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On survey of Long-tailed macaque (Macaca Fascicularis) population in Central Java Province

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Abstrak

Kera Ekor Panjang atau "LTM" (Macaca fascicularis) merupakan salah satu spesies yang diperdagangkan secara internasional dan sebagian besar LTM yang diekspor diambil dari alam termasuk di Indonesia. Eksploitasi besar-besaran ini dapat mengakibatkan kepunahan. Oleh karena itu, diperlukan regulasi untuk menetapkan kuota ekspor LTM. Salah satu kegiatan penetapan kuota tersebut adalah survei penduduk LTM. Data jumlah penduduk LTM di setiap daerah khususnya Indonesia masih belum mencukupi. Pemerintah bersama pemangku kepentingan mulai memperkirakan populasi LTM di lapangan termasuk di Jawa Tengah. Penelitian ini bertujuan untuk menganalisis estimasi jumlah penduduk LTM di Jawa Tengah khususnya di sembilan kabupaten/kota. Survei penduduk LTM di Jawa Tengah dilaksanakan di sembilan Kabupaten/Kota. yaitu Kabupaten Semarang, Kabupaten Magelang, Kabupaten Temanggung, Kabupaten Pemalang, Kabupaten Boyolali, Kabupaten Karanganyar, Kabupaten Sukoharjo, Kabupaten Wonogiri, dan Kota Semarang. Data populasi diperoleh dengan menggunakan metode konsentrasi hitung. Pengamatan diulang minimal dua kali pada setiap titik pengamatan. Satuan pengamatannya adalah pagi dan sore hari (pengamatan satu kali). Pengamatan dilakukan pada pukul 05.30-11.00 (pagi) dan pukul 15.00-17.00 (siang). Hasil penelitian menunjukkan total 811 individu LTM ditemui selama pendataan di sembilan kabupaten/kota di Jawa Tengah. Total luas wilayah survei di sembilan kabupaten/kota adalah 331,07 ha. Gua Kreo Kota Semarang merupakan salah satu lokasi dengan jumlah LTM tertinggi (164 individu), dan jumlah LTM terendah di Kabupaten Boyolali (43 individu).penanda kesantunan berbahasa "selamat pagi, selamagt siang, mohon maaf, terima kasih, dan Ibu".

Abstract

Long-Tailed Macaque or "LTM" (Macaca fascicularis) is one of the internationally traded species and most of the exported LTM are taken from the wild includng in Indonesia. This massive exploitation may result in extinction. Therefore, regulations to set the LTM export quota are necessary. One of the activities to set this quota is the LTM population survey. Data on LTM population in each area especially Indonesia is insufficient. Governments, together with stakeholders, begin to estimate the LTM population in the field include in Central Java. The objective of the study was to analyze estimation of the population on LTM in Central Java especially in nine districy/city. Survey of LTM population in Central Java is implemented in nine District/City. , i.e., Semarang District, Magelang District, Temanggung District, Pemalang District, Boyolali District, Karanganyar District, Sukoharjo District, Wonogiri District, and Semarang City. Population data obtained by using the method concentration count. The observation was repeated at least twice at each observation point. The observation units are morning and afternoon (one-time observation). The observation is carried out at 05.30-11.00 (morning) and 15.00-17.00 (afternoon). The Result of tf the research showed total of 811 LTM individuals are encountered during data collection in nine districts/cities in Central Java. Total survey area in nine districts/cities is 331.07 ha. Kreo Cave, Semarang City, is one of the locations with the highest number of LTM (164 individuals), and the lower number of LTM in Boyolali distric (43 individuals).

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PENDAHULUAN

Long-Tailed Macaque or "LTM" (*Macaca fascicularis*) is a wildlife species distributed in Sumatra, Borneo, Java, Bali, West Nusa Tenggara, and East Nusa Tenggara. LTM can live in various habitat types, including secondary forests, forest fringe areas, riparian areas, plantation, agricultural lands, and mangrove forests on coastal areas. This species lives in colonies containing several males and females, and led by one alpha male. Number of the females is usually greater than the males (Nasri et al 2021).

Currently, LTM is one of the internationally traded species (Nijman and Healy, 2016). Most of the exported LTMs are taken from the wild. LTM is not a protected species in Indonesia, but it is included in Appendix II of CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) (IUCN 2022). This status means that this species is yet to be threatened by extinction, but may become one if the trade continues without regulation. International trade of LTM reached 450,000 individuals during 2008-2019 (Hansen et al., 2019). The distribution, density, and abundance data of LTM are lacking (Kyes et al., 2011).

According to Eudey (2008), Indonesia is the largest exporter of LTM. Compared to other primates, MEP is the most frequently bought and much taken from their natural habitat (Eudey 2008; Foley and Shepherd 2011; Lee 2011). This massive exploitation may result in extinction. Therefore, regulations to set the LTM export quota are necessary. One of the activities to set this quota is the LTM population survey in Indonesia.

Data on LTM population in each area is insufficient especially in Indonesia. Governments, together with stakeholders, begin to estimate the LTM population in the field. This estimation is urgently required as an important material to be considered in setting offtake quota of the species as an export commodity. One of the locations with potential LTM presence is Central Java Province. Research to collect data on the species population in Central Java is yet to reach an appropriate amount. Therefore, it is necessary to conduct research to estimate the species population in several areas of Central Java. Previously, LTM research in Central Java was only recorded in Karanganyar district in a conservation area and the study is about the interaction between LTM with the humans (Syah 2020).

The introduction contains the purpose of article/research that is formulated and presented by an adequate introduction and avoids detail references and research result presentations. The research urgency, supporting facts, and data must be included. A preliminary research result should be explained as the basis of the research. Before mentioning the objective/s, a gap analysis must be elucidated. The gap analysis states the difference/s between the research and other previous studies. At this point, the novelty will be apparent. The research stance must be included, whether it corrects, debates, or support the previous research. The objective of the study was to analysis estimation of the population on LTM in Central Java especially in nine district/city.

METHODS

Research Location and Time

Survey of LTM population in Central Java is implemented in several locations, i.e., Semarang District (2 locations), Magelang District (2), Temanggung District (3), Pemalang District (2), Boyolali District (1), Karanganyar District (1), Sukoharjo District (1), Wonogiri District (2), and Semarang City (1) (Table 1). The locations are determined through several activity phases, i.e., field survey (ground check), permit application, and survey implementation. This research was conducted on 28 May - 11 June 2022.

