Al-Hayat: Journal of Biology and Applied Biology, Vol 3, No 1 (2020), 31-36
DOI. 10.21580/ah.v3i1.6069

Long-Tailed Macaques (*Macaca fascicularis*) and Humans Interactions in Grojogan Sewu Natural Park (TWA GS), Karanganyar Regency, Central Java Province

Moh. ***Jafron Syah***

[1]Study Program of Animal Biosciences, Department of Biology, Faculty of Mathematics and Natural Sciences, Bogor Agricultural University. Darmaga Bogor, 16680, West Java, Indonesia
E-mail:jafronsyah@gmail.com

Abstract

Macaca fascicularis is one species of primate that easily adapts to various habitats, such as disturbances habitat, like a natural park. The conflict between M. fascicularis and human increases due to changes in ecology. In Borneo, Sumatra, Malaysia, Mauritus, and Thailand, M. fascicularis has become pests because destroyed orchards and plantations. Interaction between M. fascicularis and human, which occurred at several natural parks in Singapura and Kaliurang caused by M. fascicularis's attraction to food brought by humans. This research aimed to study the interaction between M. fascicularis with the humans in Grojogan Sewu Natural Park (TWA GS) by direct observation and also an interview with visitors, workers, and villagers. Based on direct observation, frequency of affiliation interaction between humans and M. fascicularis (55.56%) is higher than agonistic interaction (44.4%). The dominant affiliation interaction was sitting nearby the visitors (42.96%); meanwhile, the most dominant agonistic interaction was stealing (54.12%) because the M. fascicularis attracted to food (67.02%). Workers reported having more nuisance problem with M. fascicularis than visitors and villagers. Almost all of the respondents thought that M. fascicularis needs to be kept alive in the park, and consider conservation and protection of the macaques are essential.

Keywords: affiliation, agonistic, conservation, interaction, natural park

1. Preface

Macacca fascicularis (Family: *Cercopithecidae*) in Indonesia is known as long-tailed monkeys. According to Wheatley (1980), *M. fascicularis* is a species of primates that are highly adaptive to a variety of habitat types. *M. fascicularis* can be found in both primary and secondary forest (Fooden 1995). This species can also be found in the forest canopy, forest river, coastal, mangrove, swamp, and forest tourism (Gumert et al. 2011; Fakhri et al. 2012).

The conflict between *M. fascicularis* and human currently increase due to the presence of ecological changes; one of the cases is a conflict between M. fascicularis and human in the natural park. Sha et al. (2009) reported some natural parks in Singapore did not have a buffer zone with the area of settlement. Around the Bukit Timah Natural Resource (BTNR), there are seven condos and one estate where is only 200 meters from the BTNR. These situations endorse conflict between M. fascicularis and human because *M. Fascicularis* can easily reach the human area.

As reported by Lee and Priston (2005), *M. fascicularis* was also one of the types of pests in different regions of such as Borneo, Malaysia, Mauritus, Sumatra and Thailand because they damaged the orchards and plantations. Hambali *et al*. (2012) reported that *M. fascicularis* in the Nature Park in Kuala selangor, Malaysia entered the residential area and destroyed the facility residents.

Previous studies about interaction between *M. fascicularis* and human in the natural park showed that *M. fascicularis* stole things from human in some natural parks in Singapore and Kaliurang occurred because they are interested in the food brought by humans (Sha *et al*. 2009). Meanwhile, the biting interaction of *M. fascicularis* against humans in Padangtegal, Bali and Gibraltar occurred because humans interfered *M. fascicularis* (Fuentes *et al*. 2007).

Grojogan Sewu Natural Park (TWA GS) is one of the conservation areas in Tawangmangu Village, District Tawangmangu, Karanganyar Regency, Province of Central Java. TWA GS has a function as a conservation park, e.g. species *M. fascicularis* (Siswantoro *et al*. 2012). TWA GS does not have a buffer zone so that the interaction between *M. fascicularis* and citizens can not be avoided.

Al-Hayat: Journal of Biology and Applied Biology, Vol 3, No 1 (2020), 31-36
DOI. 10.21580/ah.v3i1.6069

There is no study found regarding the interaction between human and *M. fascicularis* in TWA GS. The results of this study can be used as a basis in conservation management of *M. fascicularis* in TWA GS.

