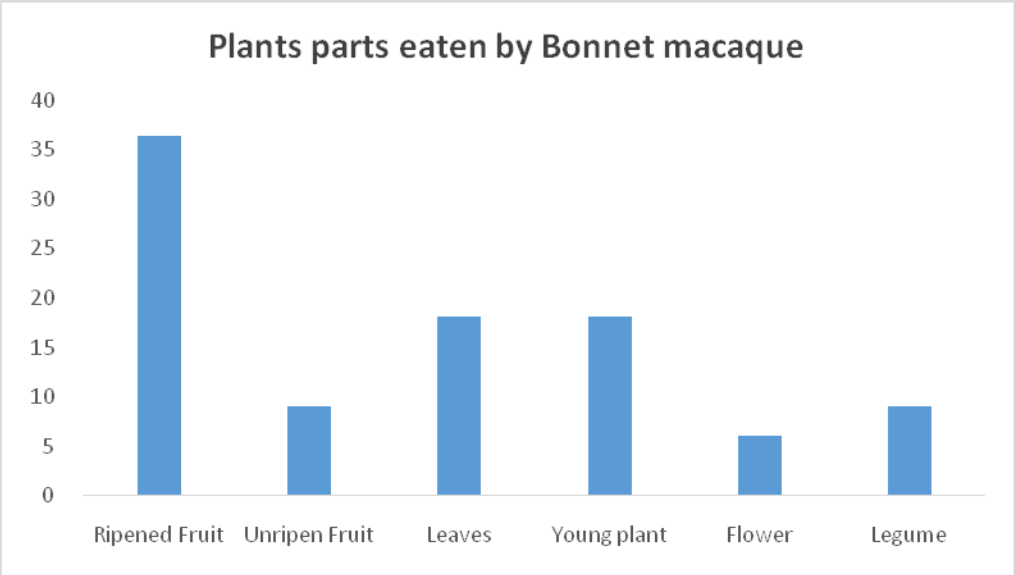
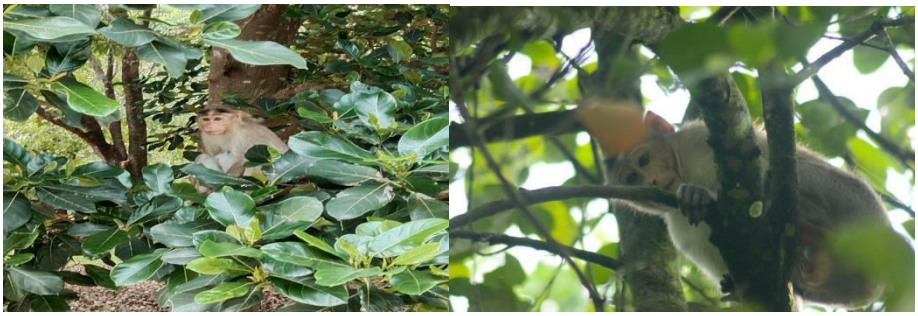


Fig 7: Parts of crop eaten by Bonnet Macaque

Banana Crop damaged by Bonnet macaque



Bonnet macaque feeding on Jack fruit

Cocoa Crop damaged by Bonnet macaque

Feeding on Arecanut **Feeding on Cordamum**

Bonnet macaques diet includes variety of things like insects, small invertebrates, eggs and small vertebrates (Alexandra 2008). According to the survey report macaques majorly select healthy and fully ripen and half ripen fruits, young leaves as well as young plants and less feed on flowers, legume and un-ripen fruits of agricultural crops were reported.