Table 1 Research location

NO.	KABUPATEN/ KOTA	KECAMATAN	DESA/ TITIK	Elevasi
1.	Kab. Semarang	Banyubiru	Cemoro Sewu	957
		Banyubiru	Gumuk Reco	823
2.	Kab. Magelang	Magelang Selatan	Gunung Tidar I	419
		Magelang Selatan	Gunung Tidar II	436
		Magelang Selatan	Gunung Tidar III	500
3.	Kab. Temanggung	Pakis	Pakis	784
		Kledung	Botorono	1287
		Kledung	Jambu	1427
		Ngadirejo	Jumprit	1275
4.	Kab. Pemalang	Belik	Sawangan	414
		Belik	Candi Batur	428
5.	Kota Semarang	Mijen	Goa Kreo	183
6.	Kab. Boyolali	Cepogo	Wonodoyo	1513
7.	Kab. Karanganyar	Ngargoyoso	Jatirejo	643
8.	Kab. Sukoharjo	Bulu	Tiyaran	200
9.	Kab. Wonogiri	Selogiri	Kepatihan I	188
		Selogiri	Kepatihan II	185

Data Collection Concentration Count

Initial survey to determine observation locations is based on the wildlife concentration area. Population data obtained by using the method

concentration count (Anggraini et al., 2013). The observation was repeated at least twice at each observation point. The observation units are morning and afternoon (one-time observation). The observation is carried out at 05.30-11.00 (morning) and 15.00-17.00 (afternoon).The following information is to be documented once the wildlife is encountered: number of individuals; time of encounter; age structure (adult/juvenile); sex;habitat type; coordinates; elevation; and other environmental factors (*temperature/ humidity/ light intensity).

Result and Discussion

Recapitulation of LTM Population in Semarang District

This research was conducted in Semarang District on 28-30 May 2022. Data collection started with permit application and location surveys. The locations were determined based on information from community members. There are 2 observation or data collection points, i.e., Cemoro Sewu and Gumuk Reco located in Banyubiru Subdistrict. Observation in both areas identifies 2 LTM groups. The first LTM group of 22individuals is found in Cemoro Sewu. This area is dominated by pine trees used as a resting place by LTM. The species cross the road to reach community farms to feed. Calliandra, cassava, and vegetable farms are the species' feeding places, while dense bamboo forests are its playgrounds.

The second LTM group of 52 individuals is found in Gumuk Reco (Table 2).Gumuk Reco is a natural scenic tourism destination. An elongated crimson cliff is one of the interesting features of this place. This cliff serves as a habitat to the species.The species feed, play, and rest on various plants near the cliff and in the river below the cliff. In the morning, LTMs are seen to relax on top of trees while picking fleas. During the day,they search for food in community farms. In the evening, they climb the cliff to play and rest.

Table 2. Number of LTM individuals in Semarang District

VILLAGE/ POINT	Number of Individuals	Coordinates	
		X	Y
Cemoro Sewu	22	436428.83	9187839.68
Gumuk Reco	52	436798.23	9188402.98

Based on the observation, the number of LTM individuals found is lower than that reported by community members. They found that there are nearly 500 LTM individuals distributed in 4 groups in Sepakung Village. The species, which are present in the village, can be considered as pest according to the community because they often damage community farms and agricultural lands. The community demands follow-up action to reduce the LTM population in the village.

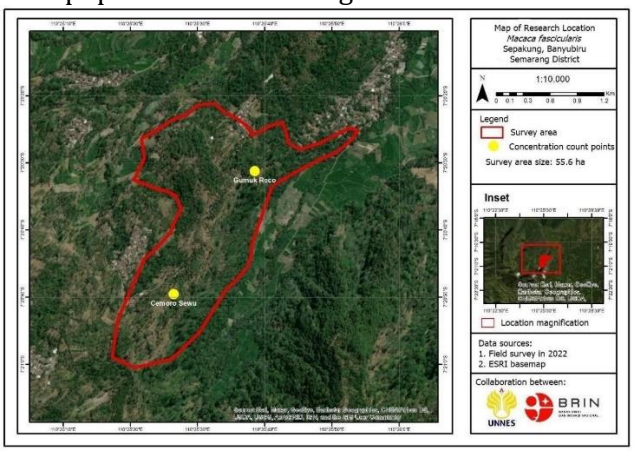


Figure 1. Map of research locations

Based on age classification of LTM in Sepakung Village, the number of individuals in each class is nearly the same. Adult males, adult females, and adolescent males share thesame number (14 individuals). Total number of adolescent males and juveniles is 13 individuals, while infants are 6 (Figure 3).

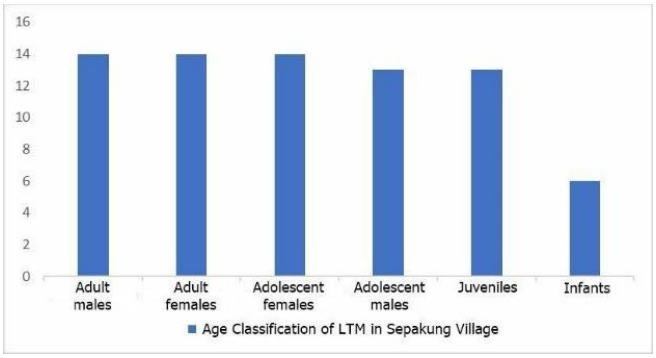


Figure 3. Age Classification of LTM in Sepakung Village

Recapitulation of LTM Population in Magelang District

Data collection in Magelang District was conducted on 1 and 2 June 2022 in Mount Tidar Botanical Garden and Pakis Village. The locations were determined based on information from community members and Mount Tidar Botanical Garden management. Inthe botanical garden, 3 LTM groups of 113 individuals are encountered. However, no LTMindividuals are found during the observation in Pakis Village.

Mount Tidar, South Magelang

Mount Tidar is a religious site in South Magelang Subdistrict, Magelang District. Mount Tidar has a management area of 70 ha with the main area of 69 ha. This area is dominated by pine trees and sugar palms. LTM currently populating

Mount Tidar were intentionally released in this area. Every day, Mount Tidar management provides fruits thatare put near the entrance for the species.

Observation location in Mount Tidar Botanical Garden is divided into three observation points. The first point (Mount Tidar I) is located near a bus station, the second point (Mount Tidar II) is near the entrance gate and feeding area, and the third point(Mount Tidar III) is located near Sheikh Subakir tomb and Mount Tidar peak (Figure 4). Based on the observation in Mount Tidar I, there are 39 LTM individuals. Number of LTM individuals on Mount Tidar II and Mount Tidar III are 27 and 47, respectively.

