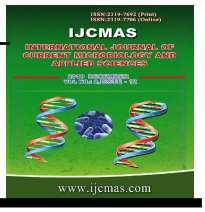
International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Volume 2 Number 12 (2013) pp. 466-475**
http://www.ijcmas.com



Original Research Article

Man - Animal conflicts in protected areas, a case study of Gaur, BosGaurus H Smith from the Mookambika wildlife sanctuary, Kollur, Karnataka, India

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Keywords

Crop damage; Bas gaurus; Man-wildlife conflict; Mookambika wildlife sanctuary.

A B S T R A C T

Crop raiding by Gaur; (Bosgaurus) was studied in aMookambika wildlife sanctuary, Kollur, Karnataka for a period of two years. Data was collected using a questionnaire in 15 villages within and around the sanctuary, followed by group discussions. Forest guards, locals, and owners of private plantations in the study area were interviewed for details on the period. Localities of crop damage, type of crop, patterns of crop depredation and economic loss caused due to Gaur in the plantations. Indirect evidences like dung, hoof marks, and damage signs were also considered. Maximum crop raiding cases were reported in the months of March, April and May i.e. during summer (56.84 per cent) and minimum cases during June, July and August i.e. during monsoons (9.79 per cent). Maximum damage was caused by a medium sized herd (9-12 individuals) and most damage was caused to paddy crop. Farms located inside the core area were the worst affected as compared to the farms located in the periphery of the sanctuary. As a crop protection strategy, maximum farmers (71 per cent) preferred manual guarding. Direct relation was observed between the climatic conditions of the park in dry months and crop raiding cases.

Introduction

Human conflict with wildlife is a significant and growing conservation problem around the world. Conservationists have long been concerned about the effects of human disturbance on wildlife (Carney and Sydeman, 1999). Wild animals causing damage in protected areas are not uncommon and are often major reasons for serious man-wildlife conflicts. The risk of wildlife damage to crops, livestock, and human lives provides incentives for rural residents to kill wildlife and to reduce the quantity and quality of habitat on private and communal lands.

Crop raid by different wild animals in particular mammals, like Elephant *(Elephasmaximus)*,Gaur *(Bosgaurus)*, Blue bull *(Boselaphustragocamelus)*, Sambar*(Cervus unicolor)*, Barking deer *(Muntiacuamuntak)*, Black buck *(Antilopecervicapra)*, Chinkara*(Gazella gazelle bennetiiy,)* Wild boar *(Susscrofa)*, Porcupine *(Hystrixindica)*, Rhinoceros *(Rhinoceros unicorniss)*, Hanuman Langur*(Semnopithecus entellus)* and Rhesus monkey *(Macacamulatta)* has been widely reported from all over the country (Prater, 1980; Schultz, 1986; Sukumar, 1990; Bohra*et al.*, 1992, Balasubramanian*et al.*, 1993; Chhangani, 1994, 2000; Ghosh, 1996; Hill, 1997; Chhangani and Mohnot: 1997, 2004, Rajpurohit and Mohnot, 1998;Sekar, 1998).

Jnawali (1989) documented very high crop losses caused by Indian one-horned, Rhinoceros *(Rhinoceros unicornis)* in Royal Chitwan National Park, Nepal. Depredation and human injuries by Elephant causing a lot of resentment and local problems in West Bengal, India was reported by Dey (1991). Similarly Johnsingh and Panwar (1992) documented the seriousness of crop damage and human injuries by wild Elephants. Studsrod and Wegge (1995) found crop and livestock depredation to be a serious problem in Royal Bardia National Park, Nepal. A collaborative study on Gaurs in West Bengal was carried out by Bhattacharya *et al.* (1997), who reported several straying cases of Gaur. They studied seasonal and spatial patterns of straying incidences with reference to crop damage and human casualties. All these studies show that wildlife-induced crop and livestock depredation is becoming a conflicting issue in villages adjacent to protected areas.

Gaurs are gregarious and known to move over-wide ranges within forested tract (Schaller, 1967; Krishnan, 1972; Conry, 1989). Being the most massive of true cattle, they have-large biomass and are, certain to play important role in the dynamics of the forest ecosystems. Gaur is listed as 'Vulnerable' according to the 2004 IUCN Red Data List, 'Endangered' by the U.S. Endangered Species Act, and is on Appendix 'I' by CITES (2003). The present work aims to study the seasonal patterns of crop damage by Gaur and the farmer's perspectives towards it in Mookambika wildlife sanctuary, Kollur, Karnataka.

