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Research Articles

Brief Report on The Population Survey Long-tailed Macaque (Macaca fascicularis [Raffles,1821]) in West Nusa Tenggara, Indonesia

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ABSTRACT

Survey on the population and distribution of long-tailed macaque (*Macaca fascicularis* [Raffles, 1821]) in the administrative areas of West Nusa Tenggara Province have been conducted during June-July 2024 to examine the distribution and population status on the macaque. The on-road reconnaissance survey, interview and literature studies have applied to collect data. We recorded 6146 individuals from 307 groups of long-tailed macaques in eight regencies. Of the 6146 individuals of long-tailed macaques, 1532 individuals are recorded living in conservation area, while 4614 individuals live in outside conservation area, respectively. The number of individuals and troops of the monkey showed us the minimum number that can be recorded. Further study needs to be conducted in addressed to dig more information on the existence of long-tailed macaque in West Nusa Tenggara. Furthermore, population information and distribution of long-tailed macaques could be the basic knowledge on the population management efforts in the future.

Keywords: Long-tailed macaque; Macaca fascicularis; West Nusa Tenggara; Lombok; Sumbawa.

INTRODUCTION

Long-tailed macaque (*Macaca fascicularis*) is a wide-ranging distribution macaque, mainly found in patchy areas of Southeast Asia and Bangladesh (Eudey, 2008; Fooden & Albrecht, 1993; Fooden, 1995; Kabir & Ahsan, 2012). They also distributed out of their native geographical area e.g. Papua, Mauritius, Angaur (Kemp & Burnett, 2003; Kondo et.al 1993; Poirier & Smith 1974).

Long-tailed macaques occupied various types of habitats. They found in in the forest around mountainous area to the human-settlement area (Hadi *et. al*. 2012, Abegg & Thierry, 2002; Kurland, 1973). Due to their wide geographical distribution, this species is recognizing as "weed species" (Richard *et al*., 1989)

This species is highly variable in morphological features such as cranial morphology and tail size (Fooden & Albrecht, 1993; Fooden & Albrecht, 1999). Hence, long-tailed macaque have divided into ten subspecies; however, as of recent, the most eastern subspecies, *M. f. philippinensis* has come under dispute (Smith et al., 2014).

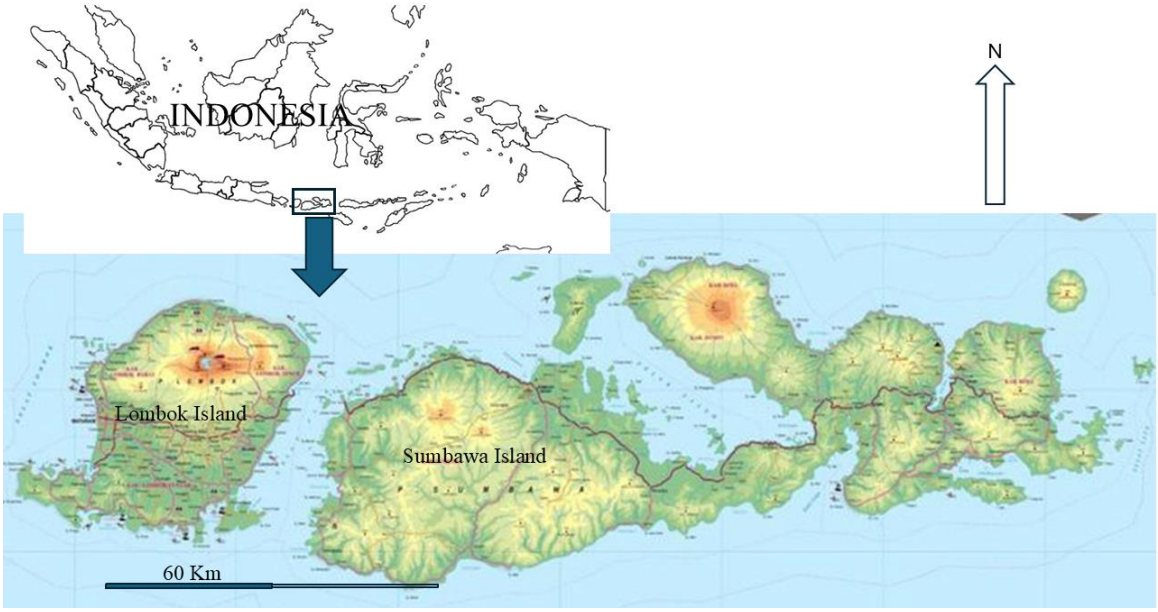
Recently, long-tailed macaques face threats as hunting and persecution in the past and recent period. Another factor those threat to the population of the macaque is changing landscape of Southeast Asia that continues to be deforested, reshaped, and degraded (Hadi et al., 2012; Sodhi *et al.*, 2009). In 2022, IUCN were reviewed long-tailed macaque (*M. fascicularis*) status from vulnerable to endangered (Hansen *et.al.* 2022). The status is still debatable due to insufficient data to support the conclusion.