Table 3. Number of LTM individuals on Mount Tidar

POINT	Number of Individuals	Coordinates	
		X	Y
Mount Tidar I	39	414220.69	9171559.07
Mount Tidar II	27	413986.37	9171617.64
Mount Tidar III	47	413740.52	9171288.81

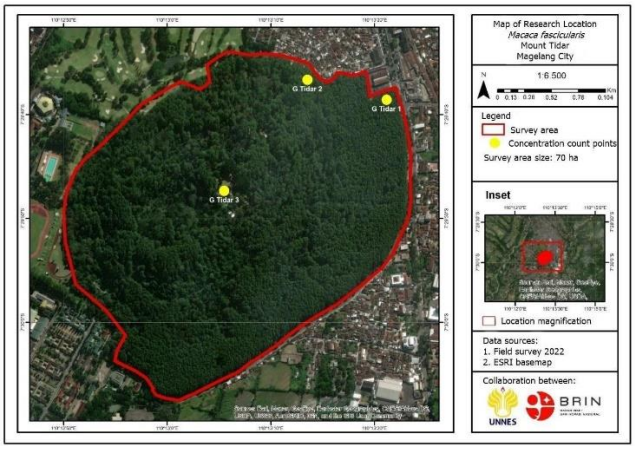
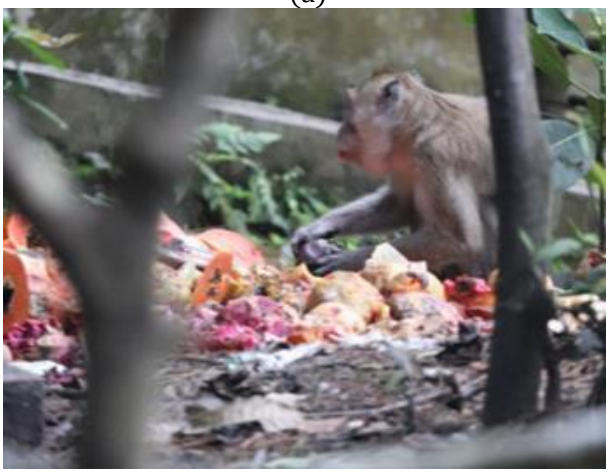


Figure 4. Map of research location

There are three LTM groups in Mount Tidar. Based on the observation in Mount Tidar I, the LTM groups feed on foods given by visitors and leftovers from kiosks around the station. LTM are encountered in the observation point at 08.00-12.00. Dominated by pine trees, this point is very near a highway, causing many people feed the species while passing through the bus station. This activity changes the species behaviour and feeding habit. LTM groups in Mount Tidar II feed on food given by the botanical garden management. The food is typically provided by the management at 10.00. This point is surrounded by pine trees. LTM in this point often interacts with visitors who sometimes give them food and drink. The species often enter the settlement and climb up the area management building. LTM groups in Mount Tidar III also feed on food from visitors, similar to those near the bus station (Figure 5). These groups are distributed around the mount peak and sheikh Subakir tomb. In this point, LTM forageon the peak and take a rest around the tomb.

(a)



(b)

(c)

Figure 5. LTM activities in Mount Tidar I (a), Mount Tidar II (b), and Mount Tidar III (c)

Based age classification, LTM population in Mount Tidar is dominated by adult males (29

individuals), followed by juveniles (24 individuals), adolescent males (19 individuals), adult females (18 individuals), adolescent females (13 individuals), and infants (9 individuals). In Mount Tidar, it is found that the number of the males is greater than the females (Figure 6).

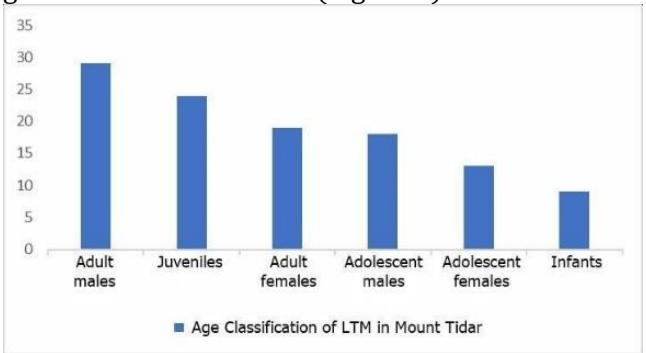


Figure 6. LTM Age Classification in Mount Tidar

Pakis Village, Pakis Subdistrict

Data collection in Pakis Village was conducted in Balak Subvillage (Figure 7). Habitat types of this area are bamboo forest, farm, and rice field. Based on community information, LTM nest in Setalang Hill bamboo forest. During dry season, LTM is often found in community farms and even in Pakis' Military Rayon Command (KORAMIL). The species often cause damages to cassava, non-rice crop, common bean, onion, corn, and other vegetable plants. Based on observation for two days, no LTM individuals are found.

Table 4. Number of LTM individuals on Pakis Village

POINT	Number of Individuals	Coordinates	
		X	Y
Pakis Village	0	425764.50	9176102.48

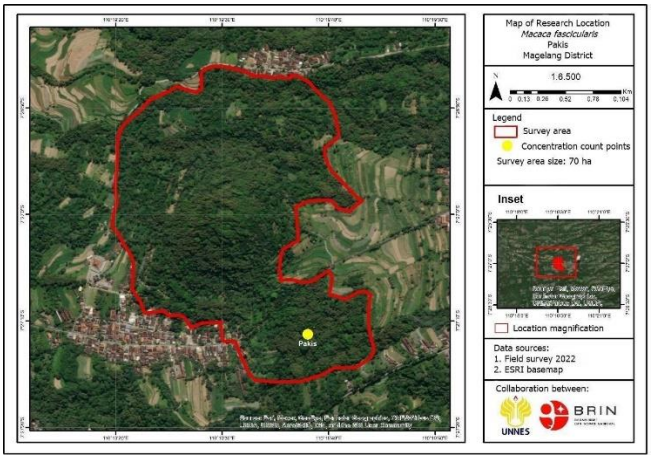


Figure 7. Map of research locations in Mount Balak

Recapitulation of LTM Population in Temanggung

Data was collected on 4-5 June 2022 in locations determined based on information from community members, i.e., Jambu and Petarangan Villages (Kledung Subdistrict) and Umbul Jumprit Village (Ngadirejo Subdistrict). Based on the observation, LTM are found in each village, i.e., 23 individuals in Jambu, 47 in Petarangan (Botorono), and 74 in Jumprit (Table 5).

Table 5. LTM Population in Temanggung

Village	Number of Individuals	Coordinates	
		X	Y
Jambu	23	394850.17	9189145.58
Botorono	47	396206.02	9190827.49
Jumprit	74	391428.58	9198008.47

Jambu Village, Kledung Subdistrict

In Jambu Village, data is collected in farms, and bamboo forests at an elevation of 1,427 metres above sea level (m a.s.l.). Apart from bamboo forests, the farms are planted with tobacco, chilli peppers, and cassava (Figure 8).