Study area

The Mookambika wildlife sanctuary of Kollur region has been named after goddess Mookambika, the presiding deity of the famous Mookambika temple at Kollur located at the heart of the sanctuary. It is situated in the Kundapurataluk of Udupi district in the Karnataka state. It lies between 13^0 42' and 13^0 59' north latitude 74^0 39' and 74^0 39' to 74^0 50' east longitude. The sanctuary is spread over 247 sq.kms with 15 reserved forest units.The climate is generally is humid and warm throughout the year due to its proximity to sea and consequently under goes limited diurnal changes. Rainfall is very heavy from June to August. South west monsoon is really torrential. Rainfall is very uneven. Average rainfall is close to 6000 mm/annum. The temperature at lower elevation ranges from 10 to 35^0 C. Rivers Charka and Sowparnika drain the sanctuary. These are the perennial rivers. In addition there are a good number of stream and nalas some of which are also perennial. Rivers, stream and nalas full brim during the rainy seasons. Forest

typesin the protected area are varied and rich. The moist deciduous forests occur at lower altitudes, especially in the foot hills. West coast semi evergreen and west coast tropical evergreen forest occur at the mid altitudes and while, typical shoal grass land vegetation is found at higher altitude. The dominant vegetation types include *Terminaliapaniculata, Dalbergia, Strobilanthes* sp*, Myristica fragrans, Calycopteris floribunda, Callophylum inophylum, Careya arborea, Grewia polygama* mixed with *Calamus* , *Bambus aarundinacea, Leea indica,. Xylia and Garcinia sp*.

Materials and Methods

Data on feeding behaviour was collected using focal and scan sampling techniques in which the activity of visible animals is recorded at regular intervals throughout the day from dawn to dusk -, following Altman (1974). Environmental parameters such as temperature, humidity, and rainfall were recorded. The ecological conditions like vegetation, level of water in the streams, availability of green grass were also assessed. The data was supplemented by photographic study.

Questionnaire survey at the' village and household level formed the basis of the study in which farmer's perceptions of the crop damage were considered with a view to estimating crop losses. The distance of the village (in kms) from sanctuary boundary was also taken into consideration. Data was collected during August 2010 to July 2012.

Forest guards, locals, and owners of crop fields in the study area were interviewed to ascertain the extent of perceived damage, patterns of crop depredation, time of raiding, composition of the herd, protection measures adopted by farmers were noted down. Depending on the number of individuals the herd size was categorized as: (1) Single individual; (2) Small herd:(2-8 individuals;) (3) Medium herd: (9-12 individuals;) (4) Big herd: (>12individuals)and (5) Mixed herd: (More than two herds together.) Indirect evidences like dung, hoof marks, and damage signs were also considered. Other details considered were socio-economic status of the farmers and resource dependency of the people on the sanctuary and National park.

Results and Discussion

Mookambika wildlife sanctuary**,** together have around 15 villages in and around the area. Out of these, eleven villages are located inside the Wildlife sanctuary and the rest four villages are located in lite periphery of the sanctuary. The total human population of these villages is around 2900 approximately.

The perennial rivers of the sanctuary are Chakra, Sowparnika. During the wet months *i.e.* June to February water is available in plenty. But during dry months *i.e.* March to May, most of the streams are water holes are dried up. Water is available only at certain patches of the forest and at higher elevation. Similarly the availability of green grass that is mainly consumed by herbivores decreased in summer months. Ecological conditions and environmental parameters are represented in Table 1.

Studies on feeding habits reveals that Gaur is a generalist feeder *i.e.* feeding upon variety of food items like grasses, leaves, herbs, shrubs, lowers, fruits, bark etc. Their diet also includes cultivated foods

Table.1 Ecological condition in the study Area.

