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Short Communication

Study of man-monkey conflict and its management in Jodhpur, Rajasthan (India)

Goutam Sharma*, Chena Ram, Devilal and L. S. Rajpurohit

Animal Behaviour Unit, Department of Zoology, Jai Narain Vyas (J. N. V.) University, Jodhpur, India.

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Human population growth and activities like deforestation, agriculture and urbanization lead to an ever-increasing encroachment of wildlife habitats. Reduction of wild animals' natural habitats altered into small marginal patches. Observations were scored who initiated the interaction (human or Hanuman langurs), the noted age classes and sex of the human and the langur, the density of people around the interacting individuals, the minimum distance between them, the interaction type, if food was present and if or how the langurs eventually obtained it, if the Hanuman langurs showed aggressive behaviour, and the visitors' response to the interaction with the Hanuman langurs. We also found some differences emerged between what the visitors reported in the interviews and what we observed.

Key words: Man-monkey conflict, langur, urbanization, Jodhpur.

INTRODUCTION

Man-monkey association is as old as man's own existence. Of nearly 225 living species of non-human primates, three Indian species have become urbanized. They are the rhesus macaque (*Macaca mulatta*), the bonnet macaque (*Macaca radiata*) and the Hanuman langur (*Semnopithecus entellus*). Human population growth and activities like deforestation, agriculture and urbanization lead to an ever-increasing encroachment on wildlife habitats. Reduction of wild animals' natural habitats altered into small marginal patches. In contrast, species with a high degree of flexibility can adapt to living in, or near, areas inhabited by man, where in some cases they end up using easily accessible food resources, like human cultivations and garbage (primates, see Box, 1991; coyotes, (Ellins et al., 1983) birds and small mammals, (Diamond, 1986; Gabrey, 1997) hooded crows, see Vuorisalo et al., 2003). Conflicts often occur when non-human primates raid crops (Forthman, 1986; Siex and Struhsaker, 1999; Hill, 2000) or when humans provision groups of primates (for example, *S. entellus*, Hrdy, 1977; *Macaca sylvanus*, O'Leary and Fa, 1993; *M. radiata*, Schlotterhausen, 1998; *M. mulatta,* Gupta, 2002). Moreover, increasingly more primates worldwide are creating problems by supplementing their natural diet with food stolen from people or with garbage found around forest reserves, picnic sites and suburban areas. In the latter cases, monkeys have reduced fear and sometimes become aggressive towards humans.

In the Indian context the man-monkey relationship is remarkable. On one side people consume blood and flesh of monkeys as medicines, trap, kill and eat them as food, on the other side people keep them as pets, trained them to play, feed and protect them (Rajpurohit et al., 2006). Urbanized populations are provisioned frequently due to religious sentiment of people. So human attitude towards monkey differ from area to area and species to species. Likewise, monkeys are not liked in the areas of massive agriculture, horticulture and other plantations since they said and damage the crops and orchards. In such areas they are considered pests (Roonwal and Mohnot, 1977). In yet another situation monkeys have become commensals and competitors of human being in and around villages, towns and cities. These are "Urbanized monkeys" (Rajpurohit et al., 2006).

MATERIALS AND METHODS

Study area

The study was conducted in and around Jodhpur. The Jodhpur city (altitude 241 m, 26 18' N and 73 08' E) is situated on the eastern edge of the Great Indian Desert. In its vicinity, a 26 km long

*Corresponding author. E-mail: -gautam_234746@yahoo.co.in.