Figure 1. Research location and home range of patapan group long tailed macaques in TWA GS

2. Materials and Methods

2.1. Study Site

This research was conducted in TWA GS, which is located in the administrative region of Karanganyar Regency, Province of Central Java. The location of TWA GS is on S 7°3917-7°3949 and E 4°1853 - 4°2016 with altitude 950 meters above sea level. TWA GS has a total area of 64,30 hectares (Siswantoro *et al*. 2012). There are two groups of *M. fascicularis* inhabitant TWA GS, namely *pandhapa* and *patapan*. Home range of *pandhapa* group located near counter 1, meanwhile home range of *patapan* group located near waterfalls.

2.2. Observation of Macaque to Human Interactions

The observation of interactions between *M. fascicularis* and humans was conducted from August until November 2016. The group composition of *M. fascicularis* in TWA GS was calculated directly using concentration count (Rinaldi 1992). The interaction between *M. fascicularis* and humans was observed only in *patapan* group, because from early observation data, the frequency of interaction between *M. fascicularis* and humans in *patapan* group was higher compared to *pandhapa* group. The observation of interaction between *M. fascicularis* and humans was conducted six hours per day using ad libitum methods (Altman 1974). The type of interactions observed in this study refer to Sha *et al*. (2009) with some modifications. Interactions were classified into two: (1) aggressive interactions, consist of mobbing, lunging and chasing, threatening facial or vocal threats, stealing luggage, scratching, and bitting, and (2) affiliative gestures consist of proximity and physical contact without aggression.

2.3. Questionnaire Survey

The questionnaire survey included questions about opinions, knowledge, and attitudes of participants toward macaques in TWA GS (Table 1). Participants were divided into visitors (n= 222), workers (n= 54), and residents (n= 74). The visitors are tourists who visit in TWA GS. The workers are employees and seller in TWA GS. Residents were selected based on the distance between their homes and the TWA GS location. We choose distance less than 500 m because M. fascicularis can reach that area.

2.4. Data Analysis

Data about macaques-humans interactions and questionnaire survey were analyzed by descriptive.

3. Results

3.1. Group Composition of Macaques in TWA GS.

The *patapan* group consisted of 79 individuals with 18 adult males, 23 adult females, 33 juveniles, and five infants.

Al-Hayat: Journal of Biology and Applied Biology, Vol 3, No 1 (2020), 31-36
DOI. 10.21580/ah.v3i1.6069

3.2. The Human and *Patapan* Group Interaction.

The interactions of humans- macaques in *patapan* group were classified into agonistic and affiliation. The frequency of affiliation behaviour (55.56%) was higher than agonistic behaviour (44.44%). The most frequent affiliation behaviour was proximity (42.96%) and then physical contact without aggression (12.60%). Meanwhile, the most frequent agonistic behaviour was grabbing (26.11%), followed by facial or vocal threats (15.37%), lunging and chasing (1.30%), scratching (1.11%), bitting (0.37%), and mobbing (0.19%), respectively (table2).

Table 1. Questions on this study

Number	Question
1.	How is your attitude towards macaques in TWA GS?
2.	Have you ever had experienced nuisance problem with macaques in TWA GS?
3.	What type of problem experienced?
4.	What is the cause of problem?
5.	Have you ever fed monkey in past?
6.	Will you feed monkey in future?
7.	Is the natural food of macaque enough in TWA GS?
8.	Do you agree with effectiveness of feeding ban to macaques in TWA GS?
9.	How to manage the macaque problem in TWA GS?
10.	Is the conservation of macaques in TWA GS necessary to be applied?

3.3. Interview Result

3.31. Human Reports on Interactions.

As many as 48.57% of respondents were experiencing nuisance problem with macaques in TWA GS. The most common conflict experienced by visitors (56.47%) and workers (68.29%) were grabbed by the macaques. On the other hand, the residents experienced lunging and chasing by macaques (45.45%). The main factor triggering the nuisance problem was due to many of macaques are interested in foods brought by humans (67.06%). The second to that was an aggressive gesture of human (16.47%), macaques provoked by humans (10.59%), and natural playfulness (5.88%) (Table 3).

