



BRIN
BADAN RISET
DAN INOVASI NASIONAL



NON-DETRIMENTAL FINDINGS (NDF) FOR LONG-TAILED MACAQUE (*Macaca fascicularis*) in Indonesia



**National Research and Innovation Agency (BRIN)
&
Ministry of Environment and Forestry (KLHK)
2023**

**NON-DETRIMENTAL FINDINGS (NDF)
FOR LONG-TAILED MACAQUE (*Macaca fascicularis*)
in Indonesia**



Contributors:

Eko Sulistyadi
Maharadatunkamsi
Yuli Sulistya Fitriana
Nurul Inayah
Wartika Rosa Farida
Endah Dwi Jayanti
Farid Rifaie
Sigit Wiantoro
Taufiq Purna Nugraha
Anang Setiawan Achmadi
Ratih Listyo Rini
Moh. Haryono
Fifin Nopiansyah
Desy Satya Chandradewi
Daniwari Widiyanto
E. Irwan Afrizal
Ibnu Maryanto

TABLE OF CONTENT

A. Taxonomy	8.
B. Morphology	8.
C. Reproduction	9.
D. Distribution	9.
E. Ecology and Habitat	11.
F. Population	12.
G. Threat	16.
H. Conservation Status	17.
I. Use of species (Utilisation)	20.
J. Export of <i>M. fascicularis</i>	34.
K. Domestic Use of Species (Domestic Utilization)	35.
M. Regulations and Trade Control	35
N. Protected Area	37
O. Use Controls and Monitoring	47
P. Captive Breeding	47
Q. Human and Long-tailed macaque interaction	49
R. Assessment and scoring of <i>Macaca fascicularis</i> population in Indonesia.	55
References	58
Annex 1.	62

TABLE OF FIGURE

Figure 1.	Long-tailed Macaque Distribution	10
Figure 2.	Long-tailed Macaque occurrence in Indonesia, based on SIDAK Database	11
Figure 3.	Long-tailed Macaque Distribution based on Global Biodiversity Information Facility (GBIF) from 2017 to 2022.	11
Figure 4.	Number of survey sites and population estimation of Long-tailed Macaque in Indonesia	14
Figure 5.	Chart of the Long-tailed macaque Habitats in Indonesia	31
Figure 6.	The Proposed Capture Quota of Wild Plant and Animal Species Flowchart	35
Figure 7.	Conservation Areas in Java	44
Figure 8.	Map of Potential Habitat of Long-tailed Macaque in Protected Areas in Java Island	44
Figure 9.	Map of Potential Habitat of Long-tailed Macaque in Protected Areas in Sumatra Island	45
Figure 10.	Human-macaque interactions in Java based on BKSDA reports and mass media articles.	50
Figure 11.	The Distribution of Human-Long-tailed Macaque interactions based on Media Reports (2015-2019)	51
Figure 12.	The number of Long-tailed Macaque involved in human-macaque interaction by District/City based on BKSDA data.	52
Figure 13.	Number of human-macaque interaction by district/city based on BKSDA data	52
Figure 14.	Scoring NDF <i>Macaca fascicularis</i>	55

LIST OF TABLE

Table 1.	Estimates of Long-tailed macaque population in several locations. Data from South Sumatra represents habitat located in riparian areas, Central Java represents interaction between Long-tailed macaque and humans, and Deli Island represents land breeding colonies. There is a survey method developed by BRIN and other researchers from several universities that affects data quality. Data sources are listed on the references.	15
Table 2.	Long-tailed Macaque Export in Indonesia in 2007-2019 (UNEP-WCMC, CITES)	21
Table 3.	Actual export realisation of Long-tailed macaque from 2012 to 2021. Adopted from the response of the Indonesian Management Authority to the CITES Sekretariat	32
Table 4.	Long-tailed Macaque suitable habitat size and population estimate in Sumatra, Java, Bali, West Nusa Tenggara, East Nusa Tenggara and Kalimantan protected areas.	38
Table 5.	Captive Breeding Facilities of Long-tailed Macaque	48
Table 6 .	Summary of scoring NDF <i>Macaca fascicularis</i> in Indonesia	54

Executive Summary

Long-tailed macaque (*Macaca fascicularis*) is a primate species commonly found in Indonesia. This species shares anatomical and physiological similarities with humans, that it is widely used for biomedical research purposes. Samples of the species' blood, tissue, serum, and individuals are used extensively for biomedical purposes. Control over the use of this species from the wild is regulated under quota setting mechanism, while the use in captive-breeding facilities is controlled by setting Maximum Production Capacity.

Population of long-tailed macaques in the wild is relatively stable as they live in multi-male/multi-female (MMF) groups and are adaptive and able to reproduce throughout the year. Since 2008, this species had held the status of 'Least Concern' according to the IUCN Red List of Threatened Species. The status increased to 'Vulnerable' in 2020, and is currently listed as 'Endangered' in 2022.

In several areas, particularly in Java and Sumatra, it is reported that there are some disturbances caused by this species to humans, agricultural lands and farms, as well as settlements.

Based on the scoring process, a total score of 42 points was obtained, resulting in an average score of 1.615. According to these categories, the NDF scoring assessment of the long-tailed macaque falls under the 'Positive' criteria. This means that the long-tailed macaque population in Indonesia can be utilized through a quota mechanism. Although it falls into the positive category with a score of 1.615, this score is close to the neutral category, indicating the need for annual monitoring to observe population trends of long-tailed macaques in Indonesia. Specifically, the population of long-tailed macaques should be periodically monitored after utilization/harvesting to assess the impact on their population sustainability. Utilizing long-tailed macaques should provide incentives for the conservation of this species in Indonesia.



A. Taxonomy

Phylum	: Chordata
Sub-Phylum	: Vertebrata
Class	: Mammal
Ordo	: Primates
Family	: Cercopithecidae
Genus	: <i>Macaca</i>
Species	: <i>Macaca fascicularis</i> (Raffles, 1821)
English Name	: Long-tailed Macaque
Local Name	: Monyet Ekor Panjang, Monyet Kra

As a widely distributed species, *Macaca fascicularis* has 9 subspecies, i.e. (1) *M. f. fascicularis* (found in Brunei, Cambodia, Indonesia [Bali, Bangka, Batu Islands, Bawean, Java, Kalimantan, Karimata, Lingga, Natuna Islands, Nias, Nusa Tenggara, Riau Islands, Sumatra, Sumba, and Timor], Malaysia [Sabah and Sarawak], the Philippines [West Mindanao, Sulu Archipelago], Singapore, South Thailand [including offshore islands], and South Vietnam); (2) *M. f. aurea* (South Bangladesh, Laos, Myanmar [including Mergui Archipelago], as well as Central and West Thailand); (3) *M. f. umbrosa* (Nicobar Islands in India); (4) *M. f. fusca* (Simeulue Island); (5) *M. f. condorensis* (Con Son Island, South Vietnam); (6) *M. f. tua* (Maratua Island); (7) *M. f. lasiae* (Lasia Island, Sumatra, Indonesia); (8) *M. f. karimondjawa* (Karimun Jawa Island and probably near Kemujan Island); and (9) *M. f. atriceps* (Khram Yai Island, Thailand) (<http://www.itis.gov/>). Out of the ten subspecies, five are present in Indonesia. For this reason, Indonesia has a significant position and role in the conservation of Long-tailed macaque.

B. Morphology

The hair colour of Long-tailed macaque varies from grey, brown, and reddish brown with white hair on their chest and belly. The newborns have black hair that will slowly change to grey as they grow up. The face is greyish brown with whiskers around the cheeks. Similar to other primates, Long-tailed macaques have forward-directed eyes, allowing them to see in three dimensions and estimate distance of an object. Their nose is flat, and the nostrils are narrow and close together. This

species has shovel-shaped incisors, striking canines (particularly in male individuals), and bilophodont molars. The tail length is 50-60 cm, longer than the head-to-body length (40-47 cm). The adult males weigh 4.8-7 kg, while the females are 3-4 kg (Supriatna & Wahyono 2000; Payne *et al.*, 2000; Maharadatunkamsi *et al.*, 2020).

C. Reproduction

Female Long-tailed macaques reach sexual maturity at the age of four, while the males are at six years old. The females at higher rank of hierarchy will reach sexual maturity before the lower-ranking females. The offspring of higher-ranking females have greater probability of surviving than those of lower-ranking ones. This is due to the availability of food sources and the low aggression of females at higher rank. The females have a gestation period of approximately 165 days with an average of one baby at a time. The weaning period is 420 days. The lifespan of this species living in the wild remains unclear, but they can live up to 30 years old in captivity. (Bonadio, 2000).

D. Distribution

Long-tailed macaque is widely distributed in South and Southeast Asia throughout Bangladesh, Brunei Darussalam, Cambodia, India (Andaman and Nicobar Islands), Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand, Timor-Leste, and Vietnam. This species is also very adaptive to and can live in various types of habitats, from lowlands to the areas at elevation of 1,800 meters above sea level (m a.s.l.) (Eudey *et al.*, 2020).

In Indonesia, Long-tailed macaque is commonly found in Indonesia, distributed in Sumatra, Nias, Simeulue, Riau Islands, Bangka, Belitung, Lingga, Natuna Islands, Kalimantan, Java, Bali, Batu Islands, Bawean, Kangean Islands, Karimata, Karimun Jawa, Lombok, Nusa Tenggara, Sumba, Sumbawa, and Timor. This species is also recorded as a species introduced to Kabeana and Papua Islands (Groves, 2001). Eudey *et al.* (2020) mentioned that the species is distributed in Sumatra, Kalimantan, Java, Bali, West Nusa Tenggara, and East Nusa Tenggara (Figure 1). This species tends to have a wide distribution because of its adaptive ability and year-round reproduction.



Figure 1. Long-tailed Macaque Distribution (Eudey et al. 2020)

Based on the occurrence data by Ministry of Environment and Forestry (SIDAK Database, <https://sidak.ksdae.id/>) between 2018 and 2022, Long-tailed macaque has also been recorded in Tinjil, Deli, Bonerate, Selayar, Buton, and Papua Islands, which do not constitute their natural habitats (Figure 2).

Their presence in Tinjil and Deli Islands originated from a ‘colony island breeding’ programme that has taken place since 1990. In addition, this species can also be found in Sulawesi and Papua, which also do not constitute their natural distribution areas.

Long-tailed macaques are distributed in both inside and outside conservation areas. The species is even found in large numbers at plantations, settlements, and urban areas. Figures 2 and 3 show a consistency between distribution data provided by the Ministry of Environment and Forestry and those of the Global Biodiversity Information Facility (GBIF). Both maps suggest that the species is distributed across western to central parts of Indonesia. The largest population is found both inside or outside conservation areas in Java, Sumatra, and Kalimantan.

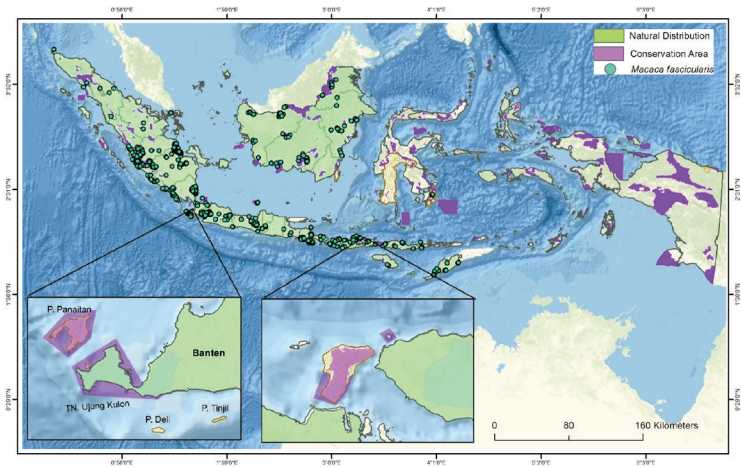


Figure 2. Long-tailed Macaque occurrence in Indonesia, based on SIDAK Database

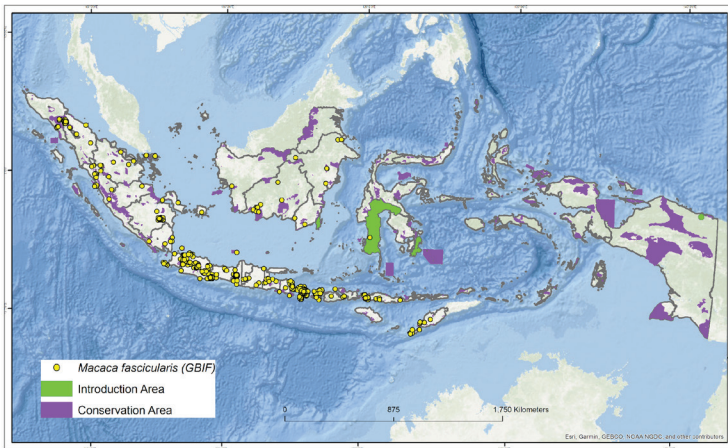


Figure 3. Long-tailed Macaque Distribution based on Global Biodiversity Information Facility (GBIF) from 2017 to 2022.