Month	Average Temperature (°C)	Average Rainfall(Cms)	Grass Availability	Water Availability
January	15	-	PP	WW
February	22	-	PP	WW
March	29	-	P	W
April	31	02	P	W
May	32	09	P	W
June	30	55	PP	WW
July	20	69	PPP	WWW
August	19	64	PPP	WWW
September	20	43	PPP	WWW
October	12	12	PPP	WW
November	15	03	PP	WW
December	14	-	PP	WWW

Grass availability: P: Scanty to Nil; PP*:* Moderate; PPP; Plenty
Water availability: W: Scanty to dry; .WW: Moderate; WWW: Plenty/Heavy

Fig.1 Seasonal patterns of crop damage by Gaur

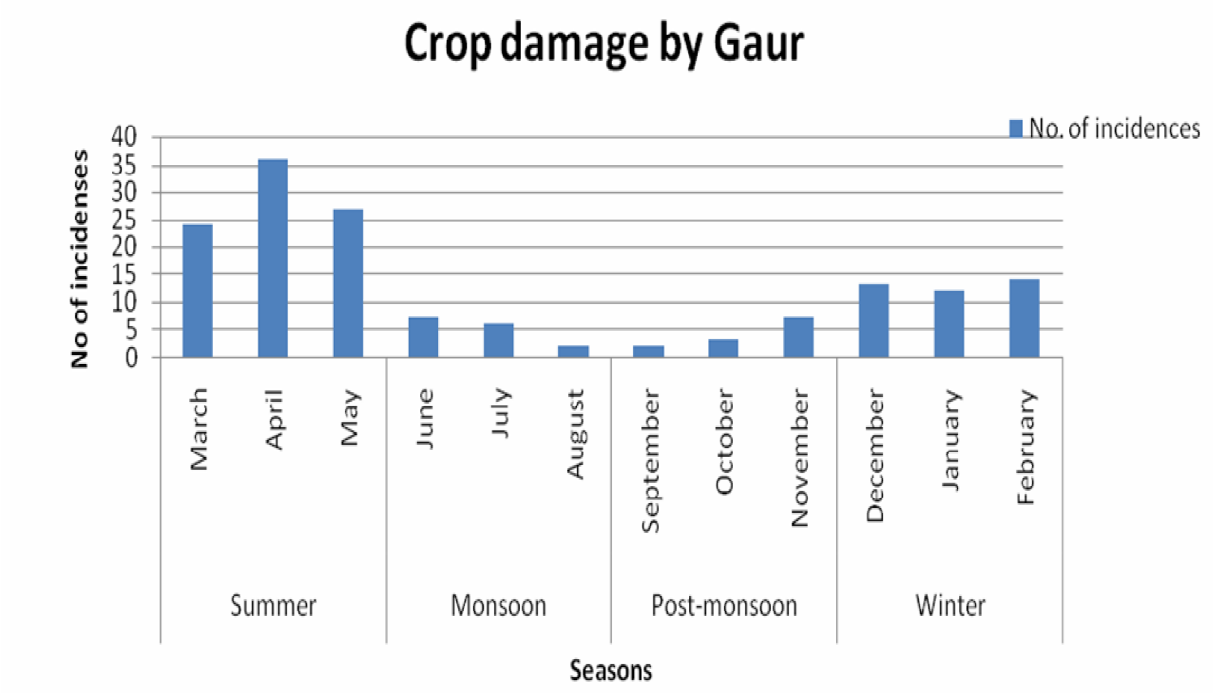


Fig.2 Crop protection measures adopted by farmers

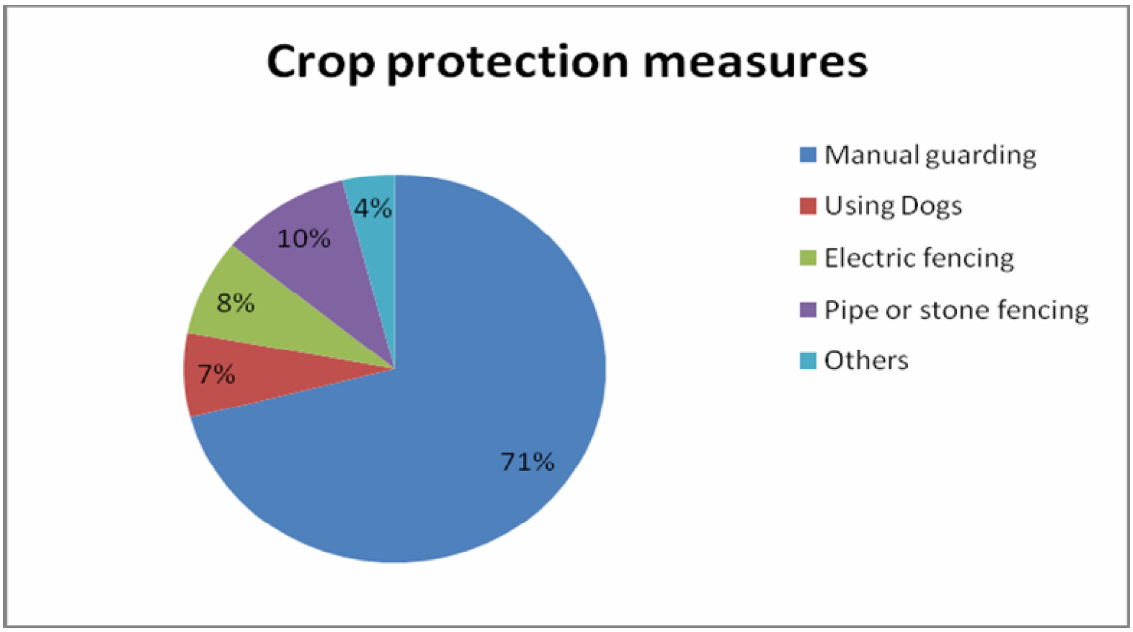


Fig.3 Composition of the Gaur herd