Studies on long-tailed macaque in West Nusa Tenggara population have been conducted sporadically in the last period (Hadi *et al*., 2012; Kawamoto *et.al*., 1984; Yamin & Artayasa, 2024;(Cahyadin *et al*., 2024). However, those previous studies did not figure the population condition of the long-tailed macaques in West Nusa Tenggara broadly. The recent population survey of long-tailed macaques in West Nusa Tenggara province was aimed at data collection to examine the recent status of long-tailed macaque in the relation to their recent distribution and population size. Furthermore, the recent study also addressed on the contribution to answer the debatable status of long-tailed macaque assessed by IUCN in 2022 (Hansen *et.al*. 2022).

MATERIALS AND METHODS

Survey Area and Period

We conducted field survey from June to July 2024 in the administrative region of West Nusa Tenggara Province of Indonesia. The region is situated eastern of Bali Island, consists of two main islands Lombok Island and Sumbawa Island (figure 1). The survey area lies on 08º10'-09º05'S and 115º46'-119º05'(BPS NTB, 2024)

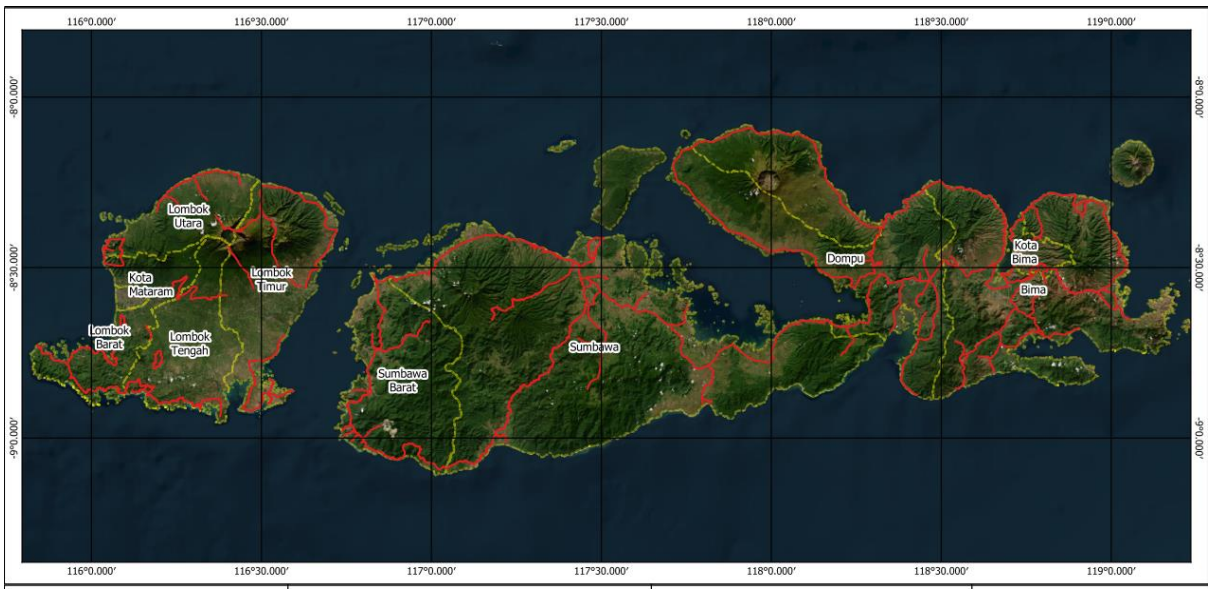


(Image sources : https://regional.kompas.com/read/2022/10/10/071100278/daftar-kabupaten-dan-kota-di-provinsi-nusa-tenggara-barat and https://live.staticflickr.com/1908/44099749694_b81575051b_b.jpg)

Figure 1. Map of West Nusa Tenggara Province

Data Collection

The field surveys of long-tailed macaque troops were conducted during May-July 2024. We applied on-road survey (Kumara et al., 2010). We travelled using motorcycles on the designed routes throughout the regencies in West Nusa Tenggara. The designed routes were indicated by red line are shown in figure 2.



(map source: ESRI Satellite 2024)

Figure 2. Survey route during field observation of long-tailed macaques (*Macaca fascicularis*) in West Nusa Tenggara Province 2024.