E. Ecology and Habitat

Long-tailed macaque is a highly adaptive species and able to live in various habitats, including mangroves, swamps, and agricultural lands near forests (Eudey *et al.*, 2020). The species can be found from lowland to the area at elevation of 1,000 m a.s.l. (Heaney *et al.*, 1998; Suroño, 2012; Maryanto *et al.*, 2012).

This macaque is a diurnal and arboreal species, but often found moving on the ground and living in a colony comprising several males and females, lead by an alpha male. Number of females is always greater than males. The females also have a clear hierarchy where they have dominant/main females maintained through a matrilineal system. This social organisation system allows this species to have multiple mating partners (polygynandrous/promiscuous mating), although alpha male and dominant females have a greater opportunity to choose their mating partners. This species communicates through visual signs (facial expression and body movement), vocalisation, and pheromone as signals (Maharadatunkamsi *et al.*, 2020).

This species lives in various types of habitats, such as primary forest, secondary forest, plantation and agricultural lands, nipah forests on coastal area, lowland tropical forest, disturbed secondary forest, mangrove forest, swamp forest, montane forest, peat forest, area near settlement, and logged forest (Eudey *et al.*, 2020).

Long-tailed macaque is an omnivore (Molur *et al.*, 2003) and mainly feeds on fruits, as well as crabs, flowers, insects, young leaves, young stems, fungi, buds, grasses, and even clay as a source of potassium. This species serves as a seed disperser and helps forest regeneration (Maharadatunkamsi *et al.*, 2020). This species plays a balancing and pioneering role in open areas. As fruit eaters, they discard the seeds after eating the pulp. They serve as seed dispersers that help regenerate forest vegetation. Taking into account their function in nature, their ecological role is significant in distributing various plant species.

Long-tailed macaque breeds faster in disturbed areas than in primary forests because of the higher level of competition with other primates inhabiting primary forests. As a result, the population is higher in secondary forests and disturbed areas, compared to primary forests. They are more opportunistic and abundant in disturbed areas, making this species may potentially become a nuisance in certain areas.

F. Population

Long-tailed macaque colonies mostly comprise 10-30 individuals, depending on the availability of sources of food. In Sumatra, the average number of each group is around 5.7 adult males and 9.9 adult females (Bonadio, 2000). The population density is varied by the habitat conditions. According to Santosa (2013), this species population

density in Mt. Walat (Java) is 0.3/ha, while in Sumatra (Bonadio, 2000), it ranges from 10-400 individuals/km². The birth rate is around 0.24, with mortality rate of juvenile and adolescent is 0.64 and adolescent to adult is 0.30. Their home range is approximately 10-30 ha. The sex (male to female) ratio ranges from 1:2 to 1:5. In general, the ratio ranges from 1:2 to 1:3. Under progressive population conditions, the colony is typically dominated by juveniles, followed by adolescents and adults.

Population study in Tanjung Puting National Park, Central Kalimantan is around 750-850 groups, with total population based on extrapolation is approximately 13,321-23,100 individuals, while the average population density in one river section is 7.50-13.01 individuals/km (Gumert *et al.*, 2012). Based on the study by Ilham *et al.* (2017) in Mt. Meru, Mt. Padang, and Mt. Panggilun, it is known that a colony consists of an average of 28-68 individuals. The infant ratio in Mt. Meru is about 0.38-1.00, while the population in Mt. Padang and Mt. Panggilun is 10 individuals/colony, with an infant ratio of 0.00-0.33. In general, the species population in Indonesia is considered stable.

Habitat used by Long-tailed macaque tends to be associated with disturbed and relatively open areas. It is known that the species commonly use mixed plantations, rubber plantations, secondary forests, and forest edge areas as their habitat. The use of these habitats is also strongly related to land cover and land use patterns, indicating that it is directly proportional to the area of the available habitats.

The use of habitats based on its elevation (altitudinal preference) shows that Long-tailed macaque tend to occupy habitats at elevations of 0-1000 m a.s.l. Use of habitat at certain elevations is related to their behavioural characteristics and also the availability of natural sources of food that mostly present in this range of elevations. Yanuar *et al.* (2009) reported that in Sumatra, the species predominantly inhabit areas at elevation of 0-700 m a.s.l., with population that, on the average, is concentrated at elevation of around 300-400 m a.s.l. Based on the compilation of various scientific publications, the distribution of Long-tailed macaque population varies in each province as presented in Figure 4.

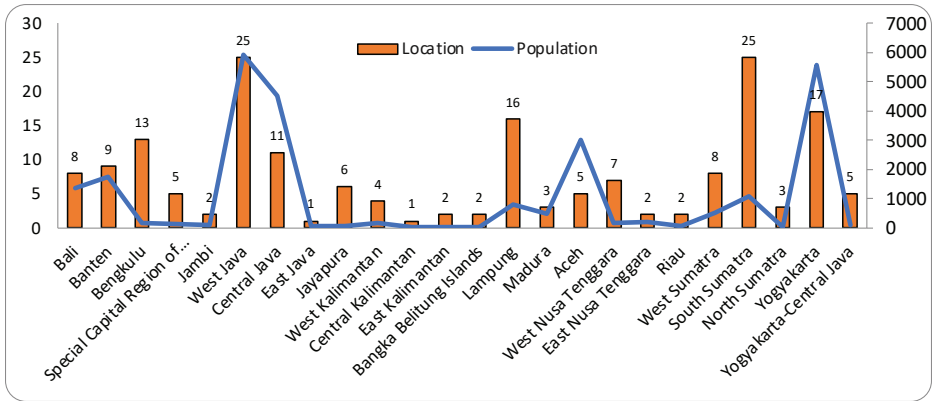


Figure 4. Number of survey sites and population estimation of Long-tailed Macaque in Indonesia

Given the number of sampling locations and total population of Long-tailed macaque indicates that the distribution pattern is inconsistent. The data shows that several provinces with limited sampling locations have high populations, such as Central Kalimantan. However, in South Sumatra, the population of this species is relatively lower compared to those with a large number of sampling locations. This indicates an inaccuracy of data. Thus, it is necessary to compare the population to the size of the sampling area.

Based on some references, the average population density of Long-tailed macaque tends to be high in Bali, Yogyakarta, East Nusa Tenggara, and West Kalimantan. In general, population density is strongly related to the condition and area of available habitat and the distribution pattern of the colonies. The survey of Keys *et al.* (2011) showed that out of 22 sampling locations in West Java, 10 were inhabited by this species with an average population of 102 individuals (ranging from 7-300 individuals). It was also reported that six other locations serving as habitat for the species are conservation areas in Java. In general, Long-tailed macaque populations in Java tend to be not evenly distributed (patchy).

The Yogyakarta Natural Resources Conservation Agency report on distribution and population of long-tailed macaques in Paliyan Wildlife Reserve (2010-2013) shows an increase in population. This species is mostly distributed outside the wildlife reserve, and only a few inside

the reserve. Consecutive observations recorded a total population of 173 individuals in January 2010, 176 in June 2012, 187 in April 2013, and 243 in December 2013. It is also reported that some disturbance caused by long-tailed macaques occurs in the border area of Paliyan Wildlife Reserve (based on personal communication report).

Table 1. Estimates of Long-tailed macaque population in several locations. Data from South Sumatra represents habitat located in riparian areas, Central Java represents interaction between Long-tailed macaque and humans, and Deli Island represents island breeding colonies. There is a survey method developed by BRIN and other researchers from several universities that affects data quality. Data sources are listed on the references.

No	Locations	Population Estimates (Individuals)	Sources of Data
1	Central Java (Semarang District, Magelang, Temanggung, Pemalang District, Semarang City, Karanganyar, Sukoharjo, Wonogiri, Boyolali Districts)	811	Population estimation surveys by MoEF, BRIN, and universities (2022)
2	Deli Island, Banten (9,489 km ²)	4,860	Population estimation surveys by BRIN, and universities (2022)
3	South Sumatra (Banyuasin and Musi Banyuasin Districts)	847	Population estimation surveys by MoEF, BRIN, and universities (2022)
4	Tinjil Island, Banten (5.6 km ²)	642 - 661	Population estimation surveys by MoEF, BRIN, and universities (2022)

5	Bokor Nature Reserve, Jakarta	96	Population estimation surveys by MoEF and BRIN (2020)
6	Kilometer Zero Tourism Forest Area (6,525 ha), Sabang	15	Afifah N <i>et al.</i> (2021)
7	Punti Kayu Nature Park (50 ha), South Sumatra	247	Ayu D <i>et al.</i> (2020)
	Balurann National Park	10,350	Hansen et al (2019)
8	Karimun Jawa	267	Sumaryati S and Susanto H (2019)
9	Gunung Kapur (475 ha), Ciampea Cicadas, Bogor	245	Dharma AP and Amirullah G (2019)
10	Sibolangit Nature Reserve, North Sumatera	33 – 45	Sembiring <i>et al.</i> (2016)
11	Tanjung Puting National Park	13,321 – 23,100	Gumert, Michael D. <i>et al.</i> (2012)
12	Banyuasin	12	Biodiversity survey (2011)
13	Solok District	18	Biodiversity survey (2011)
14	Gunung Raya Wildlife Reserve	18	Biodiversity survey (2011)

G. Threat

Illegal both in hunting and trade are threats to Long-tailed macaque. While wildlife hunting and trade are correlated, hunting can also happen without trade (Nijman *et al.*, 2005a). This species is hunted for various reasons, including being deemed pest to farmland (Wadley *et al.*, 1997; Campbell-Smith *et al.*, 2010; Luskin, 2014; Partasasmita *et al.*, 2016) and negative perception from the community about disturbances caused by the primate (Kurniawan, 2019; Romdhon, 2020).

In several areas in Bali (Lane *et al.*, 2010), Long-tailed macaque are deemed sacred animals in some places of worship. However, when disturbance occurs in their farmland, the primate will be hunted. In Indonesia, it is reported that hunting of this species has taken place in Kalimantan (Wadley *et al.*, 1997), Sumatra (Linkie *et al.*, 2007; Marchal *et al.*, 2009; Campbell-Smith *et al.*, 2010; Luskin, 2014), Java (Partasasmita *et al.*, 2016;), and Bali (Lane *et al.*, 2010; Lane-De Graaf *et al.*, 2014;).

The method to hunt this primate includes the use of traps and hunting dogs (Luskin, 2014) as well as individual's hunting rifles (Wadley, 1997; Partasasmita, 2016). The hunting activities have not been fully documented, thus the number of individuals caught and killed remains unknown. (Review relevant references on illegal hunting to confirm it is not opinion-based. Conduct screening of data from Shepherd and Nijman or otherwise use the data from DG of Environmental and Forestry Law Enforcement).

Illegal trade of long-tailed macaque occurs in several areas in Indonesia. IARI (2012) reported that 50-70 individuals were traded in almost every bird market in Java, Bali, and Sumatra. In 2018, the species was found on sale on several online sites, but none in 2019 and 2020.

Habitat degradation is a significant factor that affects the population of long-tailed macaque. Degradation of its natural habitat such as habitat conversion, fragmentation, and human interaction have a negative impact on the primate population (Wanda et al., 2023). To reach a viable population, shelters with supporting capacity are needed to increase its natural habitat such as forests, mangroves, swamp forests, nipa palm, riverine and periphery forest (Gumert 2011, Siddiq et al., 2022).

H. Conservation Status

Based on the Minister of Environment and Forestry Regulation No. P106/2018, long-tailed macaque is categorised as unprotected species. On the other hand, this species is categorised Endangered based on The IUCN Red List of Threatened Species, per March 2022 and listed on CITES Appendix II.

I. Use of species (Utilisation)

The use of wild plants and animals is regulated under the Government Regulation No. 8/1999. According to the regulation, these species can be used for several purposes including assessment, research and development, captive breeding, hunting, trade, demonstration, exchange, cultivation, and personal amusement.

Long-tailed macaque is one of the mammals used for above-mentioned purposes. One of the uses that has quite strategic value is for biomedical purposes, both for laboratory animals, pharmaceutical manufacturing,

and vaccine development. The use of this species for biomedical and research purposes has been carried out since the 1990s. Being categorised as unprotected species under the Government Regulation No. 8/1999 on Use of Wild Plants and Animals, Long-tailed macaque obtained from captive-breeding facilities or directly from the wild through quota mechanism can be used for biomedical purposes.

In 1994, Minister of Forestry issued a decree No. 26/Kpts-II/94 on The Use of Long-tailed Macaque (*Macaca fascicularis*), Southern Pig-tailed Macaque (*Macaca nemestrina*), and Asian Arowana (*Scleropages formosus*) for Export Purposes. The essence of this decree is to forbid the export of the three species captured from the wild. The prohibition is made based on the consideration of the declining population of the species. Exports are only allowed for those sourced from captive-breeding facilities. Since the prohibition, no exports of Long-tailed Macaque captured from the wild have been found.