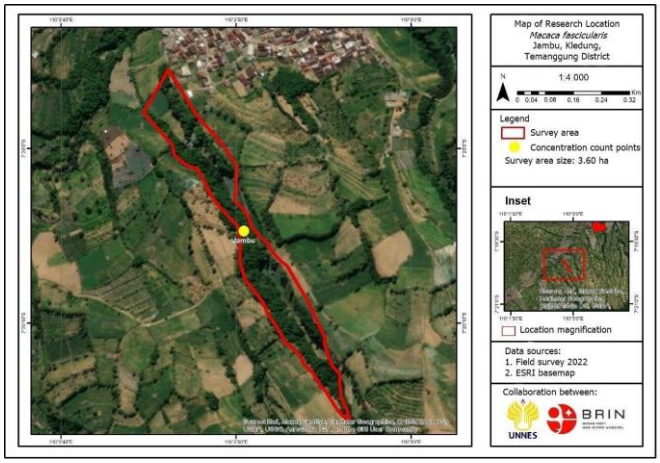


Figure 8. Map of Locations in Jambu Village

Based on the observation, one LTM group of 23 individuals was found passing through bamboo forests in the afternoon. The forest is a suitable place for LTMs to move from their nest to the feeding grounds. River on a slope serves as LTM source of drinking water. The size of survey area is 3.6 ha. This number of individuals is lower than that reported by community members. According to them, the number of LTM in JambuVillage reaches 100 individuals. LTM are often seen during dry season. When their food in nature run out, they search for food in community farms. LTM often target cabbage, onion, cassava, corn, and sometimes steal farmers' meal.

Based on age classification, it is known that the most frequently encountered class is adult males (6 individuals), followed by adolescent males and juveniles (4 individuals), adolescent females and adult females (3 individuals), and infants (3 individuals). In this village, the males are more frequently found than the females (Figure 9).

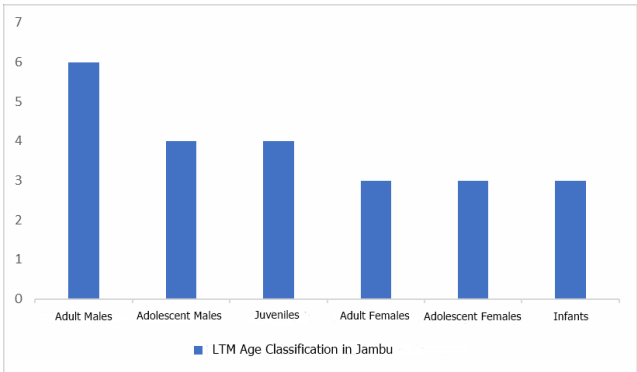


Figure 9. Age classification of LTM in Jambu Village

Botorono, Petarangan Village, Kledung Subdistrict

Botorono is a hill located in Petarangan Village and used as a tourist attraction. The hill has an elevation of 1287 m a.s.l. and a surveyed area of 16.3 ha (Figure 10). This hill with considerable slopes, which is rarely visited by humans, is a suitable habitat for LTM. The typical vegetation species in this area include calliandra tree, vegetable, bamboo, and river tamarind.

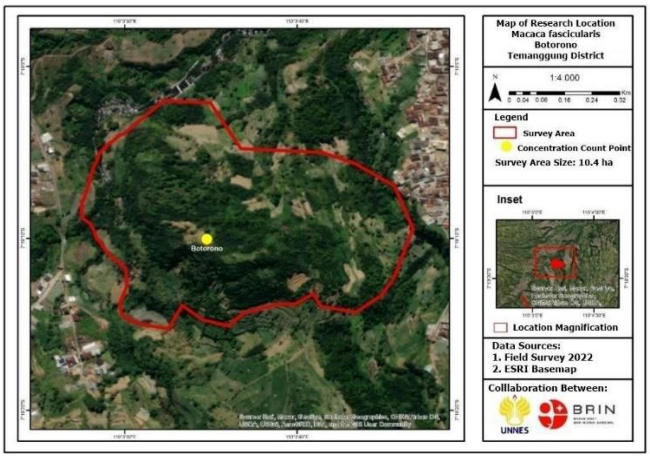


Figure 10. Map of locations in Botorono

During the observation, LTM are commonly found in Botorono hilltop area (47 individuals). The encountered individuals are used to interact with humans. Their identified activities include picking fleas, eating calliandra flowers and river tamarind leaves and seeds, sunbathing, and mating. The species are active at 07.30-09.00. and 15.00-17.00.

Based on age classification, the most frequently found individuals in Botorono are adult males (10 individuals), then followed by infants (9 individuals), female adults and adolescent males (8 individuals), adolescent females (7 individuals), and infants (5 individuals). In Botorono, the number of the males is greater than the females (Figure 11)

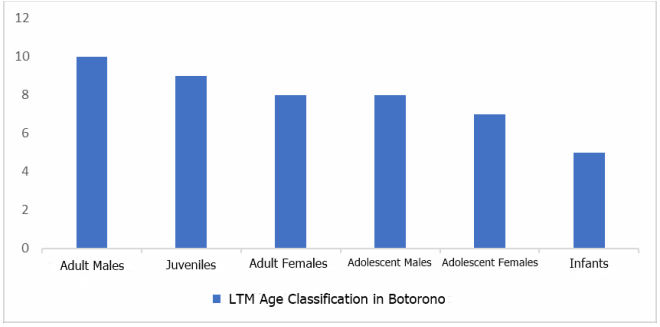


Figure 11. LTM Age classification in Botorono

Umbul Jumprit, Ngadirejo

Umbul Jumprit is owned by Perhutani (state forest company) under Kedu Utara Forest Management Unit (FMU) (Figure 12). This location, where springs are found, becomes a tourist attraction. Serving as habitat to LTM, this area is dominated by *Ficus* sp, *Engelhardia spicata*, and *Pinus merkusii*. According to the management, 200 LTM individuals are present in the area of 3.1 ha, but only 74 of them are found during observation.

