



Ecology and Behaviour of Rhesus Monkey (*Macaca mulatta*) in Biratnagar, Province No. 1 Nepal

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Abstract

Locating far from the forest, in the concrete town Biratnagar a group of monkeys was found to be settled for few years in the godown of Raghupati Jute mills. There were 11 individuals including 3 – male, 2- female, 4-young adult female and 2-juvenile. The sex ratio was found as 3/6 or 1:2 or 0.5. Habitat analysis, troop composition, foraging, moving, resting playing, time management and also conflict, damage were studied. They depended mostly in the street food, they visited to the fruit shop and hotels for food. They managed the diurnal time as 46.15% in foraging, 7.69 % in moving, 15.38 % in resting and 15.38 % in playing. Total five cases of monkey bite, some damage on the jute bags were found during study period in 2018.

Keywords: Raghupati, sex ratio, foraging, conflict, Jogbani

1. Introduction

Rhesus monkey (*Macaca 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 [1]. This category bases on the wide distribution, large population and board range of habitat. The old world monkey is the native to south, central and the southeast Asia. It is also the greatest popular non human primate [2].

In the world, there are 12 species of macaques. Among them rhesus is considered as important because they are available and they are experimental animals by medico biological institutes [3]. In Nepal there are three species of Monkey [4]. They are *Macaca mulatta*, *Maca assamensis* and *Semnopithecus entellus*. Among them the most common species is *M. mulatta*. It is well distributed in east west of plain, sivalik and hill region [5, 6]. The Langur monkey (*Semnopithecus entellus* Dufresne, 1797) is found in wild forest and marginal areas.

M. mulatta is brown or grey in color. It has a pink face, which is bereft of fur. Its tail having length between 20.7 to 22.9 cm. The female weighs about 5.3 kg and its length is 47 cm. But the male is larger with the length 53 cm and weigh about 7.7 kg. They have the peculiar identifying character as 50 number of vertebrae. Their rib cage is wider and the ratio of arm length to leg length is 89% [3].

In spite of forest, the monkeys reside also in the holy places and the towns near the forest. Kathmandu, Dharan, Pokhara, Narayanghat etc. are the towns where many troops of monkey can be seen.

Before this, the ecology and some behaviors of *M. mulatta* were studied in Makalu Barun area of this province. The study of sex ratio, foraging, time budgeting etc. were done [7]. The assamese monkeys spent 44% of time in foraging, 25% in walking or moving, 13% for grooming and 18% in sitting and resting in that area [7].

Biratnagar, an industrial and concrete town, interim capital city of province no.1 locates in the boarder of Nepal and India. The nearest forest, Charkoshe Jhadi lies at the distance of 35 kilometers. Even so, a group of monkey has been inhabiting for few years. They live in the godown of Raghupati Jute Mill. It is one of the oldest industry of Nepal

which was established in 1946 A.D. It is the mysterious that how the monkeys arrive and established in the non-forest concrete place. It stimulated the researcher to do the work.

The arrival and adjustment pattern are necessary to be studied. The socio-ecology and general ecology of this species are also important to be examined in detail because such type of information could be of great importance to the protection, conservation and the management of this monkey species. In Biratnagar they may be the challenge for the authority for their management as they are growing in number and entering into the residential area.

2. Materials and Methods

2.1 The study area

Biratnagar also called the industrial capital of Nepal is a metropolitan city and the interim capital of the Province No. 1 of Nepal. It is currently the second most densely populated (after Kathmandu) and the fourth most populous city of Nepal, with a population of 270,000. The city has a total area of 77.5 km², a geographical location of 26°28'60"N 87°16'60"E. It is located in the Morang District (in the previous Koshi Zone) of the eastern-most Terai region of Nepal at the altitude of 72 kilometers from sea level. It lies 399 km east of Nepal's capital, Kathmandu, and 6 km north of the Jogbani border of the Indian state of Bihar [8].