Around 2015-2017, several District and Provincial Environmental Offices in Java Island reported cases of disturbance caused by Long-tailed macaque in their areas, which destroyed the community's agricultural lands and farms, and thus caused economic and social losses. The local governments have taken mitigation measures to solve the problems, such as driving them away and carrying out translocation. However, the results were not as expected. Through the local Natural Resources Conservation Agencies, local governments proposed to capture this species particularly in disturbance-prone areas. If direct capture is carried out in areas seeing overpopulation of the primate, the next emerging issue is where these catches will be translocated to, as the disturbances caused by this species occur everywhere.

Around 2017-2018, Directorate of Biodiversity Conservation under DG of Natural Resources and Ecosystem Conservation of MoEF, serving as CITES Management Authority, undertook a series of coordinating meetings and focused group discussions by engaging with relevant ministries/agencies, academics, experts, and NGO to find solutions to problems of disturbance caused by Long-tailed macaque in several areas.

Given the disturbances occurring in several areas and demand for Long-tailed macaque by PT Primaco and CV Inquatex for biomedical export

purpose, the latest focused group discussion held at Ibis Hotel in Slipi, Jakarta on 19 November 2019 discussed the possibility of population reduction strategy in a number of areas in Java and Sumatra, where the catches are to be exported for such purpose. The use mechanism follows the Minister of Environment and Forestry Regulation No. P.2/MENLHK/SETJEN/KUM.1/1/2018 concerning Access to Wild Species Genetic Resources and Benefit Sharing from Their Use. The allowable capture quota and location is set under quota mechanism governed by Minister of Forestry Decree No. 447/Kpts-II/2003 concerning Administration Directive of Harvest or Capture and Distribution of the Specimens of Wild Plant and Animal Species.

Around the same time (2019), Coronavirus (Covid 19) pandemic broke out in China and rapidly spread to other countries. The pandemic has sharply increased the demand for this species for biomedical purpose - particularly for vaccine development - from China, America, and Europe.

By considering precautionary and sustainability principles and taking into account jurisdictional and technical aspects, in 2021, the Director General of Natural Resources and Ecosystem Conservation Decree No. SK. 1/KSDAE/KKH/KSA.2/1/2021 set the Long-tailed Macaque capture quota for the period of 2021 with the following details: East Java (330 individuals), Central Java (270 individuals), West Java (300 individuals), Yogyakarta (300 individuals), and South Sumatra (870 individuals). The quota mechanism sets the minimum age of 2 years old and the export for biomedical purpose. The quota set for Java is given to CV Primaco and South Sumatra is to CV Inquatex. The quota is set based on recommendation from the Director of Secretariat of Biodiversity Scientific Authority of National Research and Innovation Agency or “BRIN” (formerly Indonesian Institute of Sciences or “LIPI”) through letter No. B-330/SKIKH/KS.02.04/XII/2020 on 23 December 2022.

In 2022, the Director General of Natural Resources and Ecosystem Conservation Decree No. SK. 185/KSDAE/KKHSG/KSA.2/9/2022 sets the long-tailed macaque capture quota with the following details: Central Java (220 individuals), Deli Island of West Java (1,458 individuals), and South Sumatra (322 individuals). The quota

is set based on recommendation from the Director of Secretariat of Biodiversity Scientific Authority of BRIN through the letter No. B-8784/IV/KS.00.00/8/2022 on 29 August 2022. The recommendation is based on the prior population survey.

The domestic use of Long-tailed Macaque is mainly conducted by PT Biofarma that produces several types of vaccines, including polio vaccine. The company has used this species for a very long time and is supported by several captive-breeding facilities, including PT Primaco, CV Inquatex, PT Labsindo, etc.

J. Export of *M. fascicularis*

Long-tailed Macaque export in Indonesia has seen a dynamic since the 1980s until now (Table 2). Based on CITES Trade database, in the 1980s-1990s, there were exports of a total of approximately 10-15 thousand individuals, that subsequently declined in 1990s-2000s. Since 2000, the export had slowly increased with a peak in 2013 but sharply declined to date. Eudey (2008) mentioned that in the 1980s, Malaysia, the Philippines, and Indonesia were the main suppliers of this species for pharmacological and toxicological studies to the United States. Based on CITES database regarding crab-eating macaque trade, Indonesia has exported 187,219 samples taking the form of live individuals and specimens to 25 countries in 1977 to 2018. As many as 87.96% (164,683 samples) were used for biomedical (code M), science (code S), and commercial (code T) purposes.

Table 2. Long-tailed Macaque Export in Indonesia in 2007-2019 (UNEP-WCMC, CITES)

Year	App.	Importer	Exporter	Origin	Importer reported quantity	Exporter reported quantity	Term	Unit	Purpose	Source
2007	II	CN	ID		1500		live		B	C
2007	II	CN	ID			3000	live		T	F
2007	II	CN	ID			500	specimens		T	F
2007	II	JP	ID		626	626	live		T	F
2007	II	SG	ID		198		live		S	F
2007	II	SG	ID			224	live		T	F
2007	II	SG	ID		140		specimens	flasks	S	W
2007	II	SG	ID			70	specimens		T	F
2007	II	SG	ID			140	specimens		T	W
2007	II	US	ID		129		live		M	C
2007	II	US	ID		527		live		M	F
2007	II	US	ID			69	live		S	F
2007	II	US	ID		160		live		T	C
2007	II	US	ID		160	1292	live		T	F

NON-DETRIMENTAL FINDINGS (NDF) FOR LONG-TAILED MACAQUE (*Macaca fascicularis*)

2007	II	US	ID		1	skele- tons	T	F
2007	II	US	ID	100		speci- mens	S	W
2007	II	US	ID		1840	speci- mens	T	F
2007	II	US	ID	700		speci- mens	T	W
2008	II	CN	ID	1900	2250	live	T	F
2008	II	JP	ID	434	468	live	T	F
2008	II	SG	ID	114		live	S	C
2008	II	SG	ID	285		live	S	F
2008	II	SG	ID		401	live	T	F
2008	II	SG	ID	120		speci- mens	flasks S	F
2008	II	SG	ID		120	speci- mens	T	F
2008	II	US	ID	70		live	E	C
2008	II	US	ID	50		live	M	C
2008	II	US	ID	495		live	M	F
2008	II	US	ID	120	1038	live	T	F
2008	II	US	ID		1600	speci- mens	T	F

NON-DETRIMENTAL FINDINGS (NDF) FOR LONG-TAILED MACAQUE (*Macaca fascicularis*)

2008	II	US	ID		350	speci- mens	T	W
2009	II	CN	ID	1450		live	T	F
2009	II	JP	ID		10	deriv- atives	T	F
2009	II	JP	ID	152	390	live	T	F
2009	II	JP	ID		200	speci- mens	g	S
2009	II	JP	ID		210	speci- mens	ml	S
2009	II	JP	ID	300		speci- mens	M	F
2009	II	JP	ID	100	100	speci- mens	S	F
2009	II	JP	ID		650	speci- mens	T	F
2009	II	SG	ID	458		live	S	F
2009	II	SG	ID		632	live	T	F
2009	II	SG	ID		410	speci- mens	ml	T
2009	II	SG	ID	600		speci- mens	M	F
2009	II	SG	ID	470		speci- mens	S	F
2009	II	SG	ID		440	speci- mens	T	F
2009	II	US	ID	480	1134	live	T	F

NON-DETRIMENTAL FINDINGS (NDF) FOR LONG-TAILED MACAQUE (*Macaca fascicularis*)

2009	II	US	ID		300	specimens	cm3	T	F
2009	II	US	ID	34	1218	specimens		T	F
2010	II	AE	ID	2		bodies			I
2010	II	AU	ID	132		specimens		S	F
2010	II	AU	ID	560		specimens		T	F
2010	II	JP	ID		184	live		T	C
2010	II	JP	ID	192		live		T	F
2010	II	JP	ID		280	specimens		T	C
2010	II	JP	ID	80		specimens		T	F
2010	II	SG	ID	740		live		S	F
2010	II	SG	ID		846	live		T	C
2010	II	SG	ID	1335		specimens		M	F
2010	II	SG	ID	1900		specimens		S	F
2010	II	SG	ID		4135	specimens		T	C
2010	II	US	ID	XX	1	skeletons		P	I
2010	II	US	ID		100	live		S	F

NON-DETRIMENTAL FINDINGS (NDF) FOR LONG-TAILED MACAQUE (*Macaca fascicularis*)

2010	II	US	ID		557	live		T	C
2010	II	US	ID	340		live		T	F
2010	II	US	ID	240		specimens		M	F
2010	II	US	ID	600		specimens		S	W
2010	II	US	ID		3706	specimens		T	C
2010	II	US	ID	540		specimens		T	F
2010	II	US	ID	500		specimens		T	W
2011	II	AU	ID		960	specimens	ml	T	F
2011	II	JP	ID	180	556	live		T	F
2011	II	JP	ID	295	400	specimens		T	F
2011	II	SG	ID	296		live		S	F
2011	II	SG	ID		408	live		T	F
2011	II	SG	ID	20		specimens	l	T	F
2011	II	SG	ID		5540	specimens	ml	T	F
2011	II	SG	ID	2490		specimens		M	F
2011	II	SG	ID	150		specimens		S	F

NON-DETRIMENTAL FINDINGS (NDF) FOR LONG-TAILED MACAQUE (*Macaca fascicularis*)

2011	II	US	ID	100	427	live		T	F
2011	II	US	ID		150	specimens	ml	T	F
2011	II	US	ID		700	specimens		T	F
2012	II	CA	ID		210	specimens		T	F
2012	II	CA	ID		111	specimens		T	W
2012	II	DE	ID		1904	specimens		S	W
2012	II	JP	ID	58		live		T	F
2012	II	JP	ID	50		specimens	ml	T	F
2012	II	JP	ID	480	930	specimens		T	F
2012	II	SG	ID	20		live		S	F
2012	II	SG	ID		20	live		T	W
2012	II	SG	ID		15000	specimens	cm3	T	F
2012	II	SG	ID	6470	16475	specimens		M	F
2012	II	SG	ID		200	specimens		M	W
2012	II	SG	ID	6220		specimens		S	F
2012	II	SG	ID	16050	2970	specimens		T	F

NON-DETRIMENTAL FINDINGS (NDF) FOR LONG-TAILED MACAQUE (*Macaca fascicularis*)

2012	II	TH	ID			306	specimens	M	W
2012	II	TH	ID			840	specimens	T	W
2012	II	US	ID	XX	2		bodies	P	I
2012	II	US	ID	XX	11		skulls	P	I
2012	II	US	ID		5		bodies	P	I
2012	II	US	ID		1		bodies	T	I
2012	II	US	ID		109		live	S	C
2012	II	US	ID		3		skulls	P	I
2012	II	US	ID			10	specimens	M	F
2013	II	AE	ID			4	live	P	F
2013	II	AU	ID		479		specimens ml	T	F
2013	II	DK	ID			1220	specimens	T	F
2013	II	JP	ID		75	212	live	T	F
2013	II	JP	ID			232	specimens	M	F
2013	II	JP	ID			160	specimens	S	W
2013	II	JP	ID		540	392	specimens	T	F

NON-DETRIMENTAL FINDINGS (NDF) FOR LONG-TAILED MACAQUE (*Macaca fascicularis*)

2013	II	SG	ID		116	116	live	M	F
2013	II	SG	ID		166		live	S	F
2013	II	SG	ID			236	live	T	F
2013	II	SG	ID		1702	2663	specimens	M	F
2013	II	SG	ID		630		specimens	S	F
2013	II	SG	ID			1949	specimens	T	F
2013	II	TH	ID			500	specimens	M	F
2013	II	TH	ID			1194	specimens	T	C
2013	II	TH	ID			840	specimens	T	F
2013	II	US	ID	XX	3		skulls	P	I
2013	II	US	ID	XX	1		skulls	T	I
2013	II	US	ID		1		bodies	T	I
2013	II	US	ID		4		skulls	P	I
2013	II	US	ID		120		specimens	M	C
2013	II	US	ID			150	specimens	T	C
2013	II	US	ID			55	specimens	T	F

NON-DETRIMENTAL FINDINGS (NDF) FOR LONG-TAILED MACAQUE (*Macaca fascicularis*)

2014	II	DK	ID		3	specimens		M	F
2014	II	DK	ID	1228		specimens		S	F
2014	II	DK	ID		5	specimens		T	F
2014	II	JP	ID	37	35	live		T	F
2014	II	JP	ID	100		specimens		M	F
2014	II	SG	ID	60	221	live		M	F
2014	II	SG	ID	693	80	specimens		M	F
2014	II	SG	ID		60	specimens		T	F
2014	II	TH	ID		1625.5	specimens	ml	M	F
2014	II	TH	ID		30	specimens	ml	T	F
2014	II	US	ID	2		feet		P	I
2014	II	US	ID		80	live		T	F
2015	II	DK	ID		170	specimens	ml	M	F
2015	II	DK	ID	170		specimens	ml	S	C
2015	II	DK	ID	40		specimens		S	C
2015	II	TH	ID		80	specimens	ml	M	F

