

Feeding Ecology of Mentawai langur (*Presbytis potenziani*) in Siberut, Mentawai Islands.

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Abstract

Mentawai langur, *Presbytis potenziani* are endemic to the Mentawai Islands. The species is categorized as an endangered primate. Loss of suitable forest habitat, through commercial logging and conversion of land to agriculture, and traditional hunting system are the main factor threatening populations of the species in all islands of Mentawai. Despite the urgent need for scientifically based conservation measures, there has been little documentation of their basic information on the ecology and behaviour of the species. Present study, we assessed feeding ecology of the species based on activity budgets, diet (food species, food preferences and food items) and niche breadth using focal animal sampling method. The study was carried out in Peleonan forest, the Mentawai island of Siberut from January 2008 through June 2009 and resulted in more than 2000 contact hours on one group (8 individuals). Results show that activity budget of *P. potenziani* was dominated by resting (45.7 events/ hour) and feeding (31.8 events/ hour). Meanwhile travelling, foraging, other activity and social behaviour were 6.2, 4.4, 1.3 and 0.6 events/ hour respectively. Regarding diet, *P. potenziani* used 118 food species in total, however, based on the top ten food species, accounting almost 50% of their overall diets. Average values on food preferences showed that the species mainly fed on fruit, (17.3 events/hour), followed by leaves, flowers and other items (10.8, 1.6 and 1.5 events/ hour respectively). Detailed analysis on food items (certain parts of different plant species eaten) revealed 256 food items in total were eaten by *P. potenziani* with different feeding proportion. Calculated niche breadths (Levin's index) of the species revealed a value of 0.22.

Keywords: feeding ecology, activity budget, diet, *Presbytis potenziani*, Mentawai islands

Introduction

Mentawai Langur (*Presbytis potenziani*) are endemic to the Mentawai Islands, an islands that situated about 100 km off the west cost of Sumatra. According to geological data, Mentawai has been separated from Sundaland since the Mid-Pleistocene, about 500.000 years ago (Verstappen, 1975). Due to its geographic isolation, Mentawai has undergone an evolutionary process that has resulted at least five primate species: the Kloss's gibbon (*Hylobates klossii*), two species of macaques (*M. pagensis* on Sipora, North- and South Pagai, and *M. siberu* on Siberu), two species of langurs, the Pig-tailed langur (*Simias concolor*) and the Mentawai langur (*Presbytis potenziani*), which live sympatrically across the entire area of the archipelago. Among these, the Mentawai langur have been a subject of very little studied and particularly on their ecology and behaviour (Tilson and Tenaza, 1976; Watanabe, 1981; Fuentes, 1996; Sangchantr, 2004)

According to IUCN (2011), the Mentawai langur is considered to be Endangered (EN A2cd). Loss of suitable forest habitat, through commercial logging and conversion of land to

agriculture, and traditional hunting system are the main factor threatening populations of the species in all islands of Mentawai.

Despite the urgent need for scientifically based conservation measures, there has been little documentation of their basic information on the ecology and behaviour of the species. Present study, I assessed feeding ecology of the species based on activity budgets, diet (food species, food preferences and food items) and niche breadth based on Levin Index.

Materials and Methods

Study site

We conducted the study in the Peleonan forest, located at 0° 58' and 1° 03' S (latitude) and 98° 48' and 98° 51' E (longitude) in North Siberut, Mentawai, West Sumatra. The forest encompasses about 5,000ha. The area is confined by coastal forest in the North and the Tateiku river in the South, while the western and eastern borders are formed by the Peleonan and the Sigep rivers, respectively.

The Peleonan forest consists partly of peat swamp forest, making up the northernmost part, as well as of mixed forest representing the much larger part towards the South. The study area, located in the center of this mixed forest, is comprised of approximately 70 tree genera from 35 families, with Euphorbiaceae, Myrtaceae, Lauraceae and Moraceae being the dominant taxa. The forest structure consists of more than 50% trees with breast height diameters between 21-40 cm, and 50% of trees 6-15 m high and 35% 16-30 m in height (Hadi *et al*, 2009).

The climate at the study site is typically equatorial with high rates of precipitation throughout the year. The monthly rainfall recorded from January through September 2008 ranged from 120 – 568 mm, with fluctuation between months of low and high rates of precipitation being unpredictable. Temperatures recorded between March and December 2007, ranged between 20.6 °C and 33.6 °C (mean 25.6 °C) with a mean relative humidity of 89.4%.

Study animals

I used a group of *P. potenziani* consisted of seven individuals, including one adult male and three adult females. The number of group members increased to eight after a birth in 2008. For conducting focal animal sampling I used five individuals in total (one adult male, two adult females, one sub adult male and one sub adult female). All the individuals were fully habituated.

Data collection and analysis

I collected data daily between 06.00 am and 18.00 pm from January 2008 to June 2009 during more than 2000 contact hours. In total, we compiled 722 focal animal sampling protocols for *P. potenziani* (based on 5 individuals). Each focal animal protocol was composed of 20 second sampling intervals, covering a total length of 30 min, resulting in 90 data points (or events) per sample.