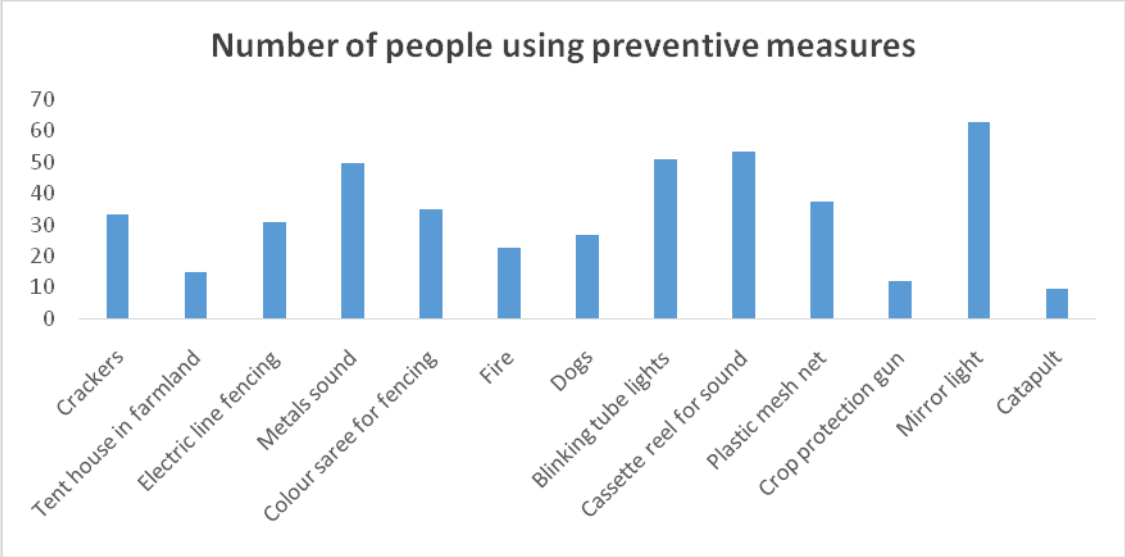


Fig 8 : The effectiveness of preventive measures used by farmers

Table 1: Preventive measures used by farmers and their effectiveness

Sl. no.	Preventive measures	Effectiveness
1	Mirror light	Very High
2	Cassette reel for sound	High
3	Blinking tube lights	High
4	Metals/ glass sound	High
5	Plastic mesh net	Moderate
6	Colour saree for fencing	Moderate
7	Crackers	Moderate
8	Electric line fencing	Moderate
9	Dogs	Low
10	Fire	Low
11	Tent house in farmland	Very low
12	Crop protection gun	Very low
13	Catapult	Very low

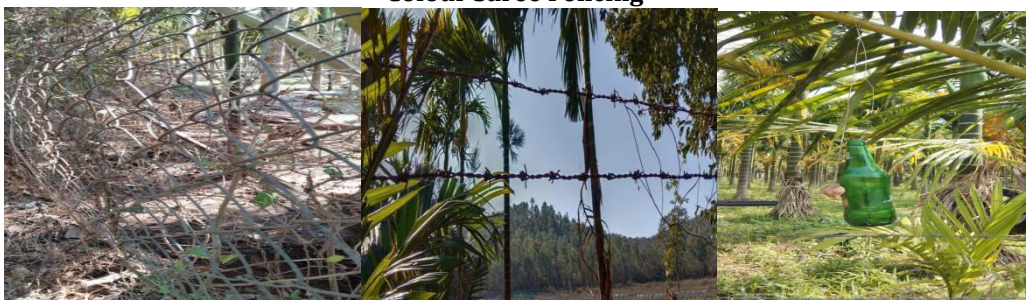
Range	Ranking
0 to 15	Very Low
16 to 30	Low
31 to 45	Moderate
46 to 60	High
61 to 75	Very High

People in the study area use different preventive measures to protect the crops from Bonnet macaque conflict. In that people use hanging mirrors in different angle around the crop land, when the sunlight falls on it light get reflected to the macaques face it scares them away this technique was more effective. Some different crop protection techniques were followed by the farmers was noted, in that use of metal or glass sounds by placing metallic plates or glass bottle and a stone tied with the threads opposite to the wind direction it produces the high intensity sound. Another one different

method they used was old cassette reels fence along with the metallic fence, when the wind blows to cassette reels produce some kind of sound which irritates the macaques. They also put blinking tube lights for every poll of IBX fence which blinks and scares the macaques as well as other species during the night also. During the study we suggested the people to use the preventive measures which are not physically biologically effect the Bonnet macaque such as thorny plant twigs. suggested to use measures only to scare the Bonnet macaque. Implementing physical barriers, noisy equipment and monkey repellents helps to reduce the conflict and crop ride (Priston & Underdown, 2009).