NON-DETRIMENTAL FINDINGS (NDF) FOR LONG-TAILED MACAQUE (*Macaca fascicularis*)

2015	II	US	ID	XX	1		bod- ies	P	I	
2015	II	US	ID			1000	speci- mens	M	F	
2016	II	GB	ID		30		speci- mens	ml	M	F
2016	II	GB	ID		2		speci- mens		M	F
2016	II	IT	ID			34.50	speci- mens	ml	M	F
2016	II	IT	ID			3	speci- mens		M	F
2016	II	TH	ID			397.20	speci- mens	ml	M	F
2016	II	TH	ID			1274.40	speci- mens	ml	T	F
2016	II	US	ID			1850	speci- mens	g	S	C
2016	II	US	ID		260		speci- mens		S	C
2017	II	DK	ID		218		speci- mens		S	F
2017	II	DK	ID			218	speci- mens		T	F
2017	II	GB	ID		174.2		speci- mens		M	F
2017	II	GB	ID			205	speci- mens		T	F
2017	II	TH	ID			7875	speci- mens		T	F
2018	II	GB	ID		90		speci- mens		M	F

NON-DETRIMENTAL FINDINGS (NDF) FOR LONG-TAILED MACAQUE (*Macaca fascicularis*)

2018	II	GB	ID		90	specimens	T	F
2018	II	US	ID		112	specimens	T	F
2019	II	DK	ID		125	specimens	S	C
2019	II	DK	ID		36	specimens	S	F

*B: Breeding in captivity or artificial propagation, E: Educational, G: Botanic garden, H: Hunting trophy, L: Law enforcement/ judicial/ forensic, M: Medical (including biomedical research), N: Reintroduction or introduction into the wild, P: Personal, Q: Circus or travelling exhibition, S: Scientific, T: commercial, and Z: Zoo.

Based on data from WCMC-UNEP CITES, Indonesia exported 24,765 individuals of live Long-tailed macaques between 1999 and 2008. The export increased by 40% from 10,285 (1999-2003) to 14,480 (2004-2008). Given that crab-eating macaque species from Indonesia is subject to Review of Significant Trade (RST). Data of export realisation in Indonesia shows a quite high number in 2010 but tends to decrease until 2014 and no export at all in 2015-2018, however, the export saw significant increase in 2019 (Figure 5; Table 3).

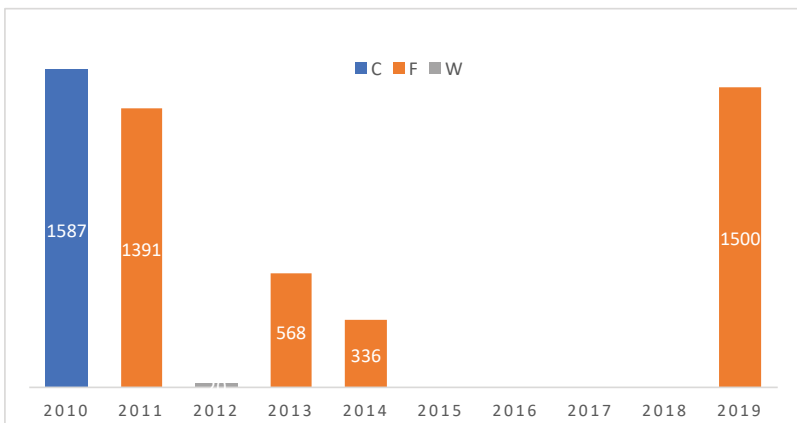


Figure 5. Chart of the Long-tailed macaque Habitats in Indonesia

Recently, responding to the notification number AC.32.Doc.15.3 from CITES Secretariat, notified the summary of 7,006 individuals of Long-tailed macaques (*Macaca fascicularis*) from the C and F source from Indonesia that were commercially exported/traded during 2012 - 2021. Upon a systematic analysis from Indonesia Annual report, Actual Export, and Importing Country Data from UNEP-WCMC, however, there were discrepancies between the report of export data and the actual export (Table 3).

Table 3. Actual export realisation of Long-tailed macaque from 2012 to 2021. Adopted from the response of the Indonesian Management Authority to the CITES Sekretariat.

Year	Notifikasi No AC32. Doc.15.3	Indonesia Annual Report *)	Actual export **)	Importing Country Data ***)	Note
2012	20	58	58	58	
2013	568	568	75	75	Indonesia CITES MA issued the CITES permit for the quantity 568 heads (live), the source F, the purpose trade and the actual export was 75 heads
2014	336	256	64	37	Indonesia CITES MA issued the CITES permit for the quantity 256 heads (live), the source F, the purpose trade and the actual export was 64 heads
2015	0	0	0	0	-
2016	0	0	0	0	-
2017	0	0	0	0	-
2018	0	0	0	0	-

NON-DETRIMENTAL FINDINGS (NDF) FOR LONG-TAILED MACAQUE (*Macaca fascicularis*)

2019	1.569	1.569	0	0	Indonesia CITES MA issued the CITES permit for the quantity 1,569 heads (live), the source F, the purpose trade and the actual export was zero. The cancellation occurred due to a Covid-19 pandemic situation globally.
2020	2.913	2.913	0	0	Indonesia CITES MA issued the CITES permit for the quantity 2,913 heads (live), the source F, the purpose trade and the actual export was zero. The cancellation occurred due to a Covid-19 pandemic situation globally.
2021	1.600	1.240	120	0	Indonesia CITES MA issued the CITES permit for the quantity 1,240 heads (live), the source F, the purpose trade and the actual export was 120 heads. The actual export of 120 heads in March 2021 referred to CITES document enacted in the end of 2020. The following permit from CITES on 2021 for 1,240 heads was cancelled due to a rising cases on Covid-19.
Total	7.006	6.604	317	170	

*) Indonesia Annual Report (2012-2021) compiled the number of individual species exported based on the CITES permit issued by Indonesia CITES MA.

**) Actual export (2012-2021) informed the real number of individual species exported based on the custom clearance information/documents.

**) Importing country data (2012-2021) provided by UNEP-WCMC.

Summary data (Table. 3) confirm the actual commercial export/trade of Macaques (*M. fascicularis*) during 2012 until 2021 from captive breeding

were only **317** individuals. The significant discrepancy occurred due to several causes amid the pandemic of COVID-19 during 2019-2020 such as limitation of trading activities and of transportation closures which impacted the realization of CITES requirements. In 2021, CITES permit was enacted by the Indonesia CITES Management Authority to officially reopen the trade/commercial export of *M. fascicularis*. The trade corresponded to 1,240 individuals from captive breeding and 260 individuals from the wild according to the annual report of the year 2021, but the realisation remained zero.

Referring to the data from the CITES Secretariat **AC.32.Doc.15.3.**, confirmed that the 1,600 individuals of Macaques exported from Indonesia comprise the summary of captivation and the wild whereas the document specifically mentions the captive-bred and ranched specimens.

K. Domestic Use of Species (Domestic Utilization)

Long-tailed macaque has consistently been the most frequent primate to be found in domestic animal markets in Indonesia (Nijman *et al.*, 2015). Several surveys of live animal markets in Indonesia separately indicate the trade of this species. In separate 66 surveys conducted between 1997 and 2008, Shepherd (2010) found 774 individuals at a bird market in Medan City, North Sumatra. More than 1,500 long-tailed macaque individuals were traded at 11 live animal markets in Bali based on nine separate surveys carried out between 1990 and 2014 (Nijman *et al.*, 2015). In addition, 350 individuals found in 126 repeated observations during the surveys undertaken in January 2019-September 2020 at 15 bird markets in North Sumatra, South Sumatra, Special Capital Region of Jakarta, West Jawa, Central Java, East Java, South Kalimantan, and Bali, (YIARI, unpublished data).

These findings indicate that long-tailed macaques are highly sought after at live animal markets. Most animals sold in the markets were infants and juveniles, and nets were used for capture (Nijman *et al.*, 2015). In 2008-2020, 14 news articles of various mass media outlets discussed the trade and smuggling of 979 long-tailed macaques from Sumatra to Java and from Java to Bali.

As reported by Mongabay Indonesia (Riski, 2014), wildlife trade has shifted from traditional markets to online platforms such as Facebook and other marketplaces since 2014. The online trade of long-tailed

macaques was discovered on Tokopedia and Shopee but was removed in 2019 (Tresnady, 2019).

L. Capture Quota Mechanism

The capture of wild long-tailed macaque is governed by regulations on harvest quota that are renewed annually and set the year before. Established quotas take into account several factors, including habitat distributions, population, sex, ratio, and animal welfare, so as not to compromise the species’ viability in its natural setting. The mechanism for determining quota recommendations can be seen in Figure 6.

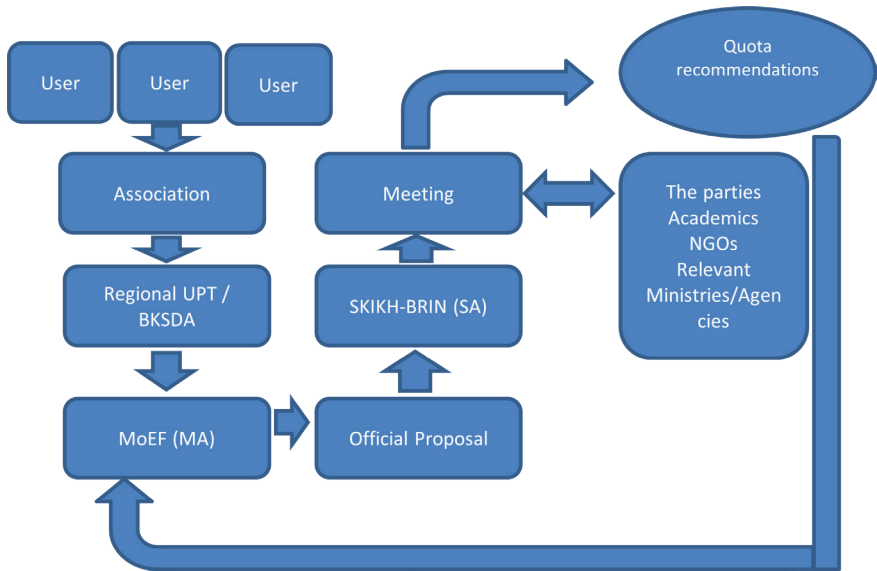


Figure 6. The Proposed Capture Quota of Wild Plant and Animal Species Flowchart

M. Regulations and Trade Control

Legally, wildlife and habitat management falls under the authority of the MoEF (*formerly the Ministry of Forestry). The Government has issued the following regulations on the management of wild plant and animal species:

1. Government Regulation No. 7/1999 on the Preserving Plant and Animal Species.
2. Government Regulation No. 8/1999 on the Use of Wild Plant and Animal Species.
3. Minister of Forestry Decree No. 447/Kpts-II/2003 on Administration Directive of Harvest or Capture and Distribution of the Specimens of Wild Plant and Animal Species.
4. Minister of Environment and Forestry Regulation No. P. 2/MENLHK/SETJEN/KUM.1/1/2018 on Access to Wild Species Genetic Resources and Benefit Sharing from Their Use.
5. Minister of Environment and Forestry Regulation No. P.106/MENLHK/SETJEN/KUM.1/12/2018 on the Second Amendment to the Minister of Environment and Forestry Regulation No. P.20/MENLHK/SETJEN/KUM.1/6/2018 on Protected Plants and Animals.

Based on the regulations, the use of this unprotected primate is not prohibited. In accordance with Minister of Forestry Decree No. 447/Kpts-II/2003, however, a capture quota is enforced for the use of this species, serving as a control mechanism to safeguard their viability in the wild. This is in line with CITES, as the long-tailed macaque is listed on CITES Appendix II, where its use is regulated under capture quota mechanism.

Long-tailed macaque species is listed on CITES Appendix II, making it subject to permits/quotas for its trade and distribution. Indonesia ratified the CITES convention in 1978 through Presidential Decree No. 43/1978. As a result of CITES ratification, the Indonesian Government has enacted several legal instruments on wild plant and animal trade. Law 5 of 1990 on Conservation of Biotic Natural Resources and Ecosystems regulates sustainable use of biotic natural resources and ecosystems. In 1994, the Minister of Forestry Decree No. 26/Kpts-II/1994 on the use of long-tailed macaque (*Macaca fascicularis*), pig-tailed macaque (*Macaca nemestrina*), and arowana (*Scleropages formosus*) for export purpose was issued, as response to the excessive use and population decrease of long-tailed macaque species. This decree states for export purposes, these wildlife species should be bred in captive breeding facilities, while wild-caught species may only be used for domestic

purposes. In determining capture quotas, DG of Natural Resources and Ecosystem Conservation (formerly PHKA) only considered the number of wildlife species that could be taken, ignoring their age classification and sex. Attention should be paid because it threatens long-tailed macaque populations (Santosa *et al.*, 2012). This decree was then revoked through Minister of Forestry No. 447/Kpts-II/2003 Decree on Administration Directive of Harvest or Capture and Distribution of the Specimens of Wild Plant and Animal Species.

