Status and Conservation of Rhesus Macaque (*Macaca mulatta)* in Chakrashila Wildlife Sanctuary, Assam, India.

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Abstract.

Rhesus macaque (*Macaca mulatta*) has a wide and cosmopolitan distribution. Commensal populations of *Macaca mulatta* are much familiar while its wild populations are declining rapidly. We conducted a survey on Rhesus macaque in the Chakrashila Wildlife Sanctuary of Assam from December 2006 and January 2007 and collected demographic data of Rhesus macaque by using modified line transect method. A total of 445 individuals in 21 groups were counted through direct sighting in the sanctuary. The average group size ranged from 8 to 40 individuals with a mean size of 21.2. The age structure of the population was represented by 49.43% adult, 30.33% juvenile and 20.22% infant. The adult male and female sex ratio was 1: 1.53 while the ratio of the adult female and infant was 1: 1.18, while the ratio of the adult female and infant was 1: 0.89. Conflicts with man and his pets (domestic dog, *Canis familiaris*) and habitat destruction through illegal felling were found to be the major threats in this protected habitat. From conservation perspective the issue of man-macaque conflict needs special attention.

Key words: Rhesus macaque, *Macaca mulatta*, status, Chakrashila Wildlife Sanctuary and Man-macaque conflict.

Introduction.

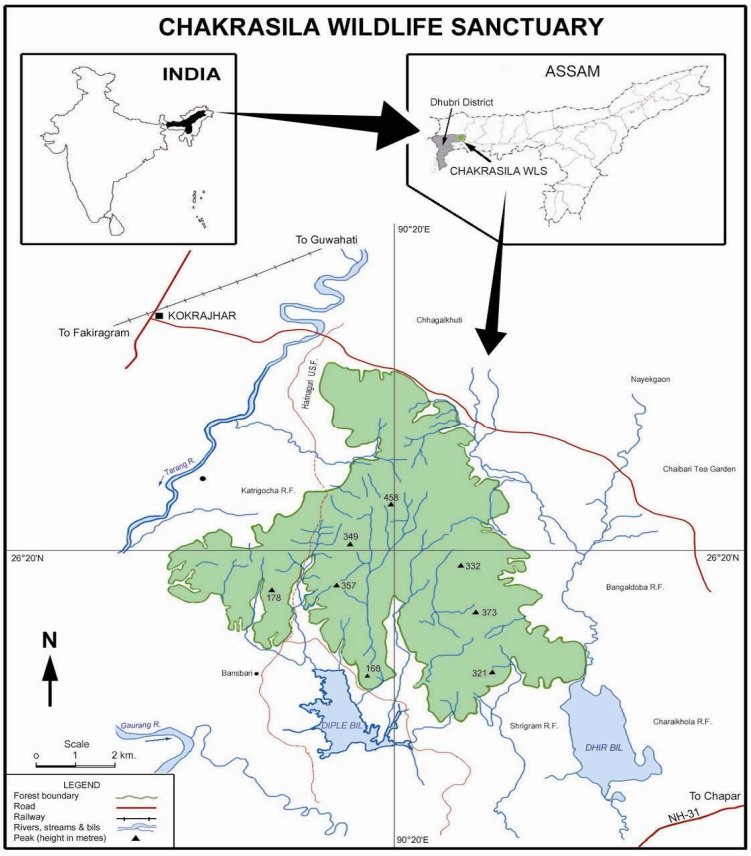
The mega-biodievsrity country, India supports eight species of macaque out of the total ten species of macaques occur in south Asia. Among all, Rhesus macaque(*Macaca mulatta*) is the most widely distributed species in India. Afghanistan, Pakistan, Nepal, Bhutan, Myanmar, Bangladesh, China, Thailand , Cambodia , Vietnam and Laos are the other habitat countries of Rhesus macaque (Tiwari and Mukherjee, 1992). This species shows a wide and cosmopolitan distribution and ranges from the sea level in Sundarbans to the 4000m altitude in the Himalayas. They are highly adaptable to human proximity and often occur in villages and towns (Southwick *et al*., 1983). The species is thus very much familiar compared to other sympatric congeneric species. The northeast region of India which supports the highest diversity of macaques in the country is also a stronghold of Rhesus macaque. Yet there is very few information about the status of the species in various protected areas in India. The Rhesus macaque (*Macaca mulatta*) which is a "Least Concern" species (IUCN,2012) has been put in the Schedule-II category by the Wildlife (Protection) Act of India, 1972 (amended upto 2002). The endangered and