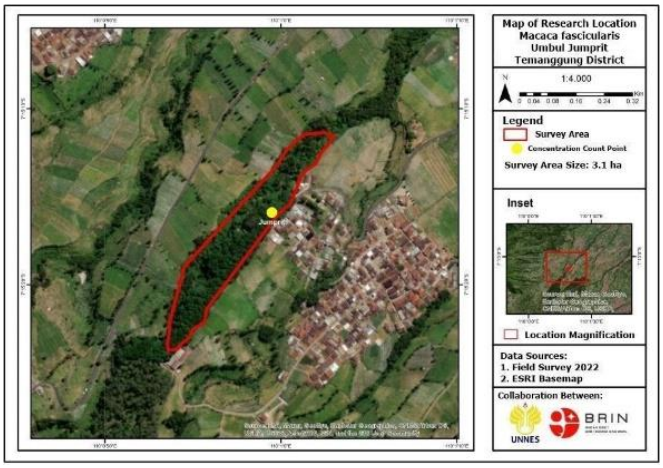


Figure 12. Map of Umbul Jumprit

Factors affecting the LTM population include the community's belief that this species is sacred and, therefore, its offtake is forbidden. In addition, the management and community often feed them fruits, snacks, and deep-fried food, causing the LTM to approach visitors carrying plastic bags. The species are no longer bothered by or afraid of humans. Most of their activities take place on trees and fences, e.g., playing, picking fleas, feeding, and mating. They will get down to the ground and approach the visitors feeding them.

adolescent females, 11 adult males, 11 adult females, 11 adolescent males, and 10 infants. Number of the females is greater than the males (Figure 13).

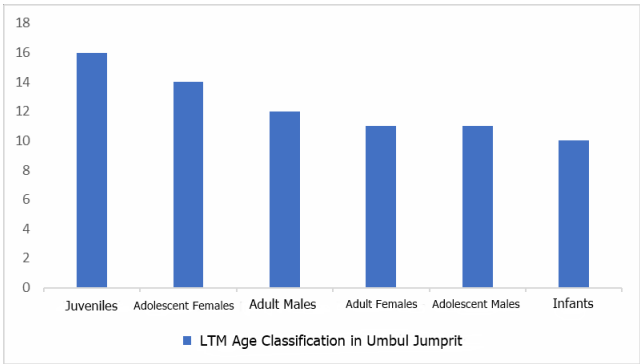


Figure 13. LTM Age Classification in Umbul Jumprit

Recapitulation of LTM Population in Pemalang District

Data collection was carried out on 8-9 June 2022 in locations determined based on information from the community. This activity took place in Sawangan and Candi Batur Subvillages in Bulakan Village, Belik Subdistrict. Based on observation, there are 19 individuals of LTM found in Sawangan Subvillage and 105 individuals in Batur Temple (Table 6).

Table 6. Number of LTM in Pemalang District

VILLAGE/ POINT	Number of Individuals	Coordinates	
		X	Y
Sawangan	19	312066.77	9211264.12
Batur Temple	105	312957.47	9209729.38

Sawangan Subvillage, Bulakan Village, Belik Subdistrict

In Sawangan Subvillage, the data was collected in an area comprising bamboo forest, weeping fig forest, and vegetable farm at an elevation of 414 m a.s.l., with total area of 4 ha. This area is situated very close to the community settlement (Figure 14). The observation locations were determined based on the information on the community's encounters with LTM and information from subvillage heads and Bulakan Village Head

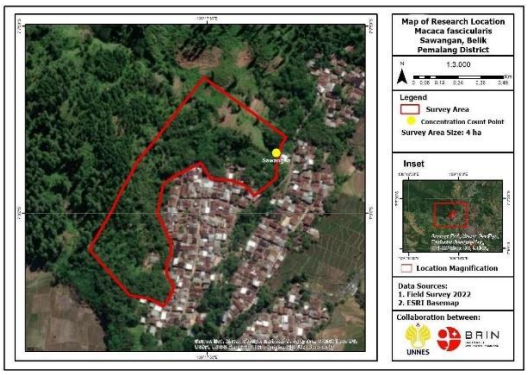


Figure 14. Map of Research Location in Sawangan

Based on the observation, 1 LTM group comprises 19 individuals. The observed activities of this species include stealing foods from community settlements, picking fleas, feeding, and taking a rest in bamboo or weeping fig trees, and heading towards the river and back to their nest. This species is active at 07.00-09.00 and 16.00-17.30 Figure 15). The presence of LTM in settlement area is concerning to the community because this species enters their houses and kitchens, and steals foods and some jars of cookies. The species also cause damage to the community's farms to steal food. The proximity of the settlement to LTM habitat and feeding ground has changed this species behaviour.

Figure 15. LTM are looking for food.

Based on age classification, LTM population in Sawangan Subvillage is dominated byjuveniles (6 individuals). Numbers of adult males and adult females are almost equal, i.e., 4and 3 individuals, respectively. The population also includes 3 adolescent males, 2 adolescent females, and 1 infant. Number of the males is greater than the females (Figure 16).

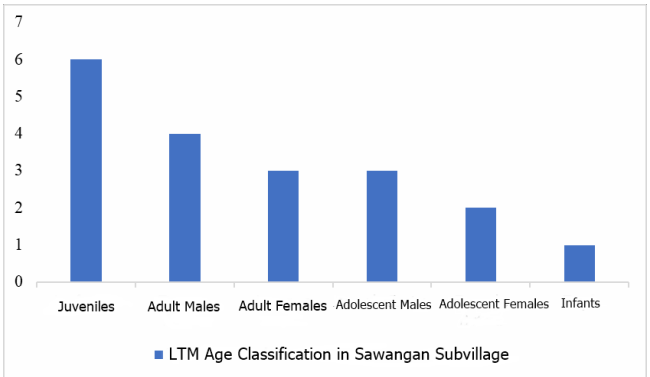


Figure 16. LTM Age Classification in Sawangan Subvillage

Batur Temple, Bulakan Village, Belik Subdistrict

Covering an area of approximately 3.67 ha, Batur Temple Site is located in Bulakan Village, Belik Subdistrict, Pemalang District (Figure 17). This temple is situated adjacent to the main road and highly accessible. It is still in pristine condition with various plants such as bamboo, *Ficus* sp., and *cembirit*. In the past, Batur Temple served as a hideout of the relatives of Mataram Patih Citra Wirya and Kyai Mpu Brama Kendali who were the ancestors of Bulakan village community. This place plays an important role because of the presence of springs used by Bulakan Village and its surroundings to meet their needs for water.

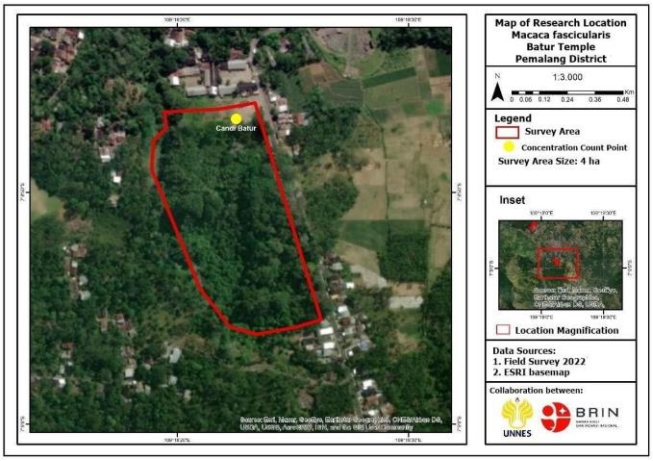


Figure 17. Map of Research Location in Batur Temple

Based on observation, most of the LTM encountered in the parking area of Batur Temple have already adapted to human presence and have interacted with them, so that theyare used to eat several types of foods, such as peanuts, bananas, pineapples, guavas, and 'deep-fried food' (Figure 18). The presence of visitors in this area slowly changes this species behaviour and feeding habit.