3.3.2. Feeding Interactions.

More than 50% of respondents stated that they did not feed macaques in TWA GS and will never do that in future. The visitors (59.46%) and workers (55.56%) stated that they did not feed macaques in TWA GS. Contrast to the residents' result that they did not feed macaques in TWA GS (47.30%). Most of the respondents did

not agree with the feeding ban in TWA GS (65.43%) due to insufficient natural food of macaques (61.71%). The visitors (61.26%) and residents (81.08%) claimed that the natural food for Macaques di TWA GS was inadequate, but the workers claimed the opposite opinion (62.96%).

3.3.3. Attitudes About Macaques and Their Management.

More than 50% of visitors and residents are fond of the presence of macaques. The same applied to 42.59% of workers there. Some of the visitors (27.03%), workers (42.59%) and residents (44.59%) were neutral; meanwhile, a fraction of visitors (8.56%), workers (14.81%),

Table 2. The human and patapan group interactions in TWA GS

Interaction	Number of interaction (N)	Percentage (%)
Affiliative gesture	**(300)**	**(55.56)**
Proximity	232	42.96
Physical contact without aggression	68	12.60
Agonistic	**(240)**	**(44.44)**
Grabbing	141	26.11
Facial or vocal threats	83	15.37
Lunging and chasing	7	1.30
Scratching	6	1.11
Bitting	2	0.37
Mobbing	1	0.19
Total	**540**	**100**

Al-Hayat: Journal of Biology and Applied Biology, Vol 3, No 1 (2020), 31-36
DOI. 10.21580/ah.v3i1.6069

and residents (4.05%) dislike macaques. Most of the respondents assumed that macaques in TWA GS need to be kept alive in the park (57.02%) for educational purpose. Meanwhile, 22.06% of respondents thought to keep away troubled macaques from the urban area. A fraction of respondents (9.74%) believed that the macaques need to be removed from TWA GS, reduce the number of macaques (8.31%), and only 2.87% agreed to eradicate macaques. Most of the respondents agreed that the conservation efforts of macaques are essential to do in TWA GS (96.56%) (Table 3).

Table 3. Results of interviews with visitors, workers, and residents about their attitudes, opinions, and experiences of macaques in TWA GS

Questions	Visitor		Worker		Residence		Total (Visitor + Worker + Residence)	
	N	%	N	%	N	%	N	%
Attitude towards *M. fascicularis* existence in TWA GS								
Like	143	64.41%	23	42.59%	38	51.35%	204	58.29%
Nuetral	60	27.03%	23	42.59%	33	44.59%	116	33.14%
Dislike	19	8.56%	8	14.81%	3	4.05%	30	8.57%
	222		**54**		**74**		**350**	
Have been in conflict with Macaques								
Yes	85	38.29%	41	75.93%	44	59.46%	170	48.57%
No	137	61.71%	13	24.07%	30	40.54%	180	51.43%
	222		**54**		**74**		**350**	
Kind of conflict with Macaques in TWA GS								
Grabbing	48	56.47%	28	68.29%	16	36.36%	92	54.12%
Lunging and chasing	29	34.12%	10	24.39%	20	45.45%	59	34.71%
Spoiling/ravaging stuff	3	3.53%	3	7.32%	8	18.18%	14	8.24%
Bitting	5	5.88%	0	0	0	0	5	2.94%
	85		**41**		**44**		**170**	
Cause of human-Macaques conflict in TWA GS								
Natural palyfulness	1	1.18%	2	4.88%	7	15.91%	10	5.88%
Macaques affected by human's behaviour	12	14.12%	3	7.32%	3	6.82%	18	10.59%
Macaques does aggressive gesture	19	22.35%	3	7.32%	6	13.64%	28	16.47%
Macaques interested in foods	53	62.35%	33	80.49%	28	63.64%	114	67.06%
	85		**41**		**44**		**170**	
Feeding in the past								
Yes	90	40.54%	24	44.44%	39	52.70%	153	43.71%
No	132	59.46%	30	55.56%	35	47.30%	197	56.29%
	222		**54**		**74**		**350**	
Feeding in the future								
Yes	79	35.59%	19	35.19%	34	45.95%	132	37.71%
No	143	64.41%	35	64.81%	40	54.05%	218	62.29%
	222		**54**		**74**		**350**	
Natural food existence in TWA Grojogan Sewu								
Sufficient	86	38.74%	34	62.96%	14	18.92%	134	38.29%
Insufficient	136	61.26%	20	37.04%	60	81.08%	216	61.71%
	222		**54**		**74**		**350**	
Handling method of troubled Macaques								
Exterminate the troubled Macaques	7	3.15%	1	1.85%	2	2.74%	10	2.87%
Let it be, as people education media	133	59.91%	31	57.41%	35	47.95%	199	57.02%
Displace the troubling Macaques	22	9.91%	3	5.56%	9	12.33%	34	9.74%
Decreasing the number of Macaques in TWA GS	5	2.25%	12	22.22%	12	16.44%	29	8.31%
Dissociate Macaques from village near TWA GS	55	24.77%	7	12.96%	15	20.55%	77	22.06%
	222		**54**		**73**		**349**	
Feeding prohibition of *M. fascicularis*								

