HAYATI Journal of Biosciences March 2014
Vol. 21 No. 1, p 8-14
ISSN: 1978-3019

Available online at:
http://journal.ipb.ac.id/index.php/hayati
DOI: 10.4308/hjb.21.1.8

Dietary Variation of Long Tailed Macaques (*Macaca fascicularis*) in Telaga Warna, Bogor, West Java

SARAH NILA*, BAMBANG SURYOBROTO, KANTHI ARUM WIDAYATI

Department of Biology, Faculty of Mathematics and Natural Sciences,
Bogor Agricultural University, Darmaga Campus, Bogor 16680, Indonesia

Received July 10, 2013/Accepted January 8, 2014

The genus *Macaca*, member of sub-family *Cercopithecinae*, is the most widely distributed non-human primates in Asian countries. The habitats are strongly influence the dietary variation of the populations. The dietary variation of the macaques reflect ecological plasticity in coping with differences both in availability and abundance of food. The macaques are plastic in taking any kind of food that available in their home range and adjust their behaviour according to its abundance. Here, we present the dietary variation of long-tailed macaques (*Macaca fascicularis*) in the high altitude rain forest of Telaga Warna, West Java, Indonesia. The proportion of their food from natural sources is greater than those from visitors. The natural food consisted of plants, small animals (insects and earthworm), fungi and water from lake. The plant food comprised of 29 species plus a few mosses. The frequency of eating artificial food was influenced by visitors who come for picnic. In this site, the macaques learned that the visiting of tourists is identical with food.

Keywords: dietary variation, high altitude rain forest, *Macaca fascicularis*

INTRODUCTION

The genus *Macaca*, member of sub-family *Cercopithecinae*, is the most widely distributed non-human primates in Asian countries; the only non-Asian macaque is the North African Barbary macaque (*M. sylvanus*) (Fooden 2006). These macaques live in various habitats such as lowland forest, montane forest and coastal mangrove forest (Fooden 2006). These habitats are strongly influence the dietary variation of the populations.

The dietary variation of the macaques reflect ecological plasticity in coping with differences both in availability and abundance of food. The macaques are plastic in taking any kind of food available in their home range. Their food may varies across seasons and altitudes. For example, Japanese macaques in temperate zone such as Yakushima (Japan) show considerable altitudinal variation in the diet. The macaques consume seed/fruit and animal matter in lower zones; while in the higher zones, they consume more fiber and fungi. There was also seasonal variation in this sites where in autumn (September-November) the macaques consumed mostly seed/fruits then shift to fibrous food in spring (Hanya *et al*. 2003). The rhesus macaques in other high altitude site (at Baimaxueshan Nature Reserve, China) showed that their preference of foods were to fruits (Grueter *et al*. 2010). In Jentse, Northeastern Taiwan, dietary variation of *Macaca cyclopsis* was influenced by seasons. In summer, the macaques spent a higher proportion on fruits and insects while in winter they consumed more leaves and stems (Su & Lee 2001).

The feeding ecology of long-tailed macaques have been reported mostly in lowland areas (Wheatley 1989; Fuentes *et al*. 2007; Hadi *et al*. 2007). Those study sites are recreational parks where the macaques get food from visitors in addition to consuming the natural food items. This diet plasticity might be because of the artificial foods contain more calories (Wheatley 1989); however, the proportion of artificial food are different in each sites which leads to differences in abundance. In some parks, local staffs feed the macaques; while in other study sites, visitors bring picnics or buy some food from vendors to feed the macaques. However, there are no reports about the feeding ecology of long-tailed macaques in the high altitude. Here, we present the dietary variation of long-tailed macaques in Telaga Warna, a high altitude rain forest with human-artificial food. We found that the proportion of their food from natural sources is greater than those from visitors. The natural food consisted of plants, small animals (insects and earthworm), fungi and water from lake. The plant food comprised of 29 species plus a few mosses. The frequency of eating artificial food was influenced by visitors who come for picnic. In this site, the macaques learned that the visiting of tourists is identical with food.