Figure 18. Visitors giving food to LTM in Batur Temple

Based on observation, there are two groups, i.e., the front group (near main road) and rear group (bamboo forest). There are 105 individuals encountered during the observation. The observed activities include eating foods from visitors or stealing foods from kiosks, taking bath in puddles after the rain, picking fleas, mating, taking a rest in the forest, and sometimes showing aggressive behaviours. Based on information from the village head andcommunity members, there are four LTM groups and two feeding times. The species are active at 07.00-09.00 and 15.00-17.00.

Based on age classification, LTM population in Batur Temple is dominated by adolescent males (25 individuals), followed by 21 juveniles, 20 adult females, 16 adult males, 14 infants, and 9 adolescent females. Number of the males is greater than the females (Figure 19).

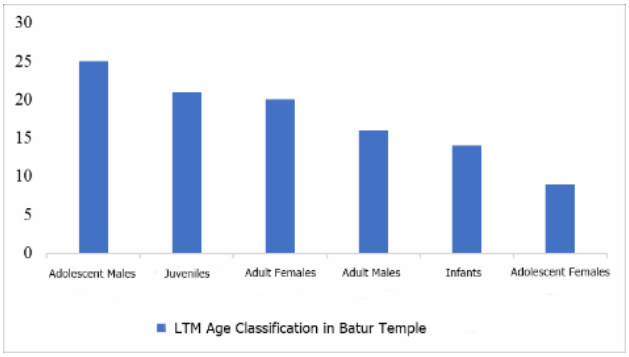


Figure 19. LTM Age classification in Batur Temple

Recapitulation of LTM Population in Semarang City

Data collection was carried out on 10-11 June 2022. Located in Kreo Cave (Fgre 20), the data was collected in two observation points. First point starts from parking area to the bridge and the second point is in the cave area and its surroundings (Figre 21). There are 112 individuals encountered in the first point and 52 individuals in the second point (Table 7). The LTM group on the first point is clearly different from that in the second point. Both groups often fight around the bridge when one of them enters another territory.

Table 7. Number of LTM individuals in Semarang City

VILLAGE/ POINT	Number of Individuals	Coordinates	
		X	Y
Kreo Cave I	112	428239.16	9221909.26
Kreo Cave II	52	427950.46	9222053.64

Based on observation, LTM is mostly found in the first point. The encountered LTM has adapted to human presence and have interacted with them. Peanuts, bananas, and snacks are often fed to the LTM because Batur Temple is a tourist attraction that have visitors almost every day who will then feed the monkeys. This slowly changes the species behaviour and feeding habit. The management of Kreo Cave typically feed them in the afternoon.

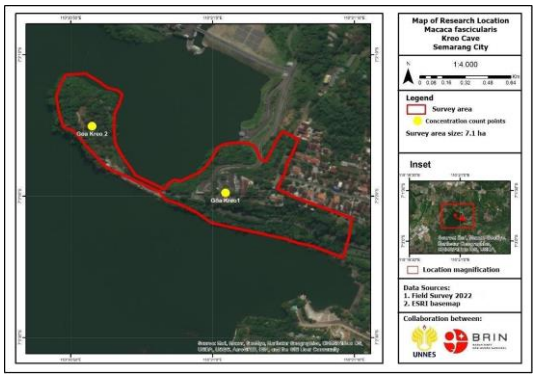


Figure 20. Map of research location in Kreo Cave

(a)

(b)

Figure 21. LTM Groups in the parking area (a) and the cave area (b)

Based on age classification, LTM population in Kreo cave is dominated by juveniles (41 individuals), followed by 41 adult males, 25 adult females, 24 adolescent males, 18 adolescent females, and 13 infants (Figure 22).

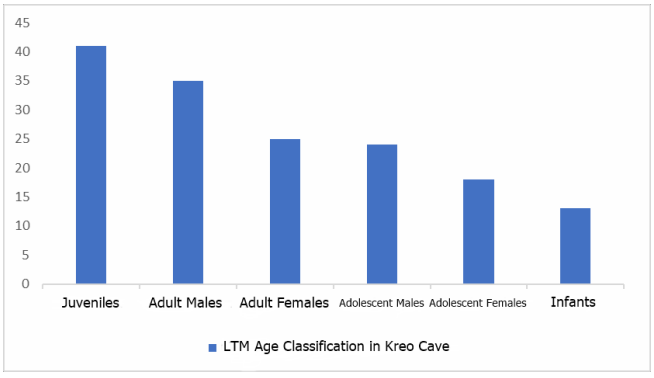


Figure 22. LTM Age Classification in Kreo Cave.

Recapitulation of LTM Population in Karanganyar

Data collection took place on 1-3 June 2022. Being determined based on information from community members, location of this activity was in Jatirejo Village, Ngargoyoso Subdistrict (Figure 23). Observation reveals the presence of 20 LTM

individuals. However, no LTM individuals are found during the second observation (Table 8).

Table 8. Number of LTM individuals in Karanganyar

VILLAGE/ POINT	Number of Individuals	Coordinates	
		X	Y
Jatirejo	20	510067.00	9162271.00

Jatirejo Village, Ngargoyoso Subdistrict

In Jatirejo, the data collection is conducted in community farms (planted with guava, orange, and durian trees), rice fields, and secondary forests dominated by teak trees at an elevation of 643 m a.s.l. In addition to the secondary forest, there is a river with a fairly strong current.

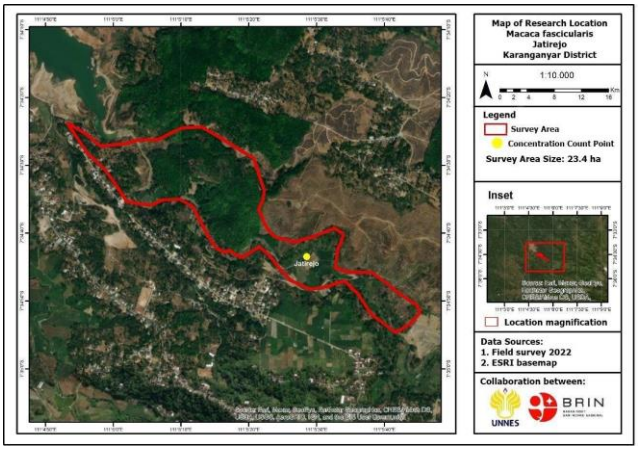


Figure 23. Map of research location in Jatirejo

Based on the observation, there are one group of 16 individuals searching for food in the riverbank and other 4 individuals in community guava farms. The number is lower than that reported by the community. According to them, there are 200 LTM individuals in Jatirejo. A dense secondary forest bordering community farms is an ideal location for LTM individuals to move from sleeping spots to feeding grounds.