4. Discussion

The frequency of affiliation interaction between *M. fascicularis* and human in TWA GS was higher than that of agonistic interaction. The result of this study is similar to those in Singapore and TWA Telaga Warna, Bogor (Sha *et al.* 2009; Hardin 2015). The highest affiliation interaction in TWA Telaga Warna was monkeys approaching human. In this study, the most observed of

affiliation interaction was proximity where *M. fascicularis* sitting next to human and used as photo's object by visitors. The second highest affiliation interaction was physical contact without aggression, where visitors touch *M. fascicularis*.

The most frequent agonistic interaction in this study was when *M. fascicularis* grab things from the human. The macaque is also interested in food sold by the seller. The frequency of grabbing in TWA GS was higher than that in Singapore (18.15%) and Botanical Garden Penang (BGP), Malaysia (18%) (Sha *et al.* 2009; Perveen *et al.* 2014). The frequency of human bitten by *M. fascicularis* in TWA GS occurred only two occurences out of 240 observed agonistic interactions and happened when visitors fed or distracted *M. fascicularis*. In Padangtegal Wenara Warna, Bali, 48 of bitten cases from 420 interaction were observed (Fuentes *et al.* 2007), in Gibraltar, there was 39 bitten interaction found (Fuentes 2006), while in Singapore seemed no bitten interaction occurred (Sha *et al.* 2009).

The result from actual observation towards human-*M. fascicularis* interaction in TWA GS was linear to the result of the interview. About 50% of respondents were reported to have a conflict with *M. fascicularis*. The highest conflict was grabbing, followed by lunged and chased by *M. fascicularis*. This interactions were caused by *M. fascicularis* who frequently interested in human's stuff. *M. fascicularis* followed the visitors who brought a bag or food in a plastic bag. This result was similar to what has been happened in Singapore (Sha *et al.* 2009) and TWA Kuala Selangor, Malaysia (Hambali *et al.* 2012).

Based on the interview result, the visitors and workers tended not to give any food to *M. fascicularis*. On the other hand, the residents feed *M. fascicularis*. Visitors and workers are having more awareness about the danger posed by feeding *M. fascicularis* than residents. In Singapore, the percentage of respondents who feed *M. fascicularis* was lower (14.2%) than in TWA GS. This condition is due to the fine system that has been applied in Singapore. The regulation in some tourist parks aimed to reduce the direct interaction between *M. fascicularis* and human, in order to prevent disease transmission from *M. fascicularis* to human. In TWA GS and Padangtegal Wenara Warna, Bali (Fuentes *et al.* 2007), the feeding ban has been enforced but without fine system. It makes people ignore the rule and still feed the *M. fascicularis*.

The results show that most respondents in this study were fond of the presence of *M. fascicularis*. The situation is different from Singapore, where most people showed neutrality with the presence of *M. fascicularis* (Sha *et al.* 2009). In this study, most respondents thought that *M. fascicularis* in TWA GS need to be kept alive because they can be used as primate edutourism. This positive attitude showed that respondent understood the importance of *M. fascicularis* conservation and can be served as a base for supporting *M. fascicularis* conservation effort (Rocha dan Fortes 2015).