The highest temperature ever recorded in Biratnagar was 43.0 °C (109.4 °F) on the 14th of April, 1992, while the lowest temperature ever recorded was -1.0 °C (30.2 °F) in December 1970 and January 1971. Average annual rain fall is 1891 [9]. Raghupati Jute mill where the monkey reside lies at the border line of Nepal (Rani) and India (Jogbani).

2.2 Materials used and Methods applied

The study was started from 1st September 2018 and continued to November last. The three months period includes about 180 hours as study hours. One assistant was taken who was more familiar and close to the monkey. He used to provide food materials daily, so he could call the monkeys and make gathering around him. After his call all gathered around him. It made easy to study from very close. The study specially focused on the history, habitat analysis,

composition of troop, foraging, time management, economic damage and even conflict between the labors, staffs and the mill authority too. For the behavioral study the continue recording technique was applied ^[10]. For the habitat analysis the inventory of tree species was done in the premise of the Jute mill and around it. The history was mentioned by the interview method applying to the locals. The researcher followed monkeys to find how far they go to collect the food. The division of time budget was recorded by direct observation and also by the use of the timer (stop watch). The members were classified according to age and sex ^[4]. All the behaviors were observed with the help of binocular. The photographs were taken with the Canon Power shot SX520 HS 42x 24-1008mm 16 MP optical zoom digital camera. The primary data collected by direct observation of individuals with the help of Bushnell H2O Waterproof/Fog proof Prism Binocular 10 x42 mm. While secondary data collected by the help of a questionnaire, reviewing literature such as journals, articles, proceedings and books, browser. The duration of any behavior and activities were recorded on the protocol papers with the help of binocular and stop-watch. The individual counting and identification were repeated several times in one observation. The group of monkey was regularly contacted for this study. Direct interview was done with the labors, staffs, mill authority and local people of Jogbani India and Rani Biratnagar to know the state of conflict and materials damage.

3. Results and Discussion

3.1 Habitat analysis

The length of godown is 200 meters and the breadth is 60 meters. It is about 12 meters high. The roof is covered by the Zinc plate. It is the old building constructed around the date 1947. Enough ventilator could be observed on the margins of wall and roof. About 1000 bundles of manufactured jute bag has been stored there in. The monkeys were found grooming on the cushion of jute bag's bundles and walking on the roof and hanging on tust and walls. Nearby the godown there are some residential blocks. The staffs of the industry have been inhabiting there. On the western border of the godown there is the busy market of Jogbani India.

Some tall trees are also present on the premise of the industry. Major trees are Siris (*Delonix regia*), Lichchi, Mango (*Mangifera indica*), Kadam, Pipal (*Ficus religiosa*), Coconut, Nut, Sissoo (*Dalbergia sissoo*), Jackfruit (*Artocarpus heterophyllus*), Guava, Ashok, Bayer, Bamboo, Some garden flowers. The habitat was found very safe, suitable and private. No such mentionable anthropogenic impacts were found. Only the labors used to go inside the godown and they found not disturbing the monkeys. The number of trees had been increasing.

Most monkeys live in trees, but some live in rocks, cave, savannas or mountain areas. Monkey tribes stay on the move to find food, so one location isn't home for very long ^[10]. The monkeys mostly live in the dense forest and the marginal areas between the town and forest. Not only this, they live in the temples and other holy places where they get food materials and protection also.

Macaca mulatta adapted to a variety of habitats from tropical coastal lowlands to snowy mountain valleys 2,500m above sea level, from dense tropical forest, to temperate pine grooves, to semi-desert conditions. Although they mostly want the fruits, they can be symbolized as

opportunistic omnivores. They prefer living on trees, but descend to floor level to forage in search of food. In this research finding they walked on the roof of building too ^[11].

3.2. History

On the concrete town Biratnagar, the group of monkey was not found till 2015. Unexpectedly two monkeys were seen in the custom area of Rani, Biratnagar. They might be there via the Trucks. They went to the unseen area. After eight months they reappeared in a group. Finally they had make a permanent resident. i.e. inside the godown of Jute mill. Actually the available literatures and locals did not describe from where they arrived to Nepal. Even in this research also describing the arrival of monkeys in Biratnagar no literatures were found.