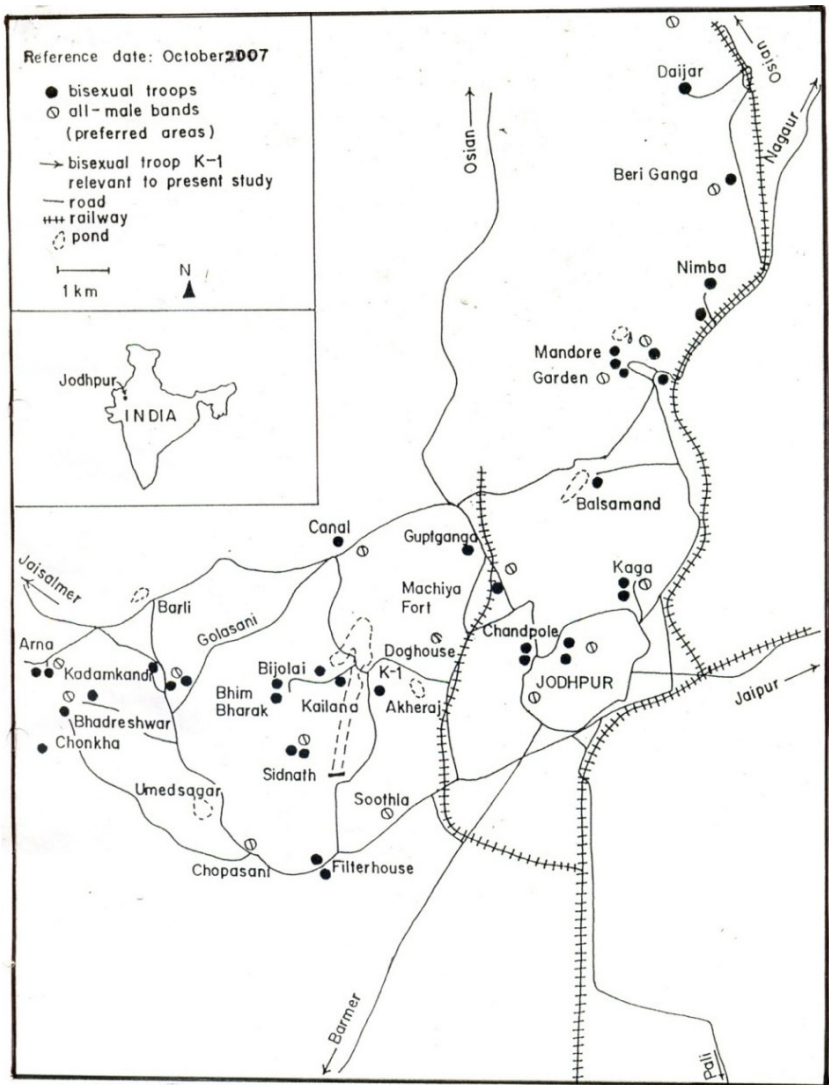

Figure 1. Location of bisexual troops and all-male bands around Jodhpur.

diagonal ridge runs from the village Arna in the west to Daijar in the Northeast passing through the Jodhpur fort. This ridge forms a plateau with an area of about 150 km^2 reaching a maximum width of 5 to 6 km (Figure 1). The area is covered with open scrub dominated by *Euphorbia caducifolia* and *Anagysus pendula* in the rocky and *Prosopis juliflora*, *P. cineraria*, *Acacia senegal* and *Ziziphus numilaria* on the plains (Mohnot, 1974 and Winkler, 1981). There are numerous irrigated fields and parks in the area. The langurs feed on about 240 natural and cultivated plant species.

Study animal

The study was conducted in Hanuman langur (*S. entellus*) which is the best studied and most adaptable South Asian Colobine. The Hanuman langur (*S. entellus*) is the best studied and most adaptable South Asian Colobine. The species has a highly variable social organization. The two basic types of social groups are bisexual troops and all-male bands. The bisexual troops are matrilineal groups of adult females and offsprings with either one adult male (unimale bisexual troops) or more than one adult male (multimale troops). The percentage of unimale troops versus multimale troops and the corresponding number of extra troop band males, varies from site to site (Newton, 1988). The unimale bisexual troops are predominant around Jodhpur where besides temporary multimale situation during male band invasion, in 99% the reproductive social units are one-male bisexual troops or harems (Mohnot, 1974; Rajpurohit, 1987; Rajpurohit, L.S. 2010; Sommer and Rajpurohit, 1989).

The langurs feed on about 208 natural and cultivated plant species (Mohnot, 1974; Winkler, 1981). For religious reasons local people provision most of the langur groups with wheat preparations, vegetables, fruits and nuts. Some groups raid crops and orchards in the area (Mohnot, 1971), but because they are considered sacred, never been hunted. Apart from feral dogs, there are no natural predators. The animals are easy to observe since they are not shy and spend most of the daytime on the ground.

RESULTS

At the time of provisioning and chasing them away from gardens and orchards or crop fields adult humans

interacted more than the other age classes, while adult and young Hanuman langurs were involved in a greater percentage of interactions, also youngsters participated in many interactions. The infant langur are dependent on mothers, living in close proximity to them, and therefore rarely approach human beings. For what concerns humans, on the other hand, we would have expected more interactions involving children, because of the natural attraction that children have towards animals. In contrast, our findings show that most of the interactions of Hanuman langur with children were mediated by adults that typically encouraged children to approach or feed the monkeys. In the majority of interactions, Hanuman langurs and visitors were found standing within the distance of a meter or less.

This clearly indicates that Hanuman langurs are accustomed to proximity with humans, and that they do not fear of them. Hanuman langurs have gradually learnt that proximity to human beings can be advantageous since they can receive food, or increase their chances of stealing it. Humans are indeed attracted to the monkeys, but do not seem to understand the meaning of their facial expressions, vocalizations and body postures. Visitors' responses to interaction with the monkeys were mainly classified as positive or neutral. These neutral responses occurred mainly when the visitors handed, threw, or left food for the monkeys; in these cases it looked as if feeding the monkeys was something very natural.

DISCUSSION

Any adaptation in primates including man that may have arisen in response to true urbanization must have been acquired within the last 10 to 12 thousand years or so, when man started becoming urban as cities began to arise. The urbanization of the only known two fully urbanized non-human primates (that is rhesus and bonnet mecaques) took place in India. These two, and a third the Hanuman langur (also Indian) have become an intimate part of the Hindu culture of tolerance (Roonwal, 1977). It is obvions that, within a species urbanization did not occur just once, but several times (and step by step). As a small village become a town and a city, neighboring groups gradually become adopted to live in urban conditions was acquired new habits and behavior patterns. This process was repeated for another city and for new population graups, and so on.

The so called urbanized non-human primates (that is rhesus and bonnet meaques and Hanuman langurs) are always a nuisance, and also damage crops and orchards. The Hindu belief in the sacredness of all life and the weaving of monkeys into ancient Hindu mythology and literature have helped to create a climate of tolerance. Man has of course, played a direct and important role. However, all primates do not have the same capacity to become urbanized. This is clear in case of Hanuman langur. For centuries it has had the some opportunities as the rhesus and the bonnet macaques, but has never become fully urbanized as these two macaque species.

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