The river downhill is also used for drinking. Based on age classification in Jatirejo, there are 9 juveniles (the largest age group), 4 individuals of adult female and adolescent male, 2 adult males, 1 adolescent female, and zero infants. Number of the males in Jatirejo is greater than the females (Figure 24). The presence of LTM is considered as nuisance to the community because they often cause damage to the community farms. Guava and durian are two plant species that are frequently targeted by the species.

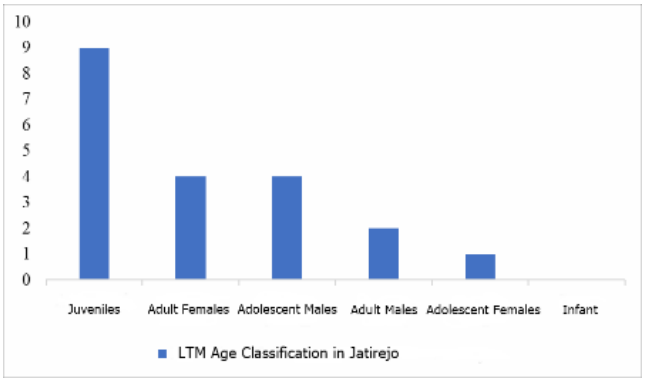


Figure 24. LTM Age classification in Jatirejo

Recapitulation of LTM Population in Sukoharjo District

Data collection took place on 3-4 June 2022. This activity locations were determined based on information from community, i.e., Mount Sepikul, Tiyaran Village, Bulu Subdistrict (Figure 25. One LTM group consisting of 69 individuals is encountered during the observation (Table 9).

Table 9. Number of LTM in Sukoharjo District

VILLAGE/ POINT	Number of Individuals	Coordinates	
		X	Y
Tiyaran	69	483435.00	9139940.00

LTM behaviours seen during the observation include searching for food and playing. LTM eat plants of Fabaceae family and do not respond to humans approaching them. The 20.9 ha survey area is a tourist attraction often visited by the community. The location is a rocky hill with typically homogeneous vegetation, including teak trees (as the main crop), plants of the Fabaceae family, and bamboo.

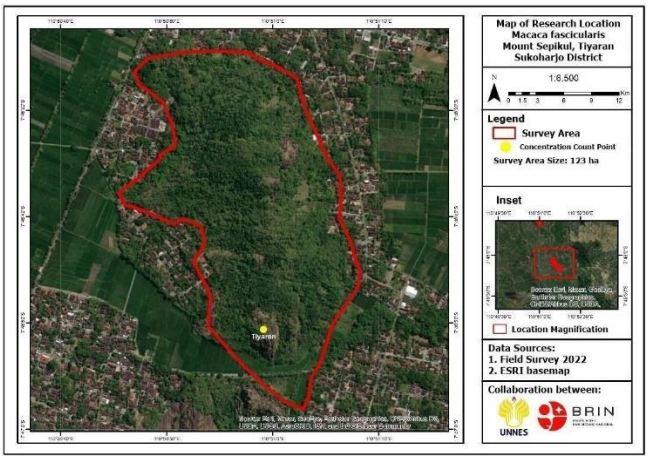


Figure 25. Map of research location on Mount Sepikul, Sukoharjo

Based on LTM age classification in Tiyaran Village, it is known that juveniles and adolescent males are the most commonly found (20 and 14 individuals, respectively), followed by 12 adolescent females, 11 adult males, 11 adult females, and only 1 infant (Figure 26).

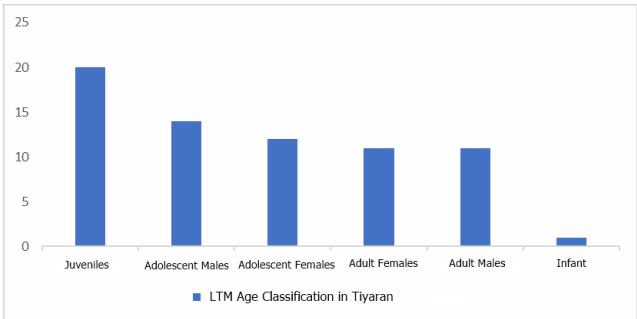


Figure 26. LTM age classification in Tiyaran Village

Mount Sepikul is home to LTM as they have inhabited this area for a long time and never moved from this mount. However, their presence is now considered as nuisance to tourists because they attempt to steal food brought by the tourists. According to community members, LTM frequently cause damage to their rice fields on Mount Sepikul foothill. The encountered LTM also eat satintails on the edge of rice fields and search for food in trash cans, and they tend to fear and avoid tourists visiting Mount Sepikul.

Recapitulation of LTM Population in Wonogiri District

LTM population density data was collected on June 4-5 2022 in Kepatihan Village, Selogiri Subdistrict, Wonogiri District (Figure 27. The data location was chosen based on information from community members on their concerns about LTM. Based on observation in Kepatihan,there are 2 LTM groups are of 27 and 33 individuals, respectively (Table 10).

Table 10. Number of LTM individuals in Wonogiri District

VILLAGE/ POINT	Number of Individuals	Coordinates	
		X	Y
Kepatihan I	27	484583.00	9137180.00
Kepatihan II	33	484504.00	9137373.00

The data is collected in Kepatihan Village with habitat types taking the form of hilly dryland and fields, and dry soil conditions since it is a karst area. The Kepatihan Village Forest is dominated by teak, bamboo, rosewood, mahogany, and cashew trees, while typical crops in fields include legumes, corn, and rice (Figure 40).