charismatic primate species of the region like Hoolock gibbon (*Hoolock hoolock* and *Hoolock leuconedys*) and Golden langur (*Trachypithecus geei*) have got maximum attention in all the recent distributional and demographic studies (Chetry *et al* 2007;Srivastava *et al*, 2001a,b; Medhi *et al*., 2004; Chetry *et al.*, 2008, Ghosh 2009; Chetry & Chetry, 2009). However, Medhi *et al*., (2007) highlighted the status and distribution of Rhesus macaque populations in temples of northeast India. This shows the dearth of information on the status of Rhesus macaque and the precocity of information is really alarming as far as conservation of wild forest population of the species is concerned (Srivastava, 1999). In this background we have for the first time assessed the status of Rhesus macaque in the Chakrashila wildlife sanctuary in the state of Assam, India during December 2006 to January 2007.

Materials and methods.

Study site

Chakrashila Wildlife sanctuary covers an area 45 km^2 and lies between 26°15′ and 26°26′N and 90°15′ and 90°20′E. The terrain is hilly, covered with dense forest, mostly semi-evergreen and moist deciduous. Two perennial streams, Howhowi Jhora and Bamuni Jhora, cut across the Sanctuary and act as sources of water for the wildlife therein.



Modified line transects method (Burnham *et al* 1980; NRC,1981, Struhsaker 1997) was used depending upon the habitat and the forest condition . 12 transects with a total length of 111 km were laid in a stratified random manner to cover all representative areas of the wildlife sanctuary (Mueller-Dombois *et.al.*1974, Kent *et al*., 1994). Three observers walked randomly through existing forest trails and occasionally without forest tracts covering on an average of 11 kms per day. The walk transect was initiated in the morning and terminated in the evening. The observer walked slowly through the transect pausing at regular intervals of 500m. On sighting primates, the GPS co-ordinates, altitude, group structure and individual detail like age, sex and number of individuals were recorded.
At every 500m intervals and at each location where primates were encountered, the observers estimated the tree height, canopy cover, ground cover, dominant tree, and shrub and herb species within an area of 10m radiuses. Observers also took notes on the evidences and degree of grazing and logging in the study area. Some related information was also gathered by interviewing local villagers.

Results and Discussion

i. Population status: During the survey period we encountered 445 individuals in 21 groups in the Chakrashila Wildlife Sanctuary through direct sighting. The estimated population of Rhesus macaque was about 953 individuals.

ii. Population distribution: The survey covered 111km of transects in various parts of the sanctuary and recorded distribution of Rhesus macaque within an altitudinal range of 101ft to 940ft in the sanctuary. A detail of the altitudinal range is given in the Table 1.

S.No	GPS co-ordination		Altitude (ft)	Locality
1	N 26 16′888″	E90 20′826″	126	Jornagra
2	N26 18′124″	E90 21′355″	940	Bamunsuli
3	N26 18′035″	E90 20′691″	539	Jornagra
4	N26 17′325″	E90 20′836″	236	Jornagra
5	N26 18′105″	E90 21		

Table: I: Sighting locations of Rhesus macaque in Chakrashila

iii. Group size and age-composition: The group structure and composition of the directly sighted groups are shown in Table –II. The average group size was 21.2, ranging from 8 to 40 individuals. Most of the groups (52.38%) were observed with 10-20 individuals while 38.09% groups had individuals above 20. Only 9.52% groups had less than 10 individuals. Of the total population 49.43% were adults, 30.33 % were juveniles and infants constituted the rest 20.22 %. The ratio of the adult male and female was 1:1.53.

Table-II: Group size and age-sex composition

Area	Group Composition							Total	Grand total	Estimated Population
	AM	AF	A?	JM	JF	J?	I?			
Chakrashila	5	10	-	-	5	5	10	35	445	953
	5	6	4	-	3	7	5	30		
	2	2	-	-	-	3	1	8		
	2	3	2	3	-	4	4	18		
	3	3	-	-	-	6	3	15		
	5	5	6	-	-	1	5	22		
	5	5	5	-	-	10	5	30		
	2	4	2	-	-	2	2	12		
	10	7	1	-	-	10	7	35		
	5	7	1	-	-	10	4	27		
	3	4	2	2	-	2	2	15		
	3	6	2	-	1	3	5	20		
	6	9	3	-	-	4	8	30		
	2	3	-	-	-	4	3	12		
	3	2	2	-	3	7	2	19		
	2	1	-	-	-	3	1	7		
	2	3	-	-	-	6	3	14		
	1	4	3	2	1	2	4	17		
	5	6	-	-	-	3	6	20		
	5	6	-	-	-	4	5	20		
	9	5	1	-	9	10	5	39		