Shade Net Fencing

Colour Saree Fencing



Iron Net Fencing **Iron thorn Fencing** **Glass bottle sound**

The effectiveness of the preventive measures was determined according to the interview data and farmers opinion towards it. The rankings are given on the basis of number of people using it.

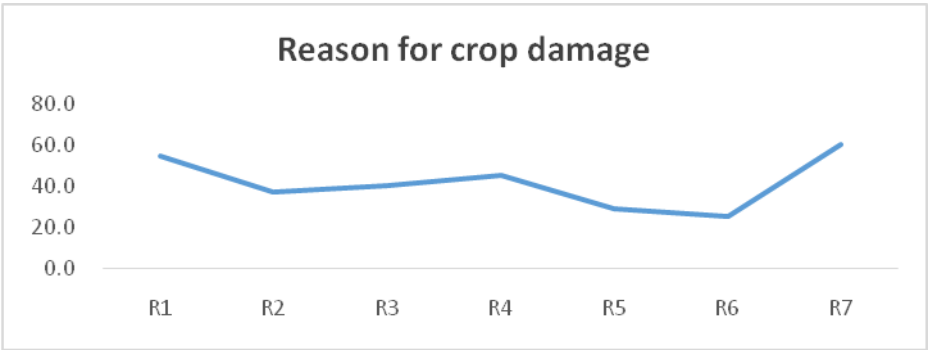


Fig 9 : The reason for crop damage by Bonnet Macaque

R1= Easy Food availability
R2= Increase in Bonnet macaque population
R3= Close forest
R4= Adaptation
R5= Poor crop protection
R6= Encroachment
R7= Variety of Food

According to the survey report the major reason for the frequent attack of Macaque to the crop land is because variety of food and easy food availability in the agricultural land. The macaques get adapted to this from many years and forest is very close to their settlements.

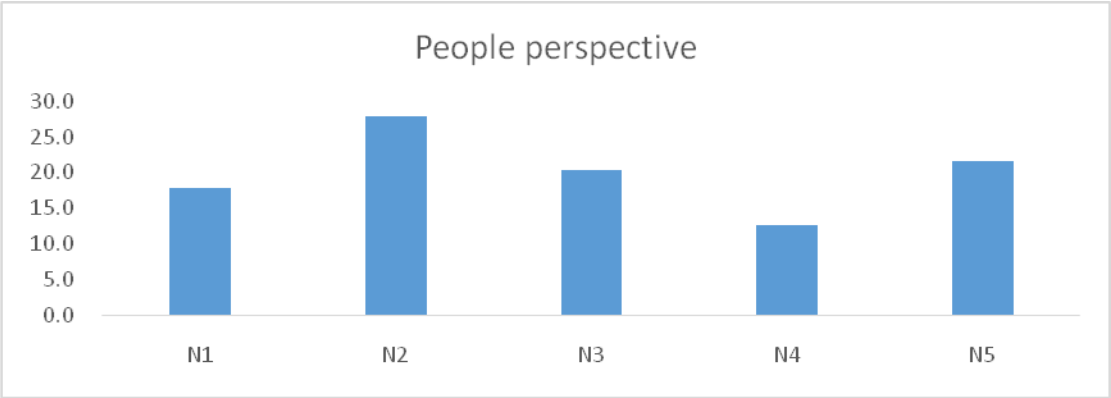


Fig 10: People perspective towards Bonnet Macaque

N1= Right to live like us
N2= Anjaneya/ Hanuma(Religious)
N3= Disperse the seeds
N4= Spread the disease
N5= Ecosystem balance

People perception is very important to determine the depth of conflict condition (Lee & Priston, 2005). Even though the macaque conflict is high in the study area people have good opinion towards Bonnet macaques they religiously treat it as god 'Anjaneya/ Hanuman' and they also believe that these macaques are very good seed dispersal agents by this way Macaque balance the ecosystem. Cultural believes in India are beneficial for primate conservation (Medhi *et al*., 2007).