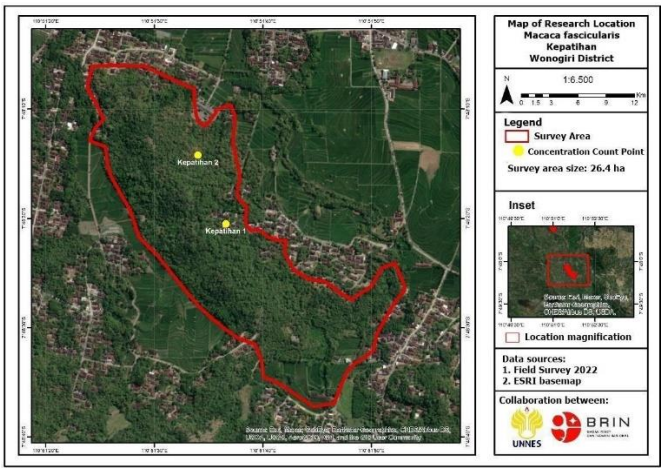


Figure 27. Map of Research Location in Kepatihan

Based on LTM age classification, the most frequently found are juveniles (20 individuals), followed by adult females (15 individuals), adult males (11 individuals), female adolescents (8 individuals), male adolescents (6 individuals), and zero infants (Figure 28).

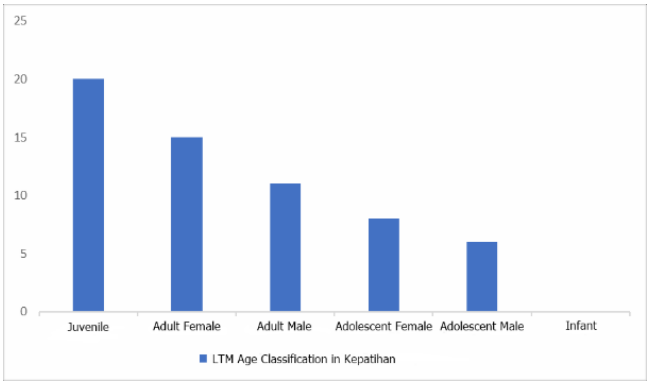


Figure 28. LTM Age Classification in Kepatihan

LTM are found in dryland habitats which are dominated by teak (*Tectona grandis*), cashew (*Anacardium officinale*) and *sonokeling* (*Dalbergia latifolia*) trees. A troop of LTM was seen searching for food in tamarind trees (*Tamarindus indica*) and playing by hanging from trees (Figure 29. The number of individuals found were fewer than that reported by community members saying that there were hundreds of individuals in one group.

Figure 29. LTM activities in Kepatihan

Based on interviews with community members, a troop of LTM individuals attackstheir fields and enters their settlements. The LTM eat the community crops, such as corn and velvet bean. Initially, their attacks only occur during the dry season, but gradually appear during the rainy season. The troop comes during fruit season. Not only fruit trees in theforest, LTM also attack the fruit trees planted in the community house gardens, stealing jarsof food and deep-fried foods. In dealing with this problem, the community can only use simple ways to scare them away, including using *kentongan* (traditional alarm made of wood) and firecrackers and putting up information boards about monkeys in the forest area.

Recapitulation of LTM Population in Boyolali District

Survey of LTM population was carried out on 29-30 May 2022. The data was collected in Wonodoyo Village, which was chosen based on community information on nuisance created by this species. The survey was carried out by recording the encountered LTM. Basedon the results of two-day observation, there are 43 LTM individuals distributed in 3 groups (Table 11).

Table 11. Number of LTM Individuals in Boyolali District

VILLAGE/ POINT	Number of Individuals	Coordinates	
		X	Y
Wonodoyo 1	20	441547.11	9168606.85
Wonodoyo 2	7	442558.11	9168634.17
Wonodoyo 3	16	440597.53	9167223.77

LTM groups are found on hillsides and around community farms. The first group is seen coming down the hill and approaching the community farms to find food. They eat vegetables and fruits, such as mustard green, tomato, shallot, and tobacco. The second and third groups were found on slopes with vegetation dominated by *Acacia decurrens* and calliandra stands. LTM are seen crossing from other hills, hanging from trees, and some of them eating *Acacia decurrens* fruits (Figure 30).

Figure 30. LTM activities

Wonodoyo is one of the villages in Cepogo Subdistrict administrative area, Boyolali District, Central Java. Wonodoyo drylands are mostly used as tobacco, sweet potato, mustardgreen, shallot, chilli, tomato, and green bean farms. Wonodoyo is dominated by secondary forest areas directly adjacent to the Merapi National Park area (Figure 31).

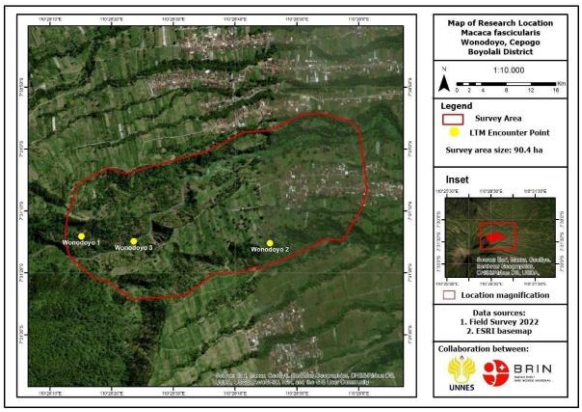


Figure 31. Map of Research Location in Wonodoyo

Based on age classification of LTM in Wonodoyo, it is found that juveniles are the most encountered individuals (14 individuals), followed

by 8 adolescent females, 8 adolescent males, 7 adult females, and 6 adult males (Figure 32).

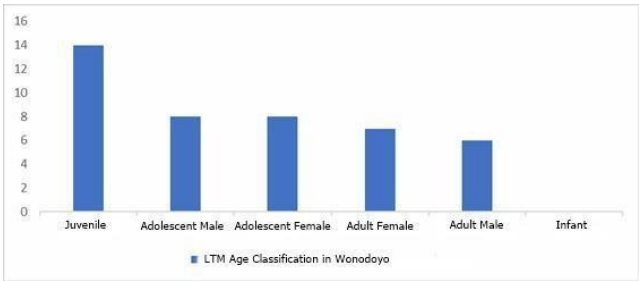


Figure 32. LTM Age Classification in Wonodoyo

Based on information from the local community, LTM are often seen in community farms and settlements in Wonodoyo Village, particularly during dry season taking place approximately from July to October. The presence of LTM is concerning because they frequently cause damage to plants, resulting in crop failure (particularly in vegetable and fruit crops). Community reports that there are more than 5 LTM groups/troops in Wonodoyo, with each group comprises tens to hundreds of individuals. The community have used several methods to scare this species away from their farms, including using guns and firecrackers. Farm owners also often watch their fields and place dogs to scare them away, and install nets and zinc fences to prevent this species from entering their farms. The survey results showthat there are 3 LTM groups with a total of 43 individuals.

CONCLUSION

A total of 811 LTM individuals are encountered during data collection in nine districts/cities in Central Java and Total survey area in nine districts/cities is 331.07 ha. Kreo Cave, Semarang City, is one of the locations with the highest number of LTM (164 individuals), and the lower number of LTM in Boyolali distric (43 individuals).

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