Based on the Government Regulation No. 7/1999 with attachment of Minister of Environment and Forestry Regulation No. P.106/MENLHK/SETJEN/KUM.1/12/2018 on protected plants and animals, long-tailed macaque is classified as an unprotected animal species. Although it is not a protected animal, the use of this species is still regulated under the Government Regulation No. 7/1999 on Preservation of Plants and Animals, the Government Regulation No. 8/1999 on the Use of Wild Plants and Animals, and the Minister of Forestry Decree No. 447/Kpts-II/2003 on Administration Directive of Harvest or Capture and Distribution of the Specimens of Wild Plant and Animal Species. The latter states that the use of wild long-tailed macaques is regulated through a quota mechanism established by Management Authority in accordance with recommendation from Science Authority to ensure their sustainability.

Increasing use of Indonesia wildlife species, both domestically and internationally, for non-commercial and commercial purposes, such as bioprospecting and biomedical engineering requires regulations organising access to genetic resources and use of wildlife species. In 2013 through Law 11 of 2013, Indonesia ratified the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from Their Use under the Convention on Biological Diversity. This law was then followed up by the enactment of the Ministry of Environment and Forestry Regulation No. P.2/MENLHK/SETJEN/KUM.1/1/2018 on Access to Wild Species Genetic Resources and Benefit Sharing from Their Use.

N. Protected Area

The principal goal of the protected area is biodiversity preservation. The designation and management of protected areas in Indonesia are part of the Government's efforts to conserve wild animal and

plant species in their natural habitat (in situ). To date, the Indonesian Government has designated 568 protected area units of a total of 26,894,122 ha, with the following statuses: Nature Reserve, Wildlife Reserve, Nature Recreation Park, Hunting Park, and National Park (DG of Natural Resources and Ecosystem Conservation, 2022). See Table 4 for information on Long-tailed macaque habitat size in Sumatra, Java, Bali, West Nusa Tenggara, East Nusa Tenggara, and Kalimantan conservation areas.

Table 4. Long-tailed Macaque suitable habitat size and population estimate in Sumatra, Java, Bali, West Nusa Tenggara, East Nusa Tenggara and Kalimantan protected areas.

Province	Area Function	Unit	Size (Ha)	Habitat Size (Ha)	Habitat Percentage	Population Estimation
SUMATERA						
Aceh	Hunting Park	1	86,634.00	0.00	0.00%	0
	National Park	1	830,268.97	212,069.24	25.54%	679
	Nature Recreation Park	3	238,188.82	27,471.81	10.64%	220
	Nature Reserve	2	15,670.56	10,803.60	84.15%	36
	Wildlife Reserve	1	82,374.00	0.00	0.00%	0
	Aceh Total		8	1,253,136.35	250,344.65	28.22%
North Sumatera	Hunting Park	1	8,350.00	8,350.00	100.00%	67
	National Park	1	72,150.00	25,736.25	35.67%	82
	Nature Recreation Park	7	3,566.54	2,556.54	71.43%	20
	Nature Reserve	11	16,612.76	2,716.26	53.12%	15

NON-DETRIMENTAL FINDINGS (NDF) FOR LONG-TAILED MACAQUE (*Macaca fascicularis*)

	Wildlife Reserve	4	85,552.00	11,817.24	7.33%	38
	North Sumatera Total	24	186,231.30	51,176.29	52.06%	223
West Sumatera	Nature Recreation Park	1	112.50	112.50	100.00%	1
	Nature Reserve	7	159,433.74	132,819.40	43.00%	906
	West Sumatera Total	8	159,546.24	132,931.90	50.13%	907
Jambi	National Park	4	1,729,775.22	1,316,432.39	92.56%	5,846
	Nature Recreation Park	1	425.50	425.50	100.00%	3
	Nature Reserve	7	18,660.82	18,660.82	100.00%	149
	Jambi Total	12	1,748,861.54	1,335,518.71	97.52%	5,999
Riau	National Park	1	81,793.00	81,793.00	100.00%	654
	Nature Recreation Park	1	3,563.92	3,563.92	100.00%	29
	Riau Total	2	85,356.92	85,356.92	100.00%	683
South Sumatera	National Park	2	219,703.22	219,703.22	100.00%	1,758
	Nature Recreation Park	4	7,107.98	7,107.98	100.00%	57
	Wildlife Reserve	6	243,900.62	201,019.02	73.84%	1,411
	South Sumatera Total	12	470,711.82	427,830.22	86.92%	3,225
Bengkulu	Hunting Park	2	15,909.00	8,638.00	50.00%	69
	Nature Recreation Park	5	9,457.45	9,457.45	100.00%	76

NON-DETRIMENTAL FINDINGS (NDF) FOR LONG-TAILED MACAQUE (*Macaca fascicularis*)

	Nature Reserve	23	7,187.41	2,467.39	73.91%	20
	Bengkulu Total	30	32,553.86	20,562.84	76.67%	165
Lampung	National Park	2	439,193.80	342,753.05	84.62%	1,700
	Lampung Total	2	439,193.80	342,753.05	84.62%	1,700
JAVA						
Banten	National Park	1	105,694.46	62,518.17	59.15%	2,001
	Nature Recreation Park	1	528.15	528.15	100.00%	17
	Nature Reserve	3	5,095.05	1,554.93	33.80%	50
	Banten Total	5	111,317.66	64,601.25	52.11%	2,067
West Java	National Park	3	126,811.11	79,879.52	51.95%	2,556
	Nature Recreation Park	7	940.07	662.97	70.07%	21
	Nature Reserve	27	43,679.75	15,815.78	38.19%	506
	Wildlife Reserve	2	13,527.00	11,080.73	77.35%	355
	West Java Total	39	184,957.93	107,438.99	46.98%	3,438
Jakarta	National Park	1	107,498.00	0.00	0.00%	0
	Nature Recreation Park	1	99.82	99.82	100.00%	3
	Nature Reserve	1	18.00	18.00	100.00%	1
	Wildlife Reserve	1	25.02	25.02	100.00%	1

NON-DETRIMENTAL FINDINGS (NDF) FOR LONG-TAILED MACAQUE (*Macaca fascicularis*)

	Jakarta Total	4	107,640.84	142.84	75.00%	5
Central Java	National Park	2	117,445.48	3,094.96	4.62%	99
	Nature Recreation Park	3	216.39	179.09	65.93%	6
	Nature Reserve	9	1,012.83	1,004.66	100.00%	32
	Central Java Total	14	118,674.70	4,278.70	79.07%	137
Yogyakarta	National Park	1	6,410.00	2,269.53	35.41%	73
	Nature Recreation Park	1	1.08	1.08	100.00%	0
	Nature Reserve	2	11.84	0.00	0.00%	0
	Wildlife Reserve	2	619.59	434.60	50.00%	14
	Yogyakarta Total	6	7,042.51	2,705.21	39.24%	87
East Java	National Park	4	377,065.64	332,836.32	78.01%	7,889
	Nature Recreation Park	2	316.71	10.59	50.00%	0
	Nature Reserve	8	1,576.21	1,385.71	87.50%	44
	Wildlife Reserve	3	24,195.75	10,018.75	66.67%	321
	East Java Total	17	403,154.31	344,251.38	77.18%	8,255
LESSER SUNDA						
Bali	National Park	1	15,587.89	15,587.89	100.00%	62
	Nature Recreation Park	4	4,510.56	4,121.29	95.31%	9

NON-DETRIMENTAL FINDINGS (NDF) FOR LONG-TAILED MACAQUE (*Macaca fascicularis*)

	Nature Reserve	1	1,773.80	324.61	18.30%	1
	Bali Total	6	21,872.25	20,033.79	83.26%	73
West Nusa Tenggara	Hunting Park	1	22,537.90	22,537.90	100.00%	90
	National Park	2	112,975.65	76,965.41	64.31%	308
	Nature Recreation Park	10	11,024.09	11,024.09	100.00%	44
	Nature Reserve	5	11,041.06	11,041.06	100.00%	44
	West Nusa Tenggara Total	18	157,578.70	121,568.46	96.03%	486
East Nusa Tenggara	National Park	3	220,665.88	104,224.52	70.12%	417
	Nature Recreation Park	8	155,089.52	32,756.57	60.04%	131
	Nature Reserve	6	15,230.44	13,939.61	95.61%	56
	Wildlife Reserve	5	10,155.55	9,028.09	89.21%	36
	East Nusa Tenggara Total	22	401,141.39	159,948.79	77.74%	640
KALIMANTAN						
West Kalimantan	National Park	3	1,055,660.23	674,686.46	84.45%	21,590
	Nature Recreation Park	2	1,739.20	1,739.20	100.00%	15
	Nature Reserve	3	95,057.02	95,057.02	100.00%	3,042
	West Kalimantan Total	8	1,152,456.45	771,482.68	94.17%	24,647
Central Kalimantan	National Park	3	1,189,876.02	1,115,388.87	89.49%	13,570

NON-DETRIMENTAL FINDINGS (NDF) FOR LONG-TAILED MACAQUE (*Macaca fascicularis*)

	Nature Recreation Park	2	2,867.17	2,867.17	100.00%	15
	Nature Reserve	1	5,944.79	5,944.79	100.00%	52
	Wildlife Reserve	1	61,425.11	61,425.11	100.00%	541
	Central Kalimantan Total	7	1,260,113.09	1,185,625.94	95.50%	14,178
South Kalimantan	Nature Recreation Park	3	1,500.78	1,485.20	66.67%	46
	Nature Reserve	3	20,527.62	20,282.62	33.33%	178
	Wildlife Reserve	3	10,247.40	0.00	0.00%	0
	South Kalimantan Total	9	32,275.79	21,767.82	33.33%	224
East Kalimantan	National Park	1	192,709.56	192,709.56	100.00%	6,167
	Nature Reserve	4	179,732.87	179,732.87	100.00%	1,143
	East Kalimantan Total	5	372,442.43	372,442.43	100.00%	7,310
North Kalimantan	National Park	1	1,271,696.57	931,469.66	73.25%	29,807
	North Kalimantan Total	1	1,271,696.57	931,469.66	73.25%	29,807
	INDONESIA TOTAL	259	9,977,956.45	6,754,232.51	69.65%	105,187

Data sources: DG of Natural Resources and Ecosystem Conservation, 2022; UNEP-WC-MC and IUCN, 2023

NON-DETRIMENTAL FINDINGS (NDF) FOR LONG-TAILED MACAQUE (*Macaca fascicularis*)

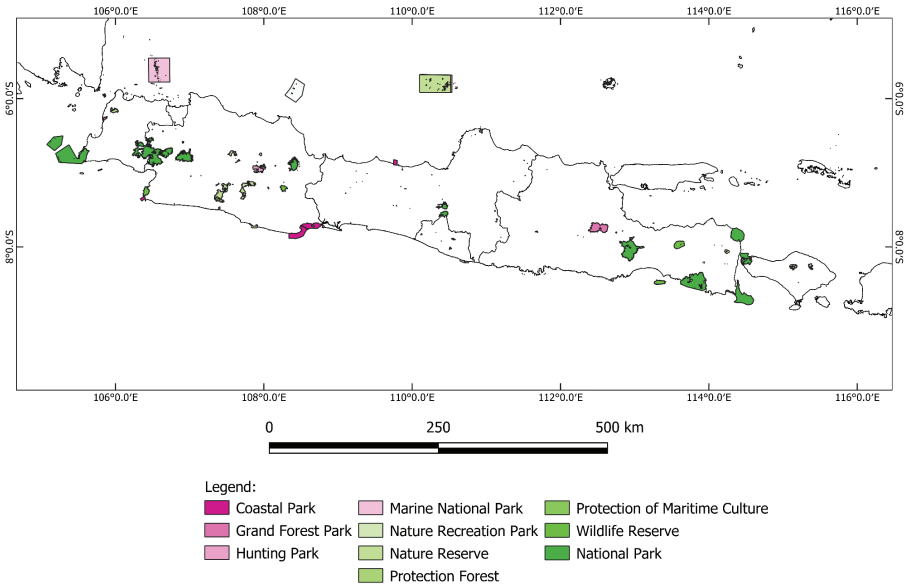


Figure 7. Conservation Areas in Java

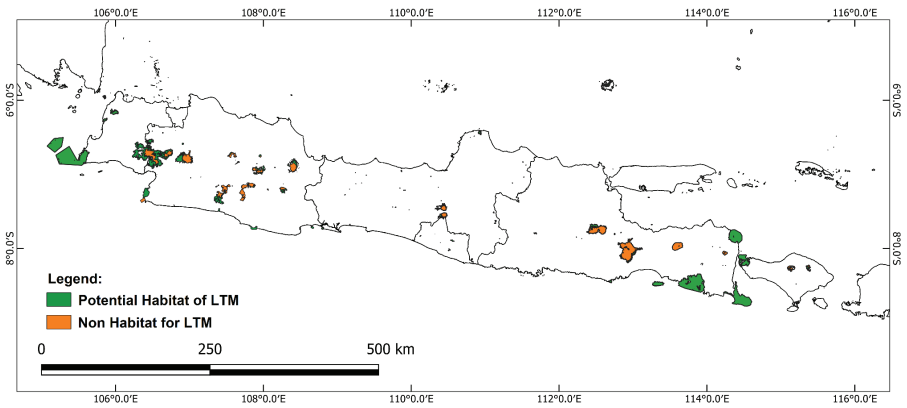


Figure 8. Map of Potential Habitat of Long-tailed Macaque in Protected Areas in Java Island