Factors triggering agonistic interaction between *M. fascicularis* and human in TWA GS were mostly caused by the macaques interested in food and human disturbance. Some regulation needs to be applied to reduce **agonistic** interaction, such as prohibition for human of bringing foods and not disturbing *M. fascicularis* in the tourist area. The macaque- human interaction may also be caused by the lack of availability of *M. fascicularis* natural food source in TWA GS. It is crucial to do future research on the feeding ecology of *M. fascicularis* in TWA GS as an effort to deal with *M. Fascicularis* and human problem.

Acknowledgements

The author thanks BKSDA of Central Java who permitted this research.

References

Altman J. 1974. *Observational Study of Behaviour: Sampling Methods*. Chicago (US): University of Chicago.

Djuwantoko, Retno NU, Wiyono. 2008. Interaksi agresif monyet, *Macaca fascicularis* (Raffles, 1821) terhadap wisatawan di hutan wisata alam kaliurang, Yogyakarta. *Biodiversitas*. 9(4): 301-305.

Fakhri H. 2012. Studi awal populasi dan distribusi *Macaca fascicularis* di Cagar Alam Ulolanang Raffles. [skripsi]. Semarang (ID): Universitas Negeri Semarang.

Fooden J. 1995. Systematic review of Southeast Asian long tail macaques, *Macaca fascicularis*. *Field Zool*. New series (81): 1- 20.

Fuentes A. 2006. Human culture and monkey behaviour: assessing the context of potential pathogen transmission between macaques and humans. *Am J Primatol*. 68: 880- 896.

Fuentes A, Shaw E, Cortes J. 2007. Qualitative assessment of macaques tourist sites in Padangtegal Bali, Indonesia and the upper rock nature reserve, Gibraltar. *Int J Primatol*. 28: 1143-1158.

Gumert MD, Fuentes A, and Jones Engel L.2011. *Monkey on The Edge: Ecology and Management of Long- Tailed Macaques and Their Interface with Humans*. New York (US): Cambridge University Press.

Hambali K, Ismail A, Zulkifli SZ, MD-Zain BM, Anuar A. 2012. Human- macaque conflict and pest behaviour of long tailed macaques (*Macaca fascicularis*) in Kuala Selangor Natural Park. *TNH*. 12(2): 189-205.

Hardin CM. 2015. *Macaca fascicularis*- human interaction in Telaga Warna, Bogor, West Java. [skripsi]. Bogor (ID): Institut Pertanian Bogor.

Lee PC, Priston NEC. 2005. *Human Attitudes to Primates: Perceptions of Pests, Conflict and Consequences for Primate Conservation*. In: Paterson JD, Wallis J, Editors. *Commensalism and Conflict : The Human Primate Interface*. Norman, Oklahama: American Society of Primatology. P: 1-23.

Perveen F, Karimullah, Anuar S. 2014. Long-tailed macaques, *Macaca fascicularis* (primate: Cercopithecidae) : human-monkey behavioural interaction in Botanical Garden Penang, Malaysia. *Annals Exp Biol*. 2(1): 36-44.

Rinaldi D. 1992. The use of triangel and concentration count methods in the investigation of gibbon distribution and population. *Media Konser*. 4: 9-21.

Rocha LC, Fortes VB. 2015. Perceptions and attitudes of rural residents towards capuchin monkey, in the area of influence of the Dona Francisca Hydroelectric Power Plant, South Brazil. *Amb n Soc*. 18 (4): 19-34.

Sha JCM, Gumert MD, Lee BPYH, Engel LJ, Chan S, Fuentes A. 2009. Macaque- human interactions and the social perception of macaques in Singapore. *Am J Primatol*. 71: 825-839.

Siswantoro H, Sutrisno A, Dwi PS. 2012. Strategi optimasi wisata massal di kawasan konservasi taman wisata alam Grojogan Sewu. *J Ilmu Lingk*. 10 (2): 100-116.

Wheatley BP. 1980. *Feeding and Ranging of East Bornean Macaca fascicularis*. New York (US): Van Nostrand Reinhold co. pp:215-246.