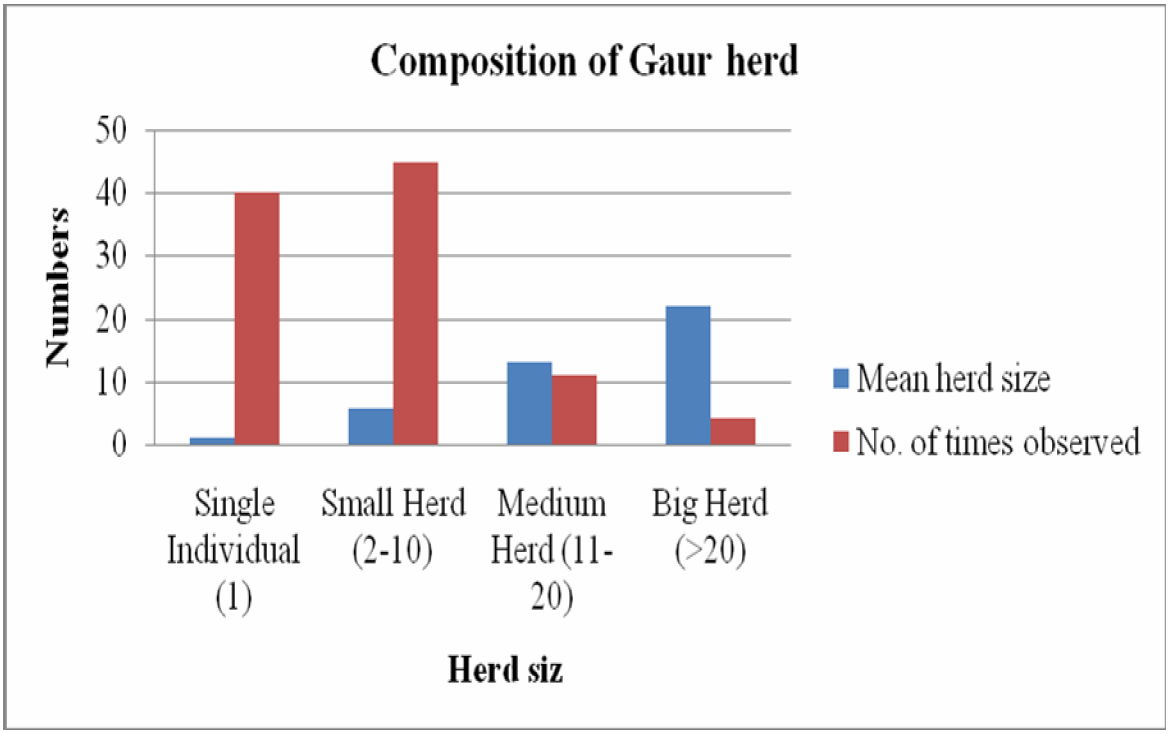


Fig.4 Crop raid by the Gaur

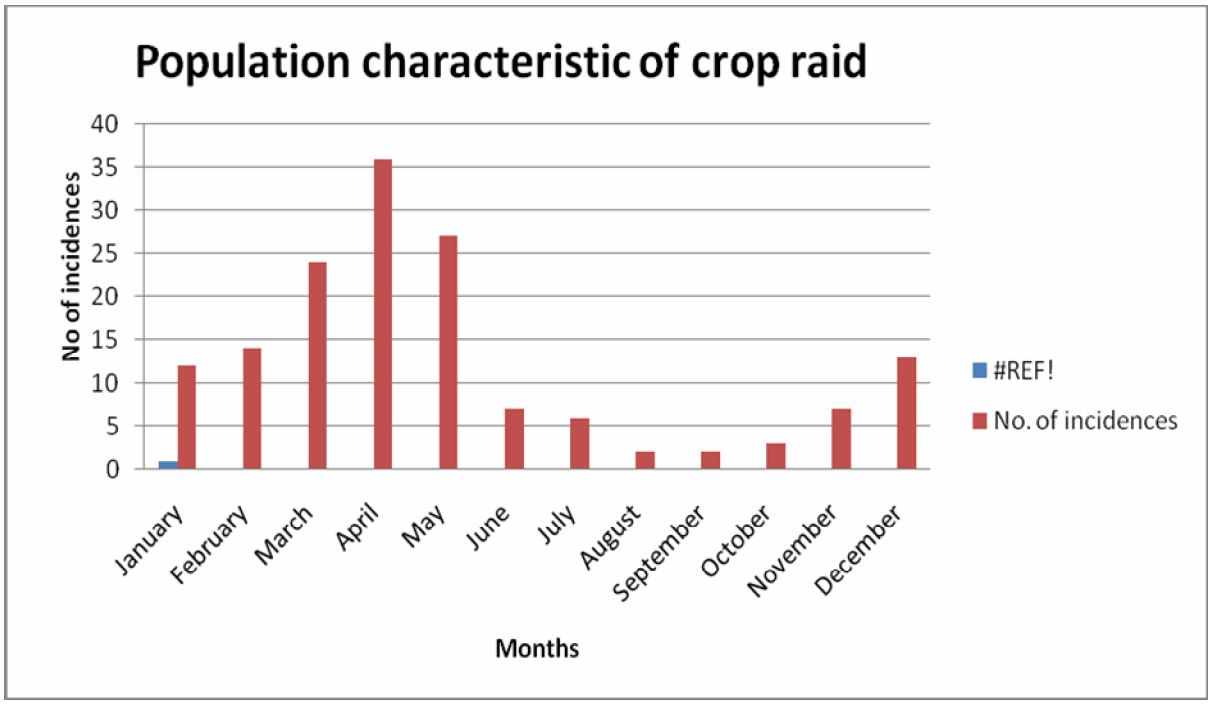


Fig.5 Behaviriol record of gaur

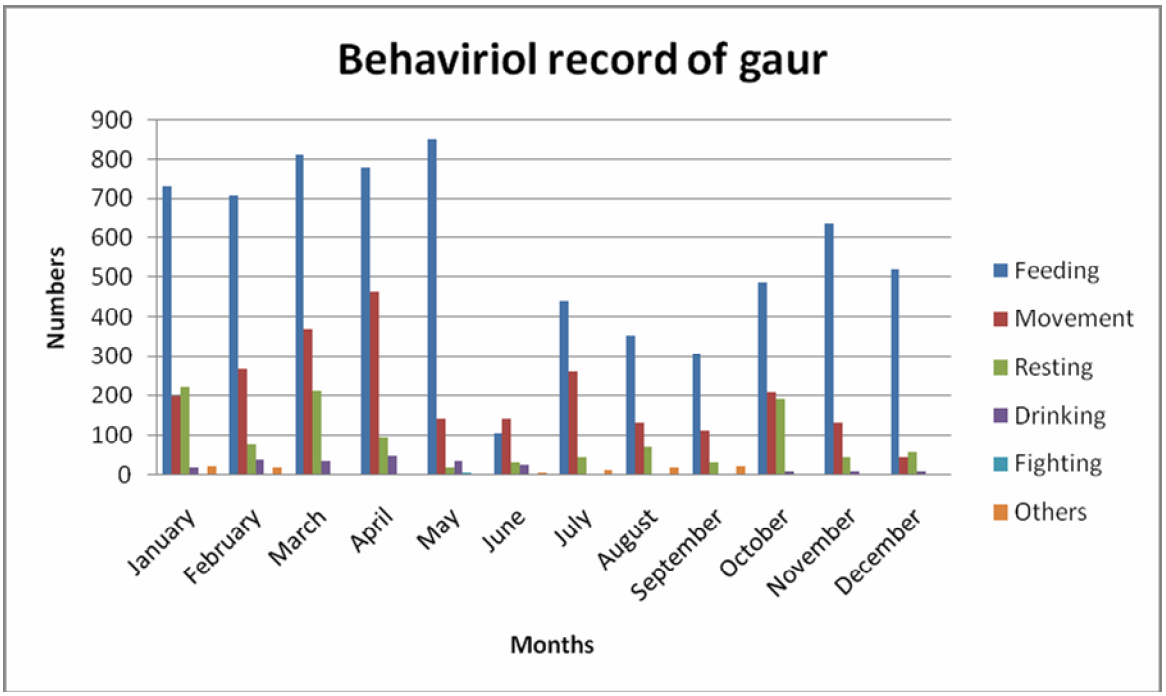
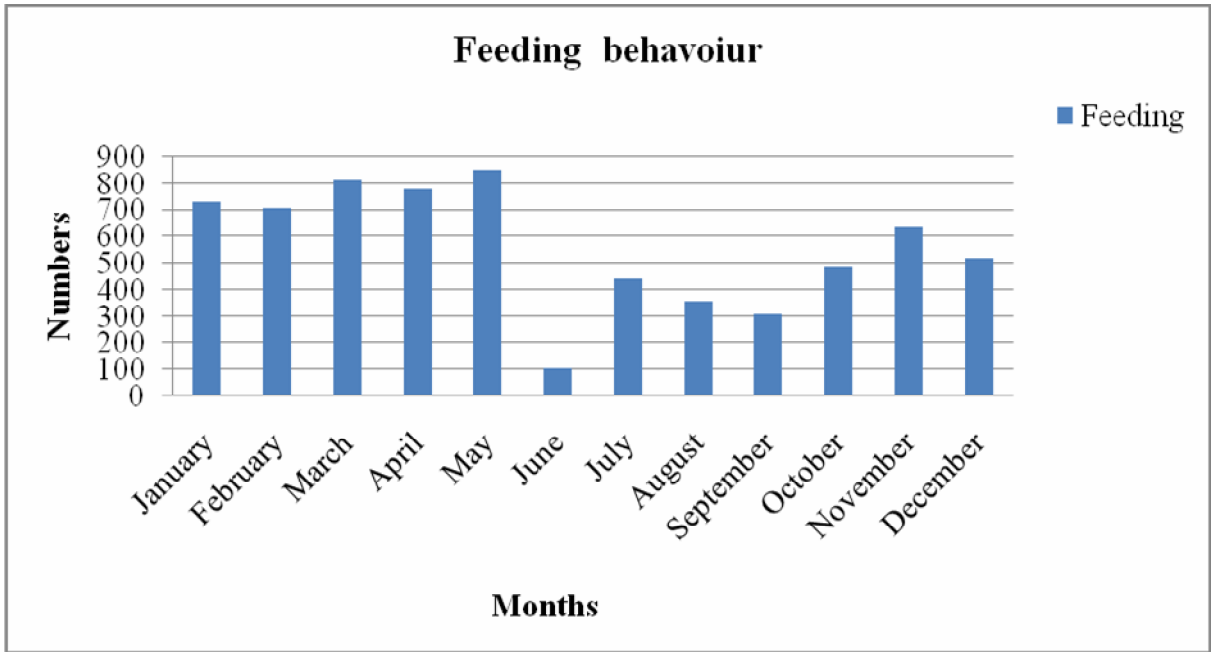


Fig.6 Monthly feeding behavior of Gaur



like tender, paddy coconut saplings etc. These animals are capable of damaging most agricultural and horticultural crops. On an average, the Gaurs of Mookambika WLS spent 41.3 per cent of their daily activity time on feeding with peak feeding in the month of October (44.2 per cent) and least in April (28.2 per cent). Altogether 80 crop-raiding cases were reported from the study area over a period of two years.