AM=Adult male;AF=Adult female; JM= Juvenile male ;JF=Juvenile female J? = Unidentified Juvenile; I? = Unidentified infant

iv. Threats: During survey we also identified the threats for Rhesus macaque and other wildlife of the sanctuary. We have identified the following threats:-

a. **Man-monkey conflict:** Man-rhesus macaque conflict is found to be the major threat. Rhesus macaque groups living in the fringe areas of the sanctuary often raid crops. Macaques cause maximum damage to the paddy crops (*Oryza sativa*). Besides paddy, they also damage cash-crops such as mustard (*Brassica campestris*), maize (*Zea mays*) and vegetables like – potato (*Solanum tuberosum*), brinjal (Solanum melangena), cabbage (*Brassica oleracea var capitata*) and gourd (*Lagenaria siceraria*). They also raid mango (*Mangifera indica*), jackfruit (*Artocarpus heterophyllus*), papaya (*Carica papaya*) and other fruiting trees. In retaliation householders keep domestic dogs in the field to keep away the macaques. Every year 8-10 macaques fall prey to the domestic dogs engaged in vigilance duty of the crop field. These death records often go unreported. The

golden langur, which is sympatric to rhesus macaque in the sanctuary, has to bear the negative impacts in midst of all these conflict between man-rhesus macaque. As a matter of fact the dogs which are kept to chase away the rhesus macaque often kill golden langurs as well. Villagers reported that rhesus macaques used to raid the field whenever crops are available. However, the raiding peak was during the winter, which coincided with the harvesting time of paddy. Their attitude to rhesus macaque is negative mainly because of the economic damages they inflicted upon. The villagers are of the opinion that habitat destruction and degradation have resulted in increased human-monkey conflict.

b. **Hunting:** Hunting is not the major threat because traditionally the fringe communities of the Chakrashila wildlife sanctuary do not hunt. However, the species is occasionally hunted as agricultural pest. Nowadays a section of people hunts rhesus macaque for meat.
c. **Encroachment:** The encroachment of forest land for human settlement and for agricultural activities had been observed during the survey.

d. **Selective logging:** Illegal felling of selective trees was also observed during the survey. Many hand sawing spots were encountered during the survey.
e. **Collection of Non Timber Forest products:** Extraction of non timber product like cane, bamboo and medicinal plants is a common practice among the local community.

The study encountered 445 individuals in 21 groups in and around the sanctuary through direct sighting. The altitudinal range of distribution was between 101 ft to 940ft. Chetry and Chetry (2007) recorded an altitudinal range of 111 to 1367ft for golden langur which is sympatric to rhesus macaque in the sanctuary. This shows that rhesus macaque inhabits mainly the forest edge. Southwick *et a*l., (1983) also reported that the species is more common in villages and towns than in forest. According to Srivastava (1999) rhesus macaque is less common in the forests of northeast India. Again occurrence of 50% immature in the current population of rhesus macaque in the sanctuary is an indication of healthy and growing population. Because for long-term maintenance of population 50% immature are necessary in rhesus macaques (Southwick and Siddiqi , 1977, Southwick *et al.*, 1980, 1982 and Teas *et al.,* 1980). Similarly, Kurup (1984) reported the declining trend of Hanuman langur population in Southern India from a demographic study where immature constituted less than 50%. The study has also registered a number of threats in the form of man-macaque conflict, domestic dog, collection of NTFP, illegal logging and hunting towards the conservation of wildlife including rhesus macaque in the sanctuary. Chetry *et al*., (2005) and Chetry and Chetry (2009) has also identified domestic dog as threat to golden langur. In general threats related with the conservation of Rhesus macaque are often not taken seriously because of the least concerned status of the species. However, all these threats especially the issue of man-macaque conflict cannot be overlooked in Chakrashila wildlife sanctuary where the conservation of endangered golden langur may be jeopardize. The issue should be considered with a new perspective and effective steps should be taken so that man-macaque conflict does not increase over time. The conflict generates negative feelings in the minds of fringe people towards primate in general and rhesus macaque in particular (Ghosh, 2009) and current study also supports this view. The changing attitude on the part of the people is often bears

detrimental consequences as far conservation is concerned (Medhi *et al.*, 2007). Moreover, if habitat loss can not be checked then indirectly it may compel golden langur which is traditionally not a raider to invade crop field. Therefore, though a least concerned species the conservation aspects related with rhesus macaque should be seriously taken into consideration in Chakrashila Wildlife Sanctuary, keeping in mind the conservation of the golden langur.

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