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Characterizing Social Interactions and Grouping Patterns of Sumatran Orangutans (*Pongo abelii*) in the Gunung Leuser National Park, Sumatra

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ABSTRACT

The character of social interactions and grouping patterns of Sumatran orangutans (*Pongo abelii*) have been studied in Ketambe research station of the Gunung Leuser National Park, Sumatra. A total number of 141 groupings and 47 incidences of interactive behavior were observed during the course of study. The character of groups (feeding group or travel-band) and the type of food trees (fig tree or fruit tree) appear to influence the interactive behavior of individual orangutans. Intolerance behavior has been characterized by feeding group in large fig trees, whereas tolerance and sexual behavior were shown mostly in travel-band.

Key words: feeding group, travel-band, social interaction, Sumatran orangutan, *Pongo abelii*.

INTRODUCTION

Orangutan is one of the largest arboreal frugivorous animals. Male of orangutans weigh up to 84 kg whereas female average about 38 kg (Rodman, 1984). In contrast to many other species of primates, orangutan lives in semi solitary life. Aggregations, however, have occurred occasionally and usually happen when they feed in large food patches or in sexual context (MacKinnon, 1974; Schurmann and van Hooff, 1986). All studies of wild orangutan have shown that more than 60 percents of orangutans' food are fruits (Rodman, 1973; Rijksen, 1979; Galdikas, 1979). Previous study of grouping in wild orangutans has revealed that two types of groups can be distinguished i.e. feeding group (aggregations of orangutan in fig trees) in which individuals feed together within a large fig tree and leave separately whereas travel-band in which individuals feed together within a patch of fruit trees, leave together, stay together for some time, and visit the next fruit patch together (Sugardjito et al., 1987).

Despite the fact many field studies over the past 30 years have produced a wealth of data about orangutans, little is known about sociality of wild orangutans. Intensive studies of the sociality and sexual behavior of this animal have been conducted mostly in captivity (Edward, 1982; Nadler, 1982). There were only few data available on the sociality of wild orangutans (Galdikas, 1985; Utami, 2000). However, data on the associations between sociality and group formations in wild orangutan are lacking. By characterizing social interactions and grouping patterns, therefore, we may be better able to understand the relationships between interactive behavior and its ecological determinants which are important for the future conservation needs of orangutan, particularly when we reintroduce a group of orangutans in the wild. This paper presents the association between grouping patterns and social interactions which is shown when orangutans formed a group either in fig trees or in fruit bearing trees.

MATERIALS AND METHODS

Study area

The field work was carried out in the Ketambe research station of the Gunung Leuser National Park, Sumatra (Figure 1). The study area is covered by mixed lowland tropical rain forest which is characterized by a high diversity of fig tree species, while the fruit trees species mostly belong to the family Meliaceae and Euphorbiaceae (Abdulhadi et al., 1984). The majority of large fig trees are strangler with very wide crown and fruiting asynchronously, on individual schedule (Schaik, 1996)

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Procedures

The population of Sumatran orangutans (*Pongo abelii*) in the area has been studied continuously since 1971 (Rijksen, 1978; Schurmann, 1981; Sugardjito, 1986; Utami, 2000). Seven habituated animals (1 adult male, 3 adult females, 2 adolescent females, and 1 adolescent male) were followed for 3 up to 10 days from dawn to dusk from February 1980 until December 1982. Data on interactive behavior was collected when focal animals were part of a group and sampled in a one-zero score (Altman, 1974). The group definitions were following Sugardjito et al. (1987). We sampled only types of interactive behavior that could be clearly observed, e.g. displacing, playing, sharing of food (tolerance to other individuals when the food is taken), and sexual interactions (copulation and genital investigation). These types of interactive behaviors have been classified into three categories, namely intolerance, tolerance, and sexual. The data were analyzed statistically with a Chi-square and Fisher tests for two or three dimensional contingency tables (Siegel, 1956; Everitt, 1977).