*Corresponding author. Phone/Fax: +62-251-8622833,
E-mail: sarahnila88@gmail.com

MATERIALS AND METHODS

Research Site. Present research was conducted in Telaga Warna, Sub-district Cisarua, District Bogor, West Java Province, Indonesia (6°702'S, 106°996'E) (Figure 1). This study area is a Nature Reserve (Cagar Alam in Bahasa) and Nature Recreational Park (Taman Wisata Alam). The Nature Reserve is a conservation area for 549.66 ha tropical rainforest with high plant diversity. The reserve is hilly terrain with altitude ranges from 1097-1600 m above the sea level. Area of the Nature Recreational Park is about 5 ha. There is a lake in the middle of the Nature Recreational Park. The lake is surrounded by a steep cliff. There are four primate species inhabited the Nature Reserve: two Leaf monkeys [surili (*Presbytis comata*) and lutung (*Trachypithecus auratus*)], Long-tailed macaques (*Macaca fascicularis*) and Javan gibbon (*Hylobathes moloch*). The long-tailed macaques and lutung are also visiting the Nature Recreational Park. The observation was done in the Nature Recreational Park.

There are also many local people and foreigners come to visit this Nature Recreational Park. The number of visitors who visited Telaga Warna in 2012 is shown in Table 1.

Data Collection Methods. We conducted preliminary study from January until July 2012 in order to familiarize and to count the population parameters. We fed the macaques with crumps of dried noodle every weekends.

There are two troops of long-tailed macaques, Troop A (max = 43 individuals, min = 30 individuals, n = 19 censuses) and Troop B (20 individuals in 4 censuses). Although both troops visited the Nature Recreational Park, we concerned only to observe the Troop A. Troop A visited the recreational area more frequently, so it was easier to observe them. Troop A was mostly found near the lake or in the hill surround it. We marked those places as the home range of Troop A (Figure 1). The Troop A composed of 8 adult males (> 5 years old), 8 adult females (> 5 years old), 3 subadult males (3.5-6 years old), 2 subadult females (3.5-6 years old), 20 juveniles (1-3 years old) and 2 infants (<1 years old) (Tsuji & Takatsuki 2009). We could identified all individual of the adults and the subadults, and some of juveniles by differentiating their faces, hair colours, body sizes, shapes of head and body, and scars in their body. This identification helped in the recording of food items.

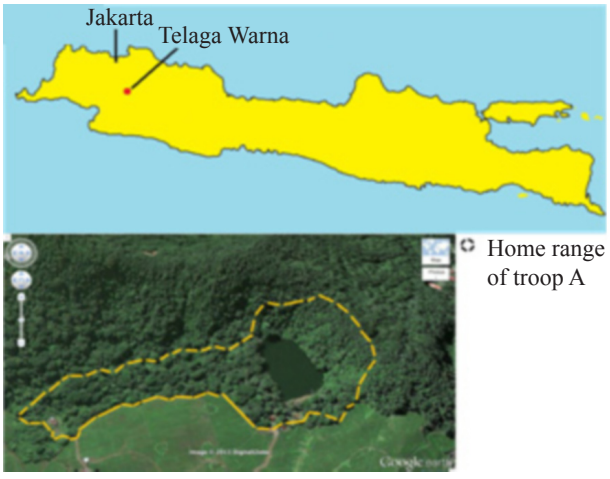

Figure 1. Research location and home range of Troop A long-tailed macaques in Telaga Warna. Perimeter of the home range was drawn by connecting outer location of the troop. The map of Telaga Warna was taken from Google Map.

Table 1. The number of visitors in Telaga Warna Nature Recreational Park 2012

Months	Number of visitors
January	1619
February	1104
March	1783
April	1744
May	1944
June	2461
July	1870
August	2137
September	1783
October	1526
November	1063
December	1166

From July to November 2012, we collected the data every day from morning (06:00) to the evening (16:00). We observed the macaques using two type of methods: scanning and *ad libitum* sampling methods (Altman 1974). The scanning method was used to estimate the proportion of every categorized behaviours (see below) that individuals performed in their activities. We observed seven behavioural categories of daily activities. We divided these activities into social and non-social behaviour. Social behaviour consisted of agonistic, grooming, mating and playing. Resting, feeding and moving were non-social behaviour. Resting refers to individual who sit on the ground or tree. Moving refers to displacements of each individual or the group from their position. These behavioural categorization were similar with Md-Zain *et al*. (2010). We took a scan of behaviour performed by randomly observed individual in one minute cycle. After we familiarized with the subjects and their behaviour, we used also *ad libitum* method (Altman 1974). In *ad libitum* method, we recorded the behaviours of macaques