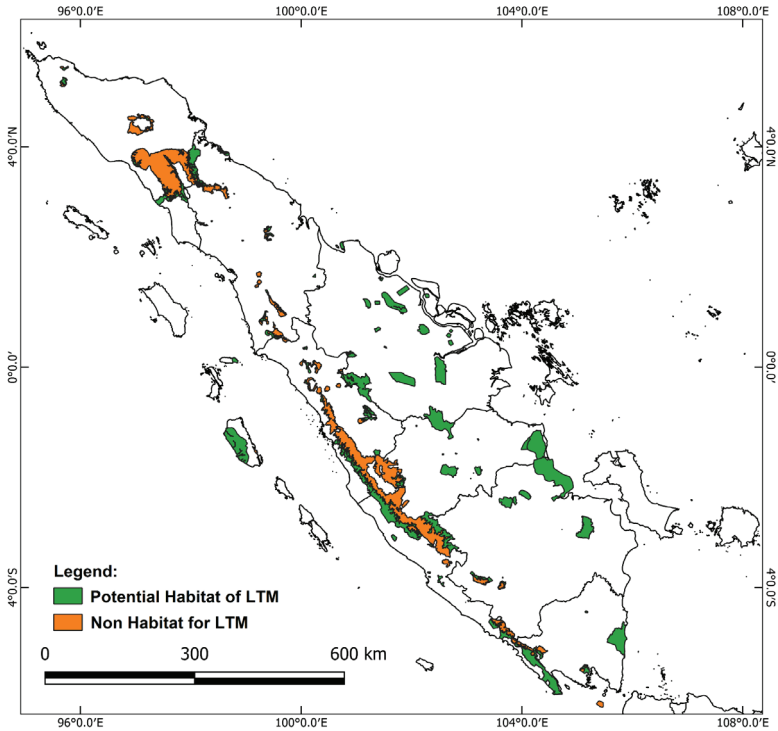


Figure 9. Map of Potential Habitat of Long-tailed Macaque in Protected Areas in Sumatra Island

The calculation of the potential population of long-tailed macaques in protected areas across Sumatra, Java, Bali, West Nusa Tenggara, East Nusa Tenggara, and Kalimantan was conducted using various approaches to rationalize the data. The elevation in Sumatra and Kalimantan is limited to 800 meters above sea level (Yanuar et al., 2009), while Java and the Lesser Sunda islands (Bali, West Nusa Tenggara, and East Nusa Tenggara) have an elevation limit of 1500 meters above sea level (Juliанти et al., 2020). For protected areas that cover land and sea areas, only the land area of protected areas was considered, excluding the sea areas. The suitable habitat for long-tailed macaques in protected areas on Java and Sumatra Islands can be observed in Figure 8 and 9, respectively.

To estimate the long-tailed macaque population in Sumatra, the density of long-tailed macaques in their respective habitat areas was extrapolated, using a density limit of 0.04 ind/ha in the highlands (Yanuar et al., 2009) and 0.1 ind/ha in the lowlands (Yanuar et al., 2009; Hansen et al., 2019). On Java Island, the density of long-tailed macaques is 0.4 ind/ha (Hansen et al., 2019), and specifically in Baluran National Park, it is 0.25 ind/ha (Hansen et al., 2020). In the Lesser Sunda region, a density value of 0.05 ind/ha was used to calculate the estimated population (Fauzi et al., 2020). For Kalimantan, population estimates of long-tailed macaques were calculated using a density of 0.06 ind/ha in estuary and shoreline habitats, 0.11 ind/ha for areas around large river habitats, and 0.4 ind/ha for habitats around small rivers (Gumert et al., 2012).

The estimated population of long-tailed macaques in protected areas in Indonesia is 105,187 individuals, with 13,835 individuals in Sumatra, 13,988 individuals in Java, 1,199 individuals in the Lesser Sunda, and 76,166 individuals in Kalimantan (Table 4). This population estimate is derived by extrapolating the density of long-tailed macaques in their habitat within protected areas, based on several conducted studies with certain limitations. It is important to exercise caution when using population estimation data, particularly in the context of long-tailed macaque management. Further inventorying and monitoring of long-tailed macaque populations are crucial to obtain an accurate understanding of the actual population in Indonesia. There is an urgent need for factual data on long-tailed macaque populations in protected areas that is tailored to the unique conditions and characteristics of each area.

Protected areas serve as the final stronghold for biodiversity conservation in Indonesia, with limited utilization of biodiversity within their boundaries. As a result, the population of long-tailed macaques in protected areas represents the last remaining reserve population in the country. Improvements are needed in controlling, monitoring, and managing populations outside protected areas due to the lack of regulatory protection. It is essential to ensure the sustainable use of long-tailed macaques for the benefit of all parties. Proper management is crucial for the utilization of long-tailed macaques outside conservation areas, considering the vulnerability of their population and habitat to threats such as habitat degradation and hunting.

O. Use Controls and Monitoring

To ensure legality, sustainability, and traceability of the use of wild plant and animal species, the Government has enforced a number of regulations on control and monitoring systems for capturing and transporting wildlife species domestically and internationally.

For wildlife capture, a quota system is implemented, which specifies the maximum number of animals that can be captured in a given area within one year, which subject to certain conditions (such as age and size). This capture quota is determined by the DG of Natural Resources and Ecosystem Conservation, which serves as the Management Authority, based on recommendations from the Biodiversity Scientific Authority of BRIN (formerly LIPI). In recommending a capture quota for a species, BRIN takes a number of factors into account, including the condition of the population in the wild and the number of captures made in prior years. Permits to capture are issued by the Natural Resources Conservation Agency to business actors who possess a Domestic Circulation Permit.

Transporting species from capture sites to different point of locations (e.g., shelters, captive-breeding facilities, ports, airports, etc.) requires a permit for the Domestic Transport of Plants and Animals (SAT-DN) issued by the local Natural Resources Conservation Agency. SAT-DN includes information on basis of issuance, type and quantity of the transported specimens, identities of the sending party, and destination, as well as evidence of inspection by Natural Resources Conservation Agency officers at the origins and destinations.

Permit for Foreign Transport of Wild Plants and Animals (SATS-LN) issued by the Directorate for Species and Genetic Biodiversity Conservation is required for the transport of animal specimens to foreign countries. SATS-LN includes details about type, number, and CITES status of the transported specimens, number/quota of previous years, identities of the sending party and recipient, port of origin and port of destination, and validity period.

P. Captive Breeding

The annual global demand for long-tailed macaques as experimental animals is around 35,000 individuals. Mauritius is the top exporter of

this species, both wild-caught (W) and captive-bred (F), while China and Vietnam are the top captive-bred exporters. The United States is the leading importer and re-exporter of this species, with numerous trading partners (Zafira et al., 2022). According to the Cites Trade Database, Indonesia exported specimens of long-tailed macaques from 1977 to 2019.

Long-tailed macaques are used extensively in medical research (as an experimental animal), international trade, education, and tourism. Despite the fact that its legal status in Indonesia is unprotected, it is listed on CITES Appendix II, meaning it is subject to quota restrictions for use and trade. Prior to 2009, Indonesia ranked among the top exporters of long-tailed macaques. As a signatory to the CITES, Indonesia is required to adhere to all applicable rules and regulations, as well as must ensure that export activities will not affect the natural population of the species.

Additionally, captive-breeding facilities with open, semi-open, and closed rearing systems have been established for this species in Indonesia since the 1990s. Until the 2000s, more than eight captive-breeding facilities were officially registered (i.e., CV New Inquitex Primates Division, CV Primaco Indonesia, PT Prestasi Farma Nusantara, CV Universal Fauna, CV Wahana Satwa Loka, PT Indo Biomedical, PSSP IPB, PT Macalaris, and Perum Perhutani).

The captive-breeding facilities obtain capture quotas recommended by the Biodiversity Scientific Authority of BRIN (formerly LIPI) based on the animal's legal and CITES protection status. Until 2009, long-tailed macaque exports were met through captive breeding, so there was no decline in wild populations. See Table 6 for details about long-tailed macaque populations in several captive-breeding facilities.

Table 5. Captive Breeding Facilities of Long-tailed Macaque

Year	Company	Number (individual)			
		F0	F1	F2	F3
2016	CV Primaco Indonesia	2,339	4,279	192	-
2016	PT Indo Biomedical	652	1,499	35	-
2016	PT Macalaris	333	1,237	-	-
2017	CV Primaco Indonesia	1,426	3,487	200	-
2018	CV Primaco Indonesia	1,816	3,483	200	-
2019	CV Primaco Indonesia	1,816	3,483	200	-
2020	CV Primaco Indonesia	2,331	5,158	200	-
	CV. Inquatex	363	3,18	242	14
2021	CV. Primaco	2563	5344	3261	
	CV. Inquatex	363	758	17	
2022	CV. Primaco	2563	5449	200	
	CV. Inquatex	363	4607	348	26

Before exporting, the management and scientific authorities inspect and/or audit captive-breeding business units based on CITES guidance for inspection of captive breeding (SC 66 Doc.41.1 Annex 3)

Q. Human and Long-tailed macaque interaction

Long-tailed macaques prefer secondary forests and habitats adjacent to community plantations. Habitat destruction forced this species to

seek out other areas that can satisfy their needs, including adapting to human-dominated environments. This leads to a high frequency of human-macaque encounters. To minimise this, it is important to understand the spatial distribution patterns, time, and escalation of the human-macaque interaction.

Data on the human-macaque interaction is derived from Natural Resources Conservation Agency reports of each province and articles from mass media outlets compiled from 2015 to 2019. During this period, 99 human-macaque interactions were documented in the news articles (82 in Java) and (17 in Sumatra, Kalimantan, and Bali). The human-macaque interaction occurred in 20 locations of 22 sampling locations in Java Island (Kyes *et al.*, 2011), primarily in fruit farms, agricultural areas, gardens, and around the settlements. This occurrence often leads to the assumptions of overpopulation; field verification is therefore needed.

Information on human-macaque interaction outside of Java is available, but the collected data do not reflect the actual conditions. As mentioned above, the media reported 99 cases of human-macaque interaction in Indonesia, the majority of which occurred in Java (82 cases), with the highest number of cases found in West Java (27), followed by East Java (25), Central Java (16), Yogyakarta (11), Special Capital Region of Jakarta (6), and Banten (5). See Figure 10 for details.

The highest number of cases in Central Java occurred in Wonogiri (7), Gunung Kidul (6), and Probolinggo (4), and Situbondo (4). These occurred predominantly between June-August and October-January, during the dry season and under dry environmental conditions. The majority of areas with frequent cases are farmlands, such as rice fields, plantations, etc.

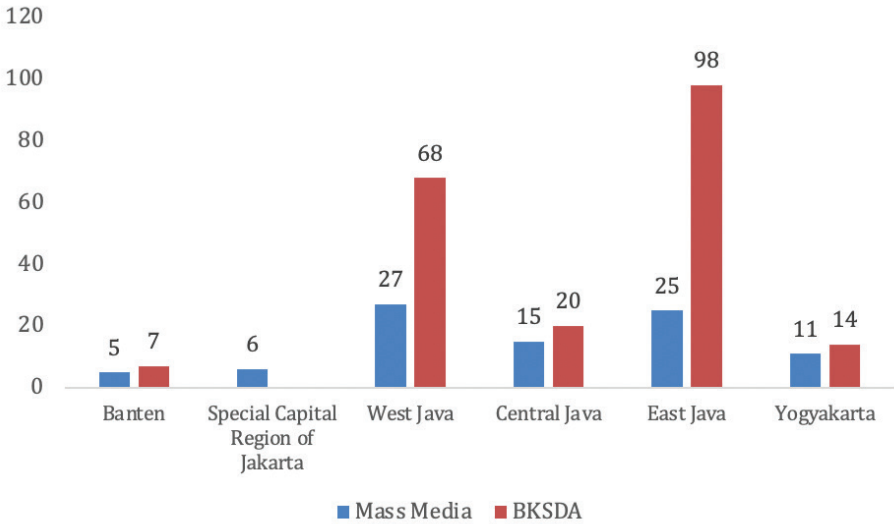


Figure 10. Human-macaque interactions in Java based on BKSDA reports and mass media articles.