RESULTS AND DISCUSSION

A total number of 141 groupings were observed during the course of study. Feeding groups occurred mainly in large fig trees while travel- bands can be formed in fruit trees other than fig trees (Table 1). Forty-seven incidences of interactive behavior were observed, and all of these have been characterized into three behavioral categories (Table 2). Regardless whether orangutan forms the group in fig trees or fruit trees, no differences were found in the frequencies of appearance of these three behavioral categories. It means that orangutan potentially shows the interactive behavior in equal opportunity while feeding in either fig or fruit trees. However, when these behavioral categories are partitioned according to the food tree types (figs or fruits) then the differences were observed (Table 3). The intolerance behavior appeared almost exclusively in large fig trees. In contrast, the tolerance and sexual interactions were observed particularly in fruit trees in which the travel-bands were formed. The data also showed that intolerance behavior was associated with the combined category e.g. feeding group in fig trees. As for the other two behavior categories did not (Table 3). These two behavior categories could be found mostly in travel-band.

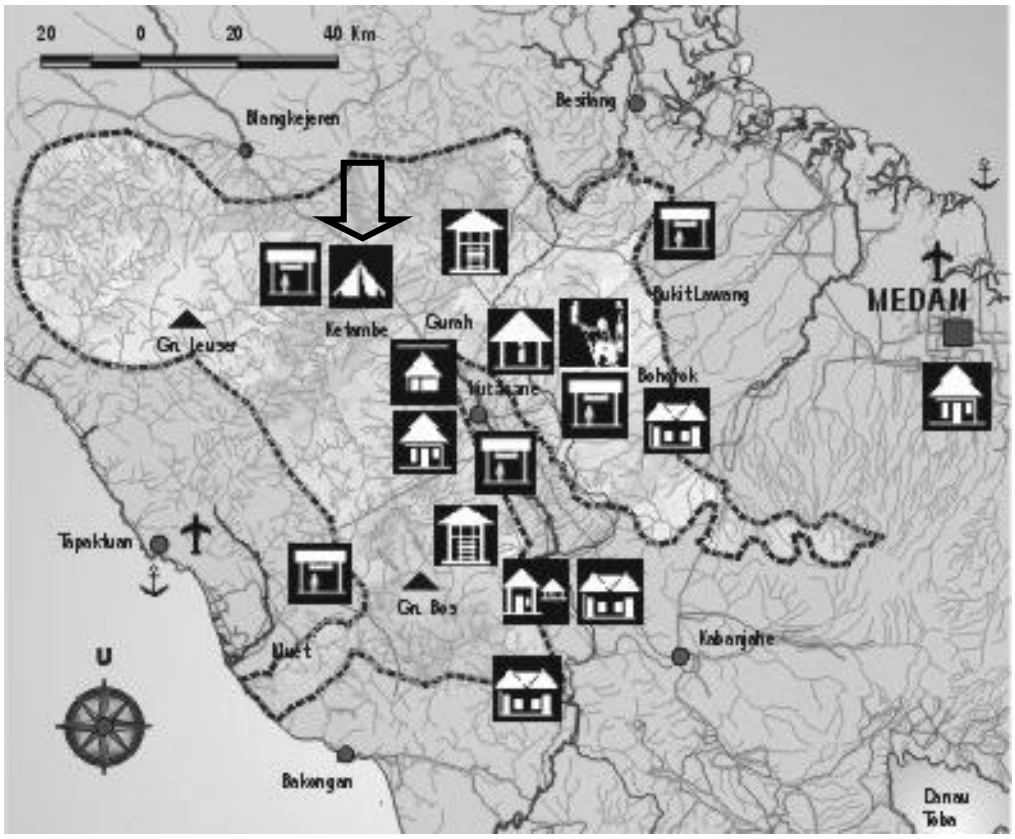

Figure 1. Location of the study area in the Gunung Leuser National Park, Sumatra.