The maximum numbers of cases were reported in summer (61 per cent) and minimum in monsoon (19 percent) , with highest number of cases in the month of April (18 cases, 21 per cent). Gaurs often raid paddy crop. The owners of the farm informed that sometimes Gaur comes in big herds of 15-20 individuals to raid the crop and becomes aggressive when tried to drive away. I found that Gaurs damaged more crops by stamping or through their movement across the fields than they actually eat.

Crop Protection Strategies

Farmers use many methods to protect crop fields and orchards from wildlife. These methods include patrolling the fields or personal guarding, keeping dogs, fencing with thorny twigs etc. On the basis of questionnaires and visual observations, the methods for crop protection are calculated in percentage. The most commonly used crop protection strategy is guarding their fields by constant vigilance during night hours. This method is used by 71 per cent of the farmers in the study area. 10 per cent of field owners protect the field by pipe or stone fencing. Few farmers (about 7 percent) use dogs. 8 per cent of farmers use dangerous methods like high voltage electric fencing in which Gaurs are usually killed or seriously injured. Cases of death by electrocution have been reported in the past. While the remaining 4 per cent use other miscellaneous methods like scaring the Gaurs away, twigs and thorns fencing etc.

Gaurs of Mookambika WLS 41.3 per cent of their daily activity time in feeding; with peak feeding in October (44.3per cent) and least in April (28.2per cent). Due to high precipitation rate on account of South-West monsoon during June to September, there is good growth of green grasses and under store shrubs combined with good availability of drinking water. This makes the condition for Gaurs more suitable for foraging. October is considered as wet month with ample green grass and forage.

As the temperature increases and monsoon subsides the green grass becomes almost unavailable. The water level also goes down. Thus accounting for the least time spent on feeding in April. In the same month crop-raiding incidences was found to be highest (21 per cent). Such observations were also reported by Sekar (1998) with study on wild vertebrates in Sariska Tiger Reserve, Rajasthan.

Maximum damage was caused during dry months *i.e.* summer. The environmental conditions in dry months are characterized by unavailability of green grass decrease in water level and increase in atmospheric temperature. This might have forced the Gaurs to raid paddy crops during dry months. The crops supplement the diet thereby attracting wild animals. Thus a direct relation can be established between the crop raiding and decreasing forage condition in the park.

Chhangani and Mohnot (2004) reported that farms located adjacent to sanctuary boundary and farms with poor crop protection strategies are at most risk and suffer crop losses. In the present study, a more or less similar picture can be seen. Maximum damage was caused at Mudgalpaare beat, Chitoor beat, Jannale beat that are the villages located inside the core area away from the sanctuary boundary. Damage in Mudgalpaare beat may well be explained by its location in the core area, and surrounding hills on all sides. But villages in the periphery of the sanctuary experienced least or occasional damage by wild animals. A study by Studs rod and Wegge (1995) in Royal Bardia National Park, Nepal reported that the seriousness of crop losses varied considerably with the distance from the Parks border and specific location of households, but was also influenced by concentration of herbivore biomass.

Mammals cause severe damage to crops in many parts of the country and crop protection strategies and management tactics varies from area to area. Guarding was the most effective measure according to farmer's opinion which explains why it was popular and adopted by majority of farmers (71 per cent), although it involved hardship and time. Besides it did not involve any financial investment.

A study in Royal Bardia NP, Nepal showed that guarding was ranked by majority of farmers as the most effective measure to protect crops (Studs rod and Wegge 1995). Manual guarding as a most widely used crop protection measure was also reported by Chhangani and Mohnot (2004), and Sekar (1998). Suman Gad and S.K. Shyama (2008) Fencing was not as successful as Gaur could easily cross or stamp over. Sekar (1998) observed similar facts.

The findings of this study suggest that better conservation can be achieved through management of conflicts and providing pastures in form of grasslands to the herbivores so that grass is available year round to minimize crop-raiding cases. Measures taken up by management can

provide remedies to reduce people-wildlife conflict. Human-wildlife conflict is an important threat to the survival of many species and requires innovative, practical and cost-effective solutions.

Acknowledgement

We wish to thank the Forest department Government of Karnataka, PCCF (Head), PCCF (wildlife),CCF's, DCF's of that concerned circle, and division and the all the official staff and nonofficial for permitting and helping to carry out the research.

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