The cases occurred most frequently in East Java, West Java, Central Java, and Yogyakarta. Similar human-macaque interaction patterns were documented by the BKSDA and the media. However, the number of occurrences reported by the BKSDA, especially in East Java and West Java, is significantly higher than those reported by the media.

The analysed and mapped population data from BKSDA indicates a trend of occurrence in two major areas around the borders of East Java, Central Java, and Yogyakarta (Pacitan, Ponorogo, Wonogiri, and Gunung Kidul) and around Sumedang, Kuningan, and Ciamis. Areas with moderate-level include Bogor, Sukabumi, and Kebumen, while Banten (Tangerang), Central Java (Temanggung, Magelang, etc.), Surabaya, and Sidoarjo are those with low-level human-macaque interaction. See Figure 12 for details).

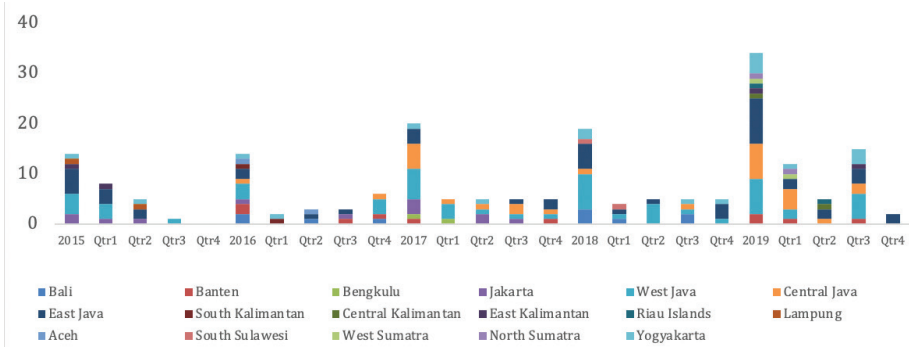


Figure 11. The Distribution of Human-Long-tailed Macaque interactions based on Media Reports (2015-2019)

In general, data from the media indicates an increase in the number of human-macaque interaction between 2015 to 2019, predominantly in four provinces (West Java, East Java, Central Java, and Yogyakarta). However, most media reports on the cases did not provide accurate population/number of individuals information. Population analysis based on mass media information was therefore not possible.

BKSDA data only covered five provincial reports, i.e., West Java, Central Java, Yogyakarta, East Java, and Jambi. Due to the lack of data from other regions, human-macaque interaction was only analysed in Java.

According to BKSDA reports, this species disturbance occurred in 35 districts/cities in Java, while various mass media outlets reported 38 districts/cities were affected. However, human-macaque interaction were only documented in 19 districts/cities, according to BKSDA data and media news coverages. This shows that not every case is documented by BKSDA or covered by the media.

NON-DETRIMENTAL FINDINGS (NDF) FOR LONG-TAILED MACAQUE (*Macaca fascicularis*)

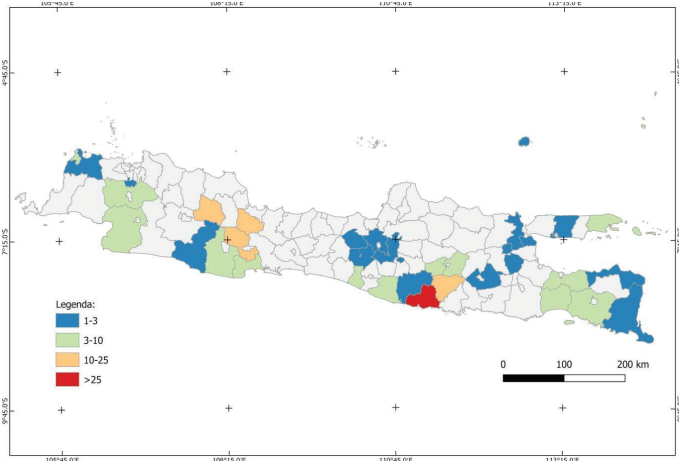


Figure 12. The number of Long-tailed Macaque involved in human-macaque interaction by District/City based on BKSDA data.

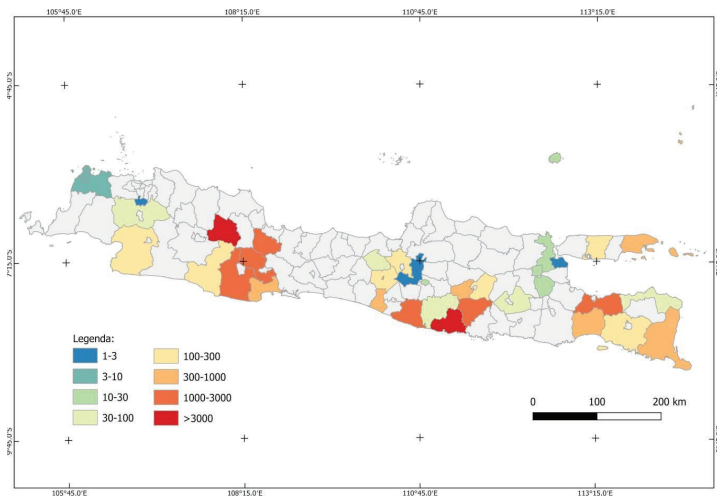


Figure 13. Number of human-macaque interaction by district/city based on BKSDA data

The interaction between human and long-tailed macaque are prevalent in 4 provinces, i.e., West Java, East Java, Central Java, and Special Region of Yogyakarta (Daerah Istimewa Yogyakarta/DIY), according to the analysis and media inventory. Mass media data and BKSDA reports correspond to the number of cases in each province. The Yogyakarta BKSDA reported cases in 9 subdistricts, i.e., Patuk, Semin, Ponjong, Purwosari, Saptosari, Paliyan, Tanjungsari, Tepus, and Girisubo, in Gunungkidul District. It has been expected that these cases involved 2 groups of 800-1,000 individuals. In addition, the cases in Kulonprogo were found in 3 subdistricts (i.e., Girimulyo, Samigaluh, and Kalibawang), involving 13 groups of 830-1,800 individuals.

Human-macaque interaction in Central Java reported occurred in Wonogiri District (Kismantoro, Nguntoronadi, Baturetno, and Jatisrono), and State-owned Forestry Enterprise (Perhutani); Temanggung District (Kaloran, Temanggung, Pakis, and Tlogomulyo); Surakarta City (Taru Jurug Zoo); Magelang City (Mount Tidar), Magelang District (Pakis, Ngablak, Dukun, Borobudur, Kajoran, and Bandongan). In West Java, cases were reported in Bogor District (Padang Golf Sentul, Dramaga Subdistrict, Kabandungan of Halimun Salak National Park), Sukabumi District (Cikakak Subdistrict, Pelabuhan Ratu Non-Autonomous Village). Lastly, 80 cases were reported in East Java. In all cases, long-tailed macaques primarily attacked local communities, settlements, and farmlands and gardens.

It is considered that the case is the result of two factors, i.e., increase in the primate population and/or a gradual decline in habitat quality. The first factor is attributed to the rapid reproduction of this species in a good habitat condition. Additionally, such cases have resulted in economic and social losses. Economic loss is brought on by crop failure in farmland and community gardens, while social loss may include the feeling of fear and job loss among community members who are unable to cultivate their own lands.

R. Assessment and scoring of *Macaca fascicularis* population in Indonesia.

Assessment of various parameters related to biological characteristics, the national population status, harvest management, and harvesting control is conducted to provide an overview of the long-tailed macaque population in Indonesia. A total of 26 parameters from these four categories are given equal weights, enabling the calculation of their average values as the final assessment score. The assessment criteria are divided into three categories based on a score range of 1-5, resulting in the positive category (<1.66), neutral category (1.67-3.33), and negative category (3.34-5) (refer to Appendix 1). The positive category indicates a secure population condition, allowing utilization through quota mechanisms. The neutral category signifies a relatively stable population where utilization is still possible with strict control and periodic population monitoring (annually). The negative category suggests that the long-tailed macaque population is under pressure, and utilization cannot be carried out until the population condition improves. The scoring result showed in Table 6 and Figure 14.

Table 6 . Summary of scoring NDF *Macaca fascicularis* in Indonesia

Criteria	Score
2.1. Life history	1
2.2. Ecological adaptation	2
2.3. Distribution efficiency	2
2.4. Interaction with human	3
2.5. National distribution	2
2.6. National profusion	2
2.7 . National population trend	2
2.8. Information quality	2
2.9 Primary threat	2
2.10. Illegal harvesting and trade	2
2.11. Management history	1
2.12. Equitable management plan	1
2.13. Objectives of harvest regime in the management plan	2
2.14 Harvest quota (if harvest is based on quotas)	1
2.15. Harvest in conservation areas	1

2.16. Harvest in areas with resources that have strong ownership control	1
2.17. Harvest in areas with open road access	1
2.18. Confidence level in harvest management	1
2.19. Monitoring methods used	2
2.20. Confidence in harvest monitoring	1
2.21. The use compared to other threats	1
2.22. Incentive for species conservation	2
2.23. Incentive for habitat conservation	2
2.24. Strictly-protected proportion	1
2.25. Effectiveness of strict protection measures	2
2.26. Harvest regulation efforts	2
Total Score	42
Average	1.615

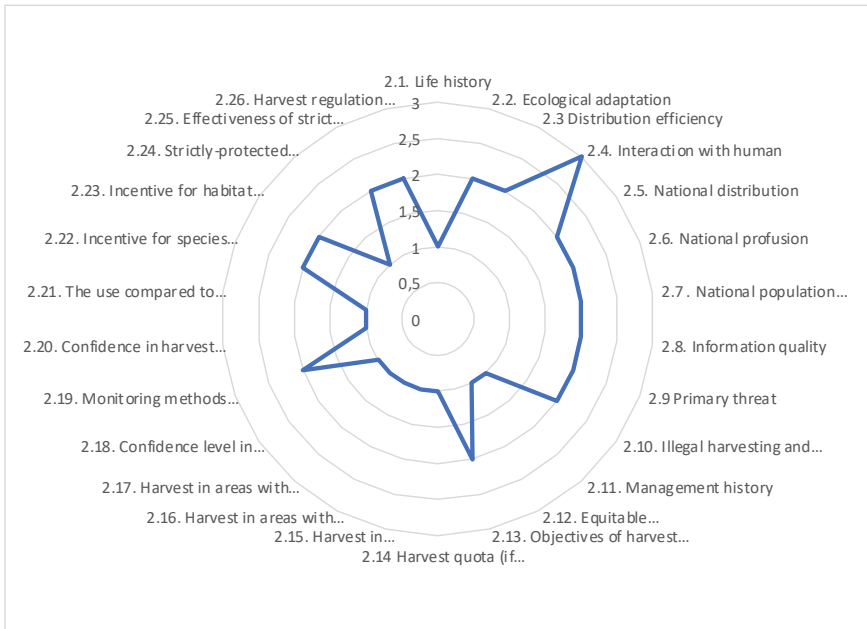


Figure 14. Scoring NDF *Macaca fascicularis*

Based on the scoring process, a total score of 42 points was obtained, resulting in an average score of 1.615. According to these categories, the NDF scoring assessment of the long-tailed macaque falls under the 'Positive' criteria. This means that the long-tailed macaque population in Indonesia can be utilized through a quota mechanism. Although it falls into the positive category with a score of 1.615, this score is close to the neutral category, indicating the need for annual monitoring to observe population trends of long-tailed macaques in Indonesia. Specifically, the population of long-tailed macaques should be periodically monitored after utilization/harvesting to assess the impact on their population sustainability. Utilizing long-tailed macaques should provide incentives for the conservation of this species in Indonesia.