They prefer to stay in a single place, but if perturbed, they can migrate until they find a better or safer place. When a population reaches a size that strain available food sources, small groups, and even individuals, can secede from the original population ^[12]. On the basis of this finding due to the mentioned behavior the monkeys arrived in Biratnagar.

3.3 Troop composition

Monkeys are very social creatures. Groups of monkeys are called missions, tribes, troops or cartloads. They want to play, cuddle and protect each other in the group ^[3]. There are totally 11 individuals. Among them 3 – male, 2- female, 4-young adult female and 2- juvenile. The sex ratio was found as 3/6 or 1:2 or 0.5.

The family is led by gaint and elder male. The average troop size recorded as 23.71 in the context of Assamese monkey ^[13] in Langtang National park. In Langtang national park it was about 0.9 ^[14]. Carpenter ^[15] mentioned undisturbed group of the monkey contain 12 to 26 number of individuals in Thailand. Adult sex ratio was reported as 1:2.3 ^[16].

3.4 Foraging

The process of eating or chewing or engulfing any substances solid or liquid, plants and plant parts or insects is called foraging. It also comprises geophagy, insect-eating and drinking water. The monkeys of this place use some different food sources rather than the other places. Since they reside in the town they mostly depend on the food made in the town. They moved freely in Jogbani, India in search of food. The locals provide them Roti, Kachauri, Samosa, sweets, coconut and fruits. Similarly, the monkey were facilitated with semi-decayed vegetables and residues of food. Sometimes they moved to the custom premises to collect grains. They became happy when they found the residues of the meal, provided by the residential and labors in Jute mill. They fed upon the apical leaf, buds, flower, seeds and fruits from the tree of the premises of mill. They allocated about six hours time for food collection. It was 46.15% of total diurnal time.

In the natural habitat rhesus monkeys prefer fruit, they are opportunistic omnivores and will eat what they can grab, including seeds, leaves, branches, tree bark, small animals (vertebrate and invertebrate), eggs, etc. ^[11].

Average amount of time spent for feeding was 44% of the total activity was posted by Chalise in the context of Monkey of other places of Nepal in the forest areas ^[7]. The larvae and insects consumed supplement protein in the primates diet and soil related materials counteract phenolic substance of their foods ^[17].

3.5 Moving/walking

Moving or walking included mainly running, chasing, jumping, climbing and playing and agnostic interactions with movement here in. They moved inside and around the godown. Some times they walked on the roof, sometimes hanging on the iron rods, some times climbing on the tree etc. They did not go much far for any type of purposes. They were found moving about 500 meters radius from their home (godown). They did not move so quickly. The leader, gaint elder male commanded the group and by following his commanding sometimes they move quickly when they get the symbol of danger. On the call of the food provider, specially a local machine man of the mill, Subas they moved swiftly. They used one hour time daily for this purpose. It was 7.69 % of total diurnal activity. The younger monkeys comparatively move randomly but not free from the leader [7].

3.6 Grooming

Grooming stands for the sanitation of body, make up or to be attractive. The part of skin was cleaned carefully. The wounded parts, scratches, face and back were cleaned by itself. Cooperation was taken within each other for this purpose. They used about two hours time for this activity. It was 15.38% of total diurnal activity. The analysis shows that macaques engaged in shorter grooming bouts and were more vigilant while grooming in focal sessions during which they interacted with people more frequently, suggesting that humans directly affected grooming effort and vigilance behavior. Furthermore, we found that in blocks characterized by higher rates of human-macaque interactions grooming bouts were shorter, more frequently interrupted by vigilance behavior, and were less frequently reciprocated [3].

3.7 Resting

Hence resting was defined the position of not moving, sitting calmly with open or closed eyes and stretched legs. They laid or rested on the roof, branches of trees and mostly on the cushion of bundles of jute bags inside godown. During day they did not use much time for this purpose and at night they rest and even sleep without any fear. Most of the time they remained together and even at the resting they gather together in, by touching the body of each other specially at night. Daily two hours time they consumed for resting. It was 15.38% of total diurnal activity of the this creature.