Table 1. The grouping incidences of orangutan while feeding in fig trees and fruit trees in Ketambe area of Sumatra. (X^2= 19.78, df=1, p<0.01)

Group formations	Fig tree	Fruit tree	Total
Feeding group	66	17	83
Travel-band	25	33	58

Table 2. The frequency of interactive behavior incidences of orangutans based on three categories. (X^2=5.39, df=2, n.s.).

	Behavioral interactions			
	Intolerance	Tolerance	Sexual	Total
Number of incidences	16	22	9	47

Table 3. The frequencies of each condensed interactive behavioral category of Sumatran orangutans with respect to the social conditions and types of food trees. (X^2=39.13, df = 7, p<0.001)

Social interactions	Travel-band		Feeding group		Total
	Fig tree	Fruit tree	Fig tree	Fruit tree	
Intolerance	0	2	13	1	16
Tolerance	6	10	4	2	22
Sexual	3	5	1	0	9

The heavy arboreal orangutans require a large amount of calories daily (Wheatley, 1982). This factor combined with calorie content of figs and the enormous size of fig trees led to argue that figs are an important staple food for orangutans. Sugardjito et al. (1987) showed that orangutans visit large fig trees in much more constant fashion throughout the year than the other fruit trees. Since large fig trees are relatively less in number compared to the other fruit trees in the area (Schaik, 1996), it will force the orangutan to return regularly to the same individual fig tree. Therefore the favorite and relatively rare fig trees could attract aggregations of orangutans for nutritional reasons. The spreading crown of a single large fig tree could reach about 30 meters, whereas the wide crown of small-medium fruit trees only about 5 meters. Further, these small-medium fruit trees usually grow abundantly in a large patch of forest whereas the large fig trees occur only a few at a rather distances. Orangutans, therefore, visit many species of fruit trees roughly as expected on the basis of their abundance in the forest. This suggests that orangutans' strategy in harvesting fruiting trees is opportunistic, i.e. in proportion to availability. However, the frequency in which fig trees are visited is far higher than expected on this basis. It is rare to have several individual of the same species of large fig trees in fruit at the same time. This is in contrast to the small-medium fruit trees. These trees are synchronously, it is often to have several individuals of the same species bearing fruits together at the same time. Further, the median feeding time per visit in a fig tree is longer than in a fruit tree (Sugardjito, 1996). This could be affected by the number of orangutan aggregates in a fig tree. Indeed, Utami (2000) has found that orangutan spent more time feeding when aggregation size increased in a fig tree. Consequently, the intolerance interactions would appear more frequent between the dominant individual and subordinate individuals in a fig tree.

The differences of growing pattern, the density and fruit bearing availability between fruit trees and fig trees would have different effects on the social interactions of orangutans. When a group of orangutan was feeding in a large fig tree, it has been shown that the availability of ripe fruit was positively related to the number of orangutans visiting a fig tree and their foraging efficiency (Utami, 2000). This might lead to intolerance behavior between individuals to be associated with feeding group in large fig trees. This phenomenon did not exist when orangutan forms a travel-band in small-medium size fruit trees. Due to the relatively smaller size of fruit tree compared to fig tree, the fruit tree provides only limited space and therefore, a single fruiting tree could hold only 2 to 4 orangutans. The other member of group of individual orangutans will exploit the neighboring fruit trees which occur in a large patch and clumped. This suggests that individuals feeding together in a fruit tree are belonging to the same social group and hence it reduces intolerance behavior between individuals.

CONCLUSIONS

The findings imply that both forms of aggregations and the growing patterns of food trees (figs and fruits) would determine the social interactions of wild orangutan. The intolerance behavior is associated with feeding groups in large fig trees, whereas the tolerance behavior and sexual interaction did not. The growing patterns of small-medium size fruit trees which grow abundantly in large patch and clusters could reduce intolerance interactions between orangutans while feeding. This is in contrast to a few huge fig trees which grow scarcely and the availability of figs are on individual schedule would attract many orangutans visit in the same fig tree. Consequently, it could lead the dominant orangutan performs intolerance behavior to its subordinate.

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