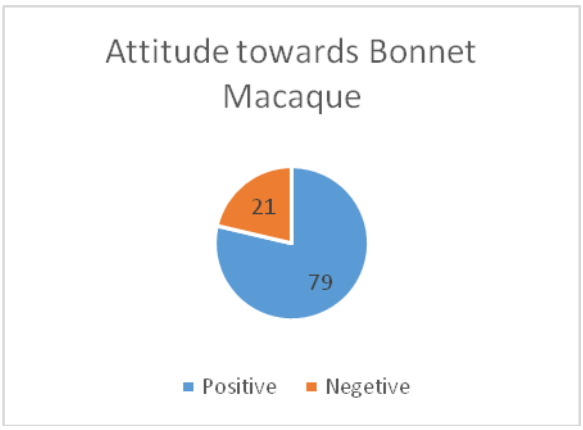


Fig 11 : People attitude towards Bonnet macaque interaction

People in the study area are facing Bonnet macaque conflict every day in their agricultural land and in their settlements but 79% of the interviewee are having positive attitude towards the Bonnet macaques and 21 % are having negative opinion on macaques.

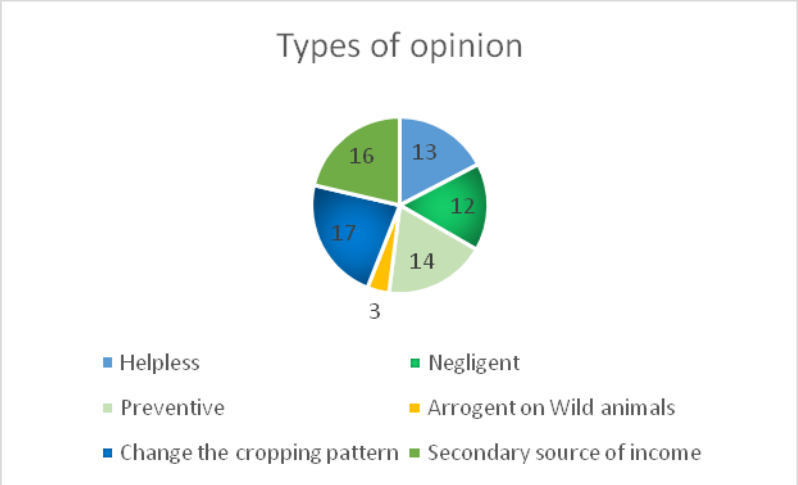


Fig12: Opinions of people towards Bonnet macaque conflict

Among those interviewed many of them were having different opinion towards the Bonnet macaque and its conflict in that 17% of the people were change their cropping pattern, 16% were depend more on the secondary source of income than

the agriculture, 14% were able to prevent the conflict and protect their agricultural crops, 13% of them were helpless conflict is more in their region and difficult to prevent for them, 12% of people were neglect the conflict and only 3% of the people were arrogant on Bonnet macaques as well as other wild animals.

4.Conclusion

Human monkey conflict represents a growing challenge, particularly in areas where expanding human populations interact with natural habitat. As urbanization and agricultural development continued to alter the landscape hence the frequency of human wildlife monkey conflict is increasing. Prioritizing the effective management strategies leads to the conservation of primates and protect the livelihood of humans. Solutions should be focusing more on ecological, social and cultural perspective which influences the sustainable human - wildlife co-existence and ensures the long term survival of both human and monkey population.

Acknowledgement

I would like to dedicate this paper for all the villagers and farmers of Huligadde grama for their valuable information.

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