3.8 Playing

Playing means jumping and enjoyment also. Specially in the evening they did such activity. They jumped every where around or inside the godown. They seemed to be happy. One sometime bits the next. In turn the second run on the back of it. They allocated about two hours daily. In playing they used about 15.38 % of total day time.

3.9 Time management

They usually waked up early in the morning at 6 or 6:30 AM. Then they went for foraging to the Jogbani market of India. They ate the food materials what they found in the market area. Residents of Jogbani had also been habitual to give homemade food materials early in the morning. Sometimes they reached to the railway and rail station too in search of food. They returned to the resident (Godown) at

the time of 9:30 AM. Now they waited for the staffs of mills who give the foods. Usually some staffs gave the food materials to them. They used this time for grooming too. After eating such foods at 11:30 they again moved to the Jogbani market and the custom premise Biratnagar. They spent day on collecting foods on the market and adjoining regions. They mostly returned to the premise of jute mill at 3:30 PM. In between the time two hours they took rest on the twig of trees or on the roof of buildings. Now they played for an hour. They climbed on the trees and roof, they enjoy on touching each other. At about 5:30 or 6:00 in the winter months but only at 7 PM in other months they got entry in to the godown. The whole night they stayed calmly and used time totally for rest and sleep.

3.10 Conflict between Human and Monkey

The conflict was also seen between human and monkeys in the jute mill area. The labors teased the monkey. Sometimes they hit them with stone. In turn the monkeys showed their aggressive behavior and the incidents of biting were also observed. Till the completion of the research the number of monkey bites were five. Three staffs and two labors were victim of the bite. The monkeys damaged the fruits and other glossary materials in the market. Similarly they took the materials from the quarter of the staffs of Jute mill.

In the other parts of the world many incidents had been recorded. It was reported that a monkey had entered a house in the village of Talabasta, Indian state of Orissa and kidnapped a baby. The baby was later found dead in a well. Though monkeys are known to attack people, enter homes or damage property, this reported behaviour was unusual [18].

3.11 Damage

Actually the crop damage by the monkey was not clearly recorded. The monkey sometimes entered into the fruit shop and escaped by taking the fruits. They also affected the glossary and the sweet house. They entered in to the quarter of the staff and took the vegetables and other things even dresses, handkerchief and mobile set, gaggles etc. Their urine is harmful for the bundles of jute bags. Till the study time total no of damaged bags were found as 200. The market cost of each was 120 NPR. Crop damaged by the monkeys was also studied previously in the other parts. A total of about 35 different crop species were cultivated across the village including minor and major crops, among which rhesus monkey mostly damaged maize and fruits. Though most damage occurred during the fruiting season but monkey damaged crops throughout the year, in Sankhuwasabha [4].

4. Conclusion

Biratnagar is a concrete town locating far from the forest at the altitude of 72 meters from sea level. A group of monkeys was found to be settled for few years in the godown of Raghupati Jute mills which is located in the border of Nepal and India (Jogbani city). There were a total of 11 individuals including 3 – male, 2- female, 4-young adult female and 2- juvenile. The sex ratio was found as 3/6 or 1:2 or 0.5. History, Habitat analysis troop composition and some behaviours like foraging, moving, resting playing, time management and also conflict, damage were studied. The habitat was godown of Raghupati jute mill and adjoining area with few trees. They depended mostly in the

street food, they visited to the fruit shop and hotels for food. They managed the diurnal time as 46.15% in foraging, 7.69 % in moving, 15.38 % in resting and 15.38 % in playing. Total five cases of monkey bite, some damage on the jute bags were found during study period September to November last in 2018.

5. Acknowledgement

The author is grateful the Subas, a staff of Raghupati Jute Mill for his cooperation for the observation of monkeys' behavior. Similarly I am thankful to Shyam Acharya, the manager of the mill and to Mohan Ghimire, Director of this jute mill.

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