During the survey, observers were travelled using motorcycle with speed of 20-40 kms/hour. Observers checked the right and left side of the route to ensure the appearance of troops of long tailed macaque along the routes. The suspicious areas along the routes e.g. riverbank, small-forested area, orchard, cemetery, mangrove forests were also checked. When the troops of long-tailed encountered, the surveyor recorded the localities of troops using GPS apparatus or smartphones-GPS application, number of individuals within the troops. All the number of troops, individuals, and localities of finding data were tabulated.

RESULTS AND DISCUSSION

Field surveys were conducted in June-July 2024 have revealed 6146 individuals and 307 troops of long-tailed macaques found in eight regencies. The number of individuals recorded during the survey was tabulated based on the regencies. The details of data are presented in table 1

Table 1. Number of groups and individuals of long-tailed macaque (*Macaca fascicularis*) in West Nusa Tenggara Province 2024

No	Regency	Area	#Troop	Tsize	#Indiv
1	Lombok Barat (incl. Kota Mataram)	938.48	38	21.7	823
2	Lombok Utara	811.19	13	16.5	215
3	Lombok Timur	1,606.47	67	23.2	1557
4	Lombok Tengah	1,169.52	23	13.1	302
5	Sumbawa Barat	1,743.58	32	14.5	465
6	Sumbawa	6,655.92	52	17.5	911
7	Dompu	2,281.75	48	19.4	929
8	Bima (incl. Kota Bima)	4,423.98	34	27.8	944
	Total	1,9630.9	307		6146

Note: Area = regencies' administrative areas (BPS NTB, 2024). #Troop = number of troops found in regencies, TSize = average number of individuals in each troop, #Indiv = total number of individuals counted in each regency.

The long-tailed macaques can be found in all the regencies in West Nusa Tenggara Province. The number of individuals of long-tailed macaques recorded from the conservation area were 1532 individuals and 4614 individuals were recorded from outside conservation area, respectively. The troop numbers in each regency varied from 13 to 67 troops, while the troop size also varied from13.1 to 27.8 individuals per troop. Lombok Timur regency has the biggest number of troops and the total number of individuals. However, Bima regency has the biggest troop size, meanwhile, Lombok Tengah has the smallest. The number of troops seems not correlated with the wide area of regencies, but the number of troops and individuals suggested to be affected by availability of food resources and predators. Long-tailed macaque could utilize various food resources for example agricultural field, human remained and leftover food from tourist and house garbage (Hadi *et al*., 2007; Hadi *et.al*. 2012; Hadi *et al*., 2020). However, the predator for long-tailed macaques in West Nusa Tenggara were absent since the absent of middle and big carnivores in this area.

Status of Long-tailed macaques in Lombok and Sumbawa Island of West Nusa Tenggara based on mitogenomic analyses (Evans *et.al* 2020) shown those long-tailed macaques in the Lesser Sunda Island, including Lombok Island and Sumbawa Island came

from the western area, possibly Bali and Java. The origin of long-tailed macaque in Lombok Island and Sumbawa Island suggested introduced from the western islands as shown by previous genetical analysis by Kondo *et. al*. (1993) and Kawamoto *et. al*. (1984).

The geological epic of last glacial maximum (LGM) in Lesser Sunda occurred 22,000-18,500 Ya, which allowed animals migrated to another connecting island. However, no reported on the migration of long-tailed macaque from Sunda Island in the west to the Lesser Sunda within this period based on the remain of animal fossils (Carro, 2022). We suggested that the gap between Bali and Lombok in Lombok Strait during LGM remained wide and deep to make potential barrier on the natural migration of terrestrial animal from sunda island to Lesser Sunda. The human-mediated transport should be considered as the main reason why long-tailed macaque occupied the Lesser Sunda and the others area out of their native geographical areas.

Further study should be taken in addressed to dig the deep knowledges on the relationship between ecological factors related to the distribution of long-tailed macaques, human-macaque interaction and the possible management efforts to control the macaque population.

CONCLUSION

The brief population survey of long-tailed macaques (*M. fascicularis*) in West Nusa Tenggara 2024 has revealed 6146 individuals in 307 troops were recorded. The long-tailed macaques were found in all of regencies with various number of troops and individuals. We need further studies to dig more information about the existence of long-tailed macaque in West Nusa Tenggara as the basic data for population management.

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AUTHOR CONTRIBUTIONS

Islamul Hadi (IH) is contributing as team leader, planning and design survey method, collecting field and literatures data, data analysis, writing manuscript.
Sigit Wiantoro, Nurul Inayah, Tika Dewi Atikah, Maharadatunkamsi, Amir Hamidy is contributing on validating field data and discussion section
Yuliadi Zamroni, Supardiono, Muhammad Rijal Alfian are contributing on field data collection

Imran Sadewo and Nurlaila Mubarokah are contributing to arrangement of field data and GIS mapping

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CONFLICTS OF INTEREST

The authors declare no conflict of interest

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