To gain representative behavioural data, we generated 12 focal animal sampling protocols per individual, per month, each representing a different hour of the daylight period (06:00-18:00). The behavioural data collected include six activity categories: resting, feeding, foraging, travelling, social behaviour and other (such as solitary play, autogrooming, agonistic and sexual behaviour). I recorded the food species and the parts of these species consumed, distinguishing leaves, flowers, fruit and others (bark, fungi, lichen, animal matter). For further identification of plants used by primates, we collected herbarium samples, which we sent to the Herbarium of Andalas University, Padang and to the Herbarium Bogoriense, LIPI Bogor, Indonesia.

I used the standardized Levin's index to calculate the values for niche breadth, applied to the proportions of food items consumed:

$$B = \frac{1}{\sum p_i^2}$$

where B is Levin's niche breadth and p_i is the proportion of a single resource category (food item) in relation to the overall consumption. Subsequently we calculated the standardized Levin's niche breadth (B_{sta}) by computing:

$$B_{sta} = \frac{B-1}{B_{max}-1}$$

where B is Levin's niche breadth and B_{max} is the total number of food items recognized. The standardized Levin's index varies between 0 (minimal niche breadth) and 1 (maximal niche breadth) (Levins, 1968; Colwell & Futuyma, 1971).

Results

Overall activity budgets for the species devoted the majority of their average daily time budget to resting (45.7 events/hour) and feeding (31.8 events/hour). Meanwhile travelling, foraging, other activity and social behaviour were 6.2, 4.4, 1.3 and 0.6 events/ hour respectively.

Regarding diet, *P. potenziani* used 118 food species in total, however, based on the top ten food species, accounting almost 50% of their overall diets. Average values on food preferences showed that the species mainly fed on fruit, (17.3 events/hour), followed by leaves, flowers and other items (10.8, 1.6 and 1.5 events/ hour respectively).

Detailed analysis on food items (certain parts of different plant species eaten) revealed 176 food items in total were eaten by *P. potenziani* with different feeding proportion. Calculated niche breadths (Levin's index) of the species revealed a value of 0.22.

Discussion

Activity budgets for *P. potenziani*, infact, follow patterns observed in other leaf eating monkeys in Africa [e.g. *Colobus guereza*, *C. satanas* and *Procolobus badius* (Rowe, 1996; Struhsaker & Oates, 1975)] and in other Asian colobines [such as *Presbytis comata* (Ruhayat, 1983), *P. thomasi* (Gurmaya, 1994), *Trachypithecus cristatus* (Brotoisworo and Dirgayusa, 1991), *T. leucocephalus* (Li & Roger, 2004), *T. pileatus* (Islam & Husain, 1982) and *Nasalis larvatus* (Matsuda *et al*, 2009)], in which only small proportions of time are spent on social behavior, but more than 80% of mean daily activity is devoted to resting and feeding. This activity pattern is typical for colobines that consume diets largely based on leaves, seeds and unripe fruits, which requires prolonged periods of resting, to support digestion (fermentation) in their sacculated stomachs (Kuhn, 1964; Oates and Davies, 1994; Folk, 2000).

Compare with *S. concolor*, the Mentawai Langur different in time spent of foraging that can be explained by the more efficient use of abundant food resources such as leaves and flowers by *S. concolor* (unpublished data) compared to the extensive foraging on scattered fruit resources by *P. potenziani*. Such a feeding strategy as observed in *S. concolor* requires an extra digestive stomach compartment, the presaccus, which assists in breaking down the great quantity of cellulose and hemicelluloses (Caton, 1998). This specific anatomical characteristic can be found in *S. concolor* but not in *P. potenziani*, further supporting a fruit dominated-diet in this species. Based on these in feeding ecology, *P. potenziani* gains much more energy from nutritious fruits, but has to spend more energy to explore these scattered food resources over wider ranges and in seasonally varying abundance.

In total, 118 food species were identified as being eaten by *P. potenziani*, however, based on the top ten food species, accounting almost 50% of their overall diets. All of which were considered to be abundant at the study site (Hadi *et al*, 2009). As comparison, *C.*

guereza use one species as 68% of their diet (Struhsaker & Oates, 1975) and *T. vetulus* use three species make up 70% of the diet (Hladik, 1977) indicated that Mentawai colobines relatively non-monotonous diet

Furthermore, when leaves, fruits, flowers, etc. of the same food plant species are considered as separate items, there are 176 food items accounted in total with different proportion. Based on the data, the Levin's niche breadth index of the species was 0.22. The value was slightly lower compare for example with *S. concolor* (0.34; unpublished data), reflecting a more specific use of the recorded food items of *P. potenziani* compared to the latter. Therefore *P. potenziani* seems spend more time for travelling and foraging to assort their diet.

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