References

- Bonadio, C. 2000. "Macaca fascicularis" (On-line), Animal Diversity Web. Accessed June 04, 2023 at https://animaldiversity.org/accounts/Macaca_fascicularis/
- Campbell-Smith G, Simanjorang HVP, Leader-Williams N, Linkie M (2010) Local attitudes and perceptions toward crop-raiding by Orangutans (*Pongo abelii*) and other nonhuman primates in Northern Sumatra, Indonesia. *Amer J Primat* 72: 866-876
- Eudey AA. (2008). The long-tailed macaque (*Macaca fascicularis*): widespread and rapidly declining. *Primate Conserv* 23: 129-132.
- Eudey, A., Kumar, A., Singh, M., Boonratana, R. 2020. *Macaca fascicularis*. The IUCN Red List of threatened species 2020: e.T12551A17949449. (Accessed: 21 November 2020).
- Fauzi, R., Wuryanto, T., Suarmadi, F., & Tomonob, A. (2020, November). Distribution of long-tailed macaque (*Macaca fascicularis*) in Kelimutu National Park. In IOP Conference Series: Earth and Environmental Science (Vol. 591, No. 1, p. 012041). IOP Publishing.
- Gumert, M. D., Rachmawan, D., Iskandar, E., & Pamungkas, J. (2012). Populasi monyet ekor panjang (*Macaca fascicularis*) di Taman Nasional Tanjung Puting, Kalimantan Tengah. *Jurnal Primatologi Indonesia*, 9(1), 3-12.
- Hansen, M.F., Ang, A., Trinh, T.T.H., Sy, E., Paramasivam, S., Ahmed, T., Dimalibot, J., Jones-Engel, L., Ruppert, N., Griffioen, C., Lwin, N., Phiapalath, P., Gray, R., Kite, S., Doak, N., Nijman, V., Fuentes, A. & Gumert, M.D. 2022. *Macaca fascicularis* (amended version of 2022 assessment). The IUCN Red List of Threatened Species 2022: e.T12551A221666136. <https://dx.doi.org/10.2305/>

- IUCN.UK.2022-2.RLTS.T12551A221666136.en. Accessed on 04 June 2023.).
- Heaney, L. R. (1998). A synopsis of the mammalian fauna of the Philippine Islands. *Fieldiana. Zoology. New Series*, 88, 1-61.
- Ilham, K., Rizaldi, Nurdin, J., & Tsuji, Y. (2017). Status of urban populations of the long-tailed macaque (*Macaca fascicularis*) in West Sumatra, Indonesia. *Primates*, 58, 295-305.
- Kurniawan, Cahyadi. 2019. BKSDA Jateng Beri Lampu Hijau Warga Wonogiri Basmi Monyet Ekor Panjang. *solopos.com*. <https://www.solopos.com/bksda-jateng-beri-lampu-hijau-warga-wonogiri-basmi-monyet-ekor-panjang-972682>. Diakses 28 Oktober 2020
- Kyes RC, Iskandar E, Pamungkas J. 2011. Preliminary survey of the longtailed macaques (*Macaca fascicularis*) on Java, Indonesia: Distribution and human-primate conflict. In M. Gumert, A. Fuentes, L. Jones-Engel (Eds.). *Monkeys on the Edge: Ecology and Management of Long-tailed Macaques and their Interface with Humans* (pg. 65-69). New York. Cambridge Univ. Press.
- Lane KE, Lute M, Rompis A, Wandia IN, Putra I G A A, Hollocher H, Fuentes, A. (2010). Pests, pestilence, and people: the long-tailed macaque and its role in the cultural complexities of Bali. In: Gursky-Doyen S, Supriatna J (eds) *Indonesian primates*. Springer, New York; pp 235-248.
- Lane-deGraaf, K. E., Putra, I. A., Wandia, I. N., Rompis, A., Hollocher, H., & Fuentes, A. (2014). Human behavior and opportunities for parasite transmission in communities surrounding long-tailed macaque populations in Bali, Indonesia. *American journal of primatology*, 76(2), 159-167.

- Lane-Degraaf, K.E., I.G.A.P. Arta, I.N. Wandia, A. Rompis, H. Hollocher, A. Fuentes. Linkie, M., Dinata, Y., Nofrianto, A., & Leader-Williams, N. (2007). Patterns and perceptions of wildlife crop raiding in and around Kerinci Seblat National Park, Sumatra. *Animal Conservation*, **10**(1), 127-135.
- Linkie M, Dinata Y, Nofrianto A, Leader-Williams N (2007) Patterns and perceptions of wildlife crop raiding in and around Kerinci Seblat National Park, Sumatra. *Anim Conserv* 10: 127–135
- Luskin MS, Christina ED, Kelley LC, Potts MD. 2014. Modern hunting practices and wild meat trade in the oil plantation-dominated landscape of Sumatra. *Human Ecology* 42:35–45. <http://doi.org/10.1007/c10745-s 013-906-8>.
- Maharadatunkamsi, R. Phadmacanty, E.Sulistyadi, N Inayah, AS. Achmadi, E. Dwijayanti, G. Semiadi, WR. Farida, Wirdateti, S. Wiantoro, RTP. Nugraha, YS. Fitriana, Kurnianingsih. 2020. Status Konservasi dan Peran Mamalia di Pulau Jawa. Jakarta: LIPI Press.
- Marchal, V., & Hill, C. (2009). Primate crop-raiding: a study of local perceptions in four villages in North Sumatra, Indonesia. *Primate Conservation*, **24**(1), 107-116.
- Maryanto, I., Noerdjito, M., & Partomihardjo, T. (2012). Ekologi Gunung Slamet: Geologi, Klimatologi, Biodiversitas, dan Dinamika Sosial. LIPI Press.
- Medan, Sumatra 1997–2001. TRAFFIC Southeast Asia, Petaling Jaya. monkeys in Indonesia. *Tropical Medicine & International Health*, **10**(12), 1305-1314.
- Molur S., D. Brandon-Jones, W. Dittus, A. eudey, A. Kumar, M. Singh, M.M. Feeroz, M. chalise, P. Priya & S. Walker (eds.) (2003).

- Status of South Asian Primates: Conservation Assessment and Management Plan (C.A.M.P.) Workshop Report, 2003. Zoo Outreach Organization Coimbatore, India, viii+432pp.
- Nijman, V., D. Spaan, E. J. Rode-Margono, and K. A. I. Nekarlis. 2015. Changes in the Primate Trade in Indonesian Wildlife Markets over a 25-Year Period: Fewer Apes and Langurs, More Macaques and Slow Lorises. *American Journal of Primatology* 79: e22517
- Partasasmita R, Iskandar J, Malone N. 2016. Karangwangi people's (South Cianjur, West Java, Indonesia) local knowledge of species, forest utilization and wildlife conservation. *Biodiversitas, Journal of Biological Diversity*. 17(1):154-161. doi:10.13057/biodiv/d170123.
- Payne, J., Francis, C. M., Phillipps, K. & Kartikasari, S. N. (2000). *Panduan lapangan mamalia di Kalimantan, Sabah, Sarawak & Brunei Darussalam*. Kota Kinabalu: Sabah Society.
- Romdhon, MS. 2018. Meresahkan Warga, 120 Monyet Ekor Panjang di Gunung Ciremai Ditangkap. *Kompas.com*. <https://regional.kompas.com/read/2020/01/23/20092861/meresahkan-warga-120-monyet-ekor-panjang-di-gunung-ciremai-ditangkap?page=all>. Diakses 28 Oktober 2020.
- Santosa, Y., Hidayat, A., & Mustari, A. H. (2013). Studi Populasi dan Pola Penggunaan Ruang Monyet Ekor Panjang (*Macaca fascicularis*) di Hutan Pendidikan Gunung Walat. *Media Konservasi*, 18(1).
- Siddiq, A. M., Wati, D. E., Sulistiyowati, H., Wimbaningrum, R., Setiawan, R., & Supriadi, D. (2022). Habitat Characteristics of Long-Tailed Macaque (*Macaca fascicularis* Raffles, 1821) in Kucur Resort at Alas Purwo National Park. *BERKALA SAINSTEK*, 10(2), 94-100.

- Supriatna, J., & Wahyono, E. H. (2000). Panduan lapangan primata Indonesia. Yayasan Obor Indonesia.
- Surono, H. (2012). Jenis Pakan dan Pola Pemanfaatan Tajuk berdasarkan Aktivitas Makan Owa Jawa (*Hylobates moloch* Audebert, 1798) di Taman Nasional Gunung Halimun Salak Provinsi Jawa Barat.
- Tresnady, T. 2019. Tokopedia Respon Laporan Manohara Terkait Jual Hewan Monyet. Uzone. <https://uzone.id/-draft-tokopedia-respon-laporan-manohara-terkait-jual-hewan-monyet>.
- Wadley, R.L., Colfer, C.J.P. & Hood, I.G. 1997. Hunting primates and managing forests: the case of Iban forest farmers in Indonesian Borneo. *Human Ecology*, 25, 243–271.
- Yanuar, A., Chivers, D. J., Sugardjito, J., Martyr, D. J., & Holden, J. T. (2009). The population distribution of pig-tailed macaque (*Macaca nemestrina*) and long-tailed macaque (*Macaca fascicularis*) in west central Sumatra, Indonesia. *Asian Primates Journal*, 1(2), 2-11.
- YIARI. 2012. Monyet ekor panjang: tak terlindungi dan banyak diperdagangkan di pasar burung. <https://www.internationalanimalrescue.or.id/staging/monyet-ekor-panjang-tak-terlindungi-dan-paling-banyak-diperdagangkan-di-pasar-burung/> . accessed 12 December 2022.

Annex 1.

Category and criteria for NDF score of *Macaca fascicularis* in Indonesia.

A. Biological Characteristics			Scoring	Note/Description
2.1 Life history What is the life cycle of this species like?	High reproduction rate, long lifespan	1	1	Biological information is complete. Note: Life history is related to reproduction rate Long life span: 30-39 years (in captivity), not known for certain in the wild (15 years).
	High reproduction rate, short lifespan	2		
	Low reproduction rate, long lifespan	3		
	Low reproduction rate, short lifespan	4		
	Uncertain	5		
2.2 Ecological adaptation: To what extent can the species adapt (habitat, food, environmental tolerance, etc.)?	Extreme Generalist	1	2	The habitat niche is wide (mangroves, secondary forests, riparian areas, forest border areas, gardens, and plantations, etc.). However, not all habitat types can be occupied; elevation limited (<1500 m a.s.l.).
	Generalist	2		
	Specialist	3		
	Extreme specialist	4		
	Uncertain	5		
2.3 Distribution efficiency How efficient is the distribution of species at each life stage?	Excellent	1	2	Distribution is proportional to habitat location.
	Good	2		
	Average	3		
	Lacking	4		
	Not Sure	5		
2.4 Interaction with human: Are the species tolerant of human activities other than harvesting?	No interaction	1	3	Many populations inhabit areas where human activities intersect.
	Commensal (no benefit nor harm caused)	2		
	Tolerant	3		
	Sensitive	4		
	Uncertain	5		

NON-DETRIMENTAL FINDINGS (NDF) FOR LONG-TAILED MACAQUE (*Macaca fascicularis*)

B. NATIONAL STATUS				
2.5 National distribution: What is the national distribution of the species like?	Widespread, evenly distributed throughout the region	1	2	Population abundance is widely-spread and only concentrated in certain habitats.
	Widespread, not evenly distributed throughout the region nationwide	2		
	Limited and fragmented	3		
	Locally widespread	4		
	Uncertain	5		
2.6 National-level abundance What is the abundance at national level?	Highly abundant	1	2	
	Common	2		
	Uncommon	3		
	Rare	4		
	Uncertain	5		
2.7 National population trend What is the current population trend?	Increased	1	2	
	Stable	2		
	Decreased, but stable	3		
	Decreased and still declining	4		
	Uncertain	5		
2.8 Information quality What type of information is available to illustrate population abundance and trends at national level?	Up-to-date quantitative data, high accuracy	1	2	Data were sourced from scientific publications, survey reports, and other verified data sources.
	Up-to-date quantitative data, medium accuracy	2		
	Quantitative-data, out of data	3		
	Information from community	4		
	Not available	5		

NON-DETRIMENTAL FINDINGS (NDF) FOR LONG-TAILED MACAQUE (*Macaca fascicularis*)

<p>2.9 Main threat: What are the main threats the species face (mainly related to: overharvesting/habitat loss and alteration/invasive species/other) and how severe are they?</p>	Not available	1	2	Relatively low threat to this species.
	Limited/reversible	2		
	Substantial/significant	3		
	Severe/irreversible	4		
	uncertain	5		
C. HARVEST MANAGEMENT				
<p>2.10 Illegal harvesting and trafficking How significant are hunting and illegal trade at the national level?</p>	Not applicable	1	2	Illegal harvesting proportion is relatively low.
	Minor	2		
	Average/medium	3		
	Major	4		
	Uncertain	5		
<p>2.11 Management history How is the harvest history?</p>	Informal but sustainable management	1	1	Regulations related to the management of this species are in place and being implemented at technical level.
	Sustainable management but informal	2		
	Managed harvest: new	3		
	Unmanageable harvest: moderate or new	4		
	Uncertain	5		
<p>2.12 Equitable management plan: Is there any management plan associated with the harvesting of the species?</p>	Management plans are approved and coordinated at local and national levels	1	1	Improved use implementation (captive breeding, maximum use limit, maximum limit of production, etc.); monitoring and assistance in habitat, population, disturbance needs improvement.
	Approved management plans at the national/state/province level	2		
	Approved management plan at the local level	3		
	No approved plan: unplanned informal management	4		
	Uncertain	5		

NON-DETRIMENTAL FINDINGS (NDