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Diet and Feeding Behaviour of Rhesus Macaque at Navagraha Temple, Kamrup district of Assam



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Abstract

The Primates around the world have unique variety of food source and they specially depend upon the plant parts and the vegetation in an area specific. These non human primates seem to be much more dependent upon the leaves of the food plants. These macaques in temples are very much disturbed by the human activities mostly during worshipping in the temples.

They depended upon natural food upto 70%. These primates are choosy of nutritious food and are very much fond of seeds, leaves and bulbs of monocotyledon plants. Also, this primate responds to the temple environments very much. As per our study during the 12 hour day time period for 2-4 hrs they are suppose to be deal with the provision foods.

The temple primates are disappearing, they are neglected and they are harmed by the food supplied by the devotees. The macaques were provisioned with many kinds of foods like chips, biscuits etc. At Navagraha temple the rhesus macaques were provided with banana, snacks like chips, biscuits, cakes. It has been found that visitors always feed on Snacks. And in the due course of time they have developed the preference for the human provisioned food during the day hours and sometimes it leads to conflict between Primates and human. Also, the snatching of food offerings for worship seems to be most common incidents.

Keywords: Navagraha, Temple Primates, Macaques, Provisioned Food, Anthropogenic.

Introduction

Mostly temple primates are dependents upon mixed food stuffs primarily leaves, twigs, fruits and seeds. The diet of these temple primates are region specific. In different region of the area their food plants are also distributed and during the day hours from morning they seems to be move in group in search of their food i.e. leaves, twigs, seeds. In forest they are fully depended upon the vegetation cover they have but in temples they are dependents upon the trees that dominantly found and if there is any food plant planted for their diet. The human provisioned diets are highly nutritious also they contain various chemicals which may alter their metabolic activity of the body. It may change their nutrient absorption rate, time and behavior. The insectivorous natures of macaques are also commonly seen in forest dwellers. In temple primates the insectivores nature seems to be less as they are busy with the provisioned foods. So, the macaque seems to be less energy uptakes with respect to the natural habitats and it is very important to increase the food plants of these temple primates.

The diet of these temple primates are the leaves of the plants, fruits and seeds. These macaques living in temples are mainly dependents upon the provisioned food provided by the humans who visited and the people of nearby temples. People usually provide during the day hours and the people living in the temple itself provides them some amount of fruits and other foods. But they are mostly harmed by the food provided by the visitors which also comprises biscuits and chips.

Aim of the Study

1. To study the feeding behavior of Rhesus Macaque in temples.
2. To identify the food plants and diets of Rhesus macaque at Navagraha temple.

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3. To study the usage of provisioned food by Rhesus macaque in temples.

Review of Literature

A balanced diet is important for the survival of a species, which provides essential nutrients. The diets of primates are very important as their metabolism is very fast. Because of their arboreal nature energy loss is very high and to compensate the loss it is very important to maintain their primary diet. It is depended upon their body size and weight. Major differences in diet and feeding ecology of primates are determined by variables such as body size energetic (Demes et al., 1984; Smith, 1984 and Maier, 1984). Also, age & sex determines the nutrient requirements (Chivers and Hladik, 1984). Different types of food they are eating also the part of their growth pattern (Ripley, 1970). The feeding behavior of many species is also changes seasonally in response to the availability of preferred food items and resources (Terborgh, 1983). There are variety of food in the evergreen and semi-evergreen forests and also in rural areas of south and Southeast Asia. Trees are the main source from which the macaques and other primates collect all plant parts (e.g. fruits, leaves, flowers, bark etc).

India is considered as the core habitat of Rhesus monkeys. It is distributed throughout the northern, central India. The wide variety of habitat including tropical moist deciduous forest to sub tropical pine belt of sub-Himalayas, semi desert of Rajasthan, West Bengal (Prakash and Krishna 1960; Mandal 1964; Mukherjee and Gupta 1965; Nevelle 1968; Imam-2000). In India, they are found on roadsides, railway stations, villages, towns and temples. In 1979 the Zoological survey of India estimated the total rhesus populations to be 183,000. Rhesus macaques were once seriously threatened by the capture and export for use of biomedical research. Uttar Pradesh may be considered as one of the known ancient sites of rhesus monkey populations in northern India. There is no study has been done on distribution and population estimation of rhesus monkey groups in Uttar Pradesh also there is a need of studying their diet and feeding behavior. Mainly the problem of monkey related problems lies in their attempts to fetch food and space in human habitats. This is only because of destruction of forests and their natural habitats attracted by food, water. Human resort to hitting monkeys with and sometimes even shooting them in response monkey become over aggressive. They threaten people by snatching food boxes and handbags and very frequently also bite human beings. The Basistha temple, Kamakhya temple, Mahamaya temple in Assam has lot of such issues.

The state of Assam is located in northeast India, a biogeographical zone that has been classified as a 'Biodiversity Hotspot' (Myers et al. 2000). The state has high primate diversity with upto 8 species being found in the area (Gupta 2000). Of these species, the Rhesus macaque is perhaps the most common, found throughout towns, villages, temples and forests in state. It is a federally protected species in India, listed under schedule 2 of the Wildlife

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(Protection) Act 1972, and is categorized as "least concern" under the IUCN redlist assessment (IUCN, 2010).

A large number of primates live permanently in temples in Assam. As in association between monkeys and humans that is an age-old phenomenon in the region. The people of Assam have a long-standing culture of interacting with macaques. Earlier studies have identified habitat loss as the primary threat for the natural populations (Choudhury 1989, 2002; Srivastava et al. 2001; Chetry et al. 2002; Das et al. 2003). Along with habitat loss, hunting is another major threat to be primates of the region (Choudhury 1989); Chetry et al. 2003; Das et al. 2003). For temple primates it is not hunting but increased human-primate conflict that is the most critical threat. The threat is because of the insufficient supply of natural food and food plants nearby temples. It is now very important understand the Diet and feeding behavior of the species to conserve the species for future. Provisioning may also be inadvertent when farms, plantations, home gardens, waste food dumps and kitchens become sources of food for animals (Becker et al., 2015). Provisioned food resources tend to be high-calorie, easily digestible, spatio-temporally predictable and available in greater proportions than natural resources in a given area (Saj et al., 1999; Becker & Hall, 2014). Human provisioning of wildlife with food is a widespread global practice that occurs in multiple socio-cultural circumstances. Provisioning may indirectly alter ecosystem functioning through changes in the eco-ethology of animals, but few studies have quantified this aspect. Provisioning of primates by humans is known to impact their activity budgets, diets and ranging patterns. Primates are also keystone species in tropical forests through their role as seed dispersers; yet there is no information on how provisioning might affect primate ecological functions. The rhesus macaque is a major human-commensal species but is also an important seed disperser in the wild. In this study, we investigated the potential impacts of provisioning on the role of rhesus macaques as seed dispersers in the Buxa Tiger Reserve, India (Sengupta et al. 2015). Studying the behavioural flexibility and adaptability of macaques to different habitats is one approach to designing a conservation plan. To determine the activity budget and feeding behaviour and evaluate the effects of seasonality in wild and human-altered habitats of Assamese macaques (*Macaca assamensis*), the activity budget and diet composition varied in response to the season. These results indicate that provisioning alters the activity and feeding behaviour of macaques, and can also increase human-macaque conflict and disease transmission (Koirala et al. 2017).

Materials and Methodology

Primary Source

1. Data collection of diet and feeding behavior of rhesus macaque was conducted from December 2017 to May 2018.
2. Study about the group size 5 groups having member size of 3-8.
3. Dietary composition was studied by observing the type of food eaten by monkey.

Study Area

Navagraha Temple

The temple is located on the top of the Chitrasil Hill or Navagraha hill in Guwahati city. Coordinates: N 26° 19'18' E 91° 76'26'



Fig: Guwahati city map showing Navagraha temple (Source: Google Earth)

Results and Discussions

Classification

Rhesus macaque

Kingdom

Animalia

Phylum

Chordata

Order

Primates

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Family

Cercopithecidae

Genus

Macaca

Species

M. mullata

The Rhesus macaque (*M. mulatta*) is one of the best known species of old world monkeys. It is listed as least concern in the IUCN Red List of threatened species in view of its wide distribution, presumed large population and its tolerance of a broad range habitat. The rhesus macaque is brown or grey in colour and has a pink face with fur. Their tails is of medium length and averages between 20.7 and 22.9 cm. Adult males measures about 53cm on average and weighed about 7.7kg. Females are smaller, averaging 47cm in length and 5.3kg in weight.

Rhesus troops comprise a mixture of 20-200 males and females. Males and females are sexually dimorphic. In temple primate populations, irrespective of species and locality, are semi-provisioned. They eat naturally occurring food items from the surrounding vegetation and other food items provided by people visiting the temples. The natural food items vary with season and include young and mature leaves, leave buds and petioles. The macaques started the day around (5 A.M. - 6 A.M.) at the sleeping trees and travelled to the temple around (7 P.M. - 8 P.M.). They foraged the natural food particularly in the mornings. They were observed to consume provisioned food mainly 12 A.M. - 3 P.M. At Navagraha temple Rhesus macaque feeds on fruits and leaves of these four species of trees as given below.

Table 1
Plant Species and Their Feeding Parts Recorded As Food Items during The Study

Sl. No.	Scientific Name	Local name	Family	Total Number of Trees
1	<i>Magnifera indica</i>	Aam	Anacardiaceae	5
2	<i>Tamarindus indica</i>	Teteli	Fabaceae	2
3	<i>Artocarpous heterophyllus</i>	Kathal	Moraceae	7
4	<i>Aegle marmelos</i>	Bel	Rutaceae	7

For drinking study, the macaques were found to spend of their active feeding time in drinking. Macaques were found to collect water from variety of sources such as tubewell, stagnant water on roof of house etc. At Navagraha temple Rhesus macaques are regularly feed on fruits like banana, coconut and processed food for eg: cake, biscuit, chips, creamrolls and sweets. Though their natural diet consist of fruit, seeds, and leaves. But in human habitation, they also eat crops and search through garbage for food. The

provisioned foods have both positive and negative effects on macaques. Therefore, a balance of dietary composition between natural food and provisioned food is important for the macaques survival and health. During the study it has been found that 70% they depend upon natural food and only 30% is from supplied. But the supplied food is found to be problematic as macaques has been reported sick frequently.

Table 1: Diet Chart of Macaque in December 2017

Diet Chart of macaque of Navagraha temple December'2017					
Sl. No.	Group Size	Food Type	Type of Food Supplied	%	% Type
1	5	Banana	Natural	20.83	70.83
2	8	Bogori Seeds	Natural	33.33	
3	4	Coconut	Natural	16.67	
4	4	Biscuit & Cakes	Supplied	16.67	29.17
5	3	Chips	Supplied	12.50	

Table 2

Diet Chart of Macaque in January 2017

Diet Chart of macaque of Navagraha temple January'2018					
Sl. No.	Group Size	Food Type	Type of Food Supplied	%	% Type
1	4	Banana	Natural	16.67	62.50
2	3	Bogori Seeds	Natural	12.50	
3	8	Coconut	Natural	33.33	
4	5	Biscuit & Cakes	Supplied	20.83	37.50
5	4	Chips	Supplied	16.67	

Table 3

Diet Chart of Macaque in February 2018

Diet Chart of macaque of Navagraha temple February'2018					
Sl. No.	Group Size	Food Type	Type of Food Supplied	%	% Type
1	4	Banana	Natural	16.67	45.83
2	3	Bogori Seeds	Natural	12.50	
3	4	Coconut	Natural	16.67	
4	8	Biscuit & Cakes	Supplied	33.33	54.17
5	5	Chips	Supplied	20.83	

Table 4

Diet chart of Macaque in March 2018

Diet Chart of macaque of Navagraha temple March'2018					
Sl. No.	Group Size	Food Type	Type of Food Supplied	%	% Type
1	4	Banana	Natural	16.67	70.83
2	5	Bogori Seeds	Natural	20.83	
3	8	Coconut	Natural	33.33	
4	4	Biscuit & Cakes	Supplied	16.67	29.17
5	3	Chips	Supplied	12.50	

Table 5

Diet Chart of Macaque in April 2018

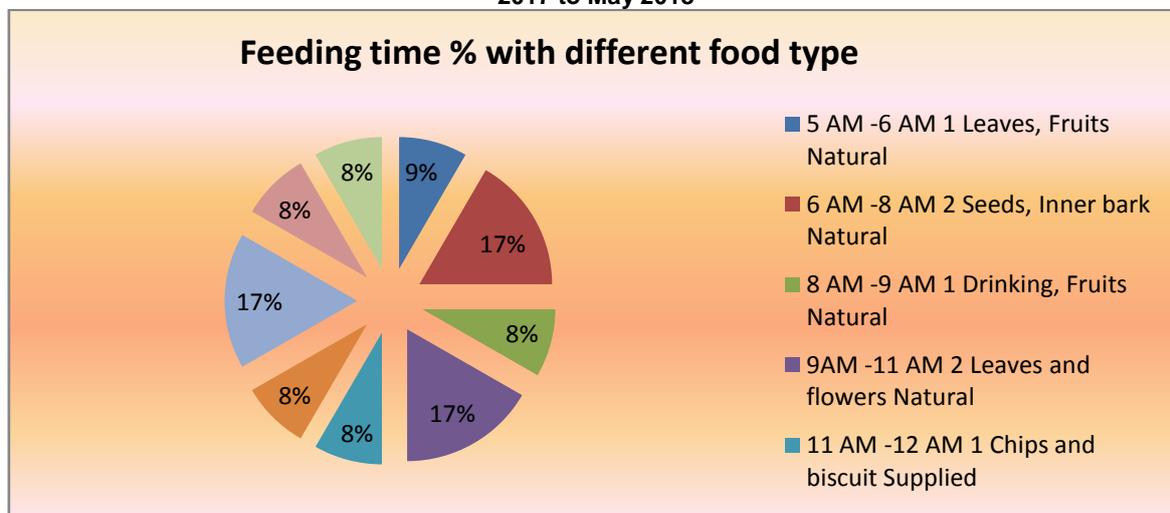
Diet Chart of macaque of Navagraha temple April'2018					
Sl. No.	Group Size	Food Type	Type of Food Supplied	%	% Type
1	5	Banana	Natural	20.83	62.50
2	5	Bogori Seeds	Natural	20.83	
3	5	Coconut	Natural	20.83	
4	3	Biscuit & Cakes	Supplied	12.50	37.50
5	6	Chips	Supplied	25.00	

Table 6

Diet Chart of Macaque in May 2018

Diet Chart of macaque of Navagraha temple May'2017					
Sl. No.	Group Size	Food Type	Type of Food Supplied	%	% Type
1	7	Banana	Natural	29.17	62.50
2	5	Bogori Seeds	Natural	20.83	
3	3	Coconut	Natural	12.50	
4	5	Biscuit & Cakes	Supplied	20.83	37.50
5	4	Chips	Supplied	16.67	

Table 7
Overall Food Diet Chart for Natural & Provisioned Food of Primates in Navagraha Temple during December 2017 to May 2018



The macaque's foraged natural food particularly in the morning and the highest percentage of feeding on natural food was 70% and they were observed to consume provisioned food mainly during 12 P.M.-5 P.M. is 25%. The percentage of the feeding on the natural food was higher than the provisioned food almost year round (December, January, March, April, and May). The provisioned food contributed large percentage of feeding (54%) in February 2018. In overall percentage it is found that macaques were feed maximum on natural food than provisioned food but in the dry seasons of February & march it increases provisioned food.

Conclusion

Macaques are decreasing at a very alarming rate as they are neglected for their diet and food stuffs. They are one of the nearest species to human being sharing the habitat. The crisis in the food plants nearby temples and increasing hunger leads to more and more serious conflict between Macaque and Humans as increasing day by day. The macaques were provisioned with many kinds of foods like bananas, chips, biscuits. At Navagraha temple the rhesus macaques were provided with banana, snacks like chips, biscuits, cakes. It seems possible that many visitors always feed on bananas, snacks. Primates may moves towards feeding on food from anthropogenic sources for one or more reasons that they developed a preference of human food, secondly, natural resource availability is too low to meet the demands of a population of their group size and lastly, provisioned food is nutritionally richer and easier to access. However, an excess consumption of the provisioned food leads to the declination of macaque's health. Therefore, a balance dietary composition between natural and provisioned food is important for the macaques for their survival and health. Now, it is the peak time to act upon the temple authorities and the government to check the deforestation nearby temples inhabitant by these group of temple primates. Also, it will reduce the consumption percentage of human provisioned food

during dry seasons i.e. February & March. So, precautionary measures should be taken to provide natural food to Macaques living in temples to save them for future.

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Photo Plates

Photo Plate No.1- Foraging

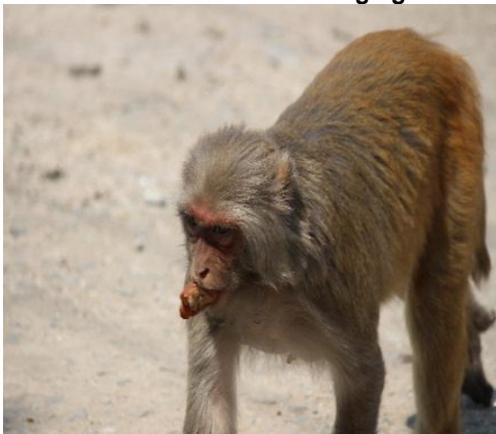


Photo Plate No.2- Feeding



Photo Plate No.3- Feeding Natural Foods



Photo Plate No.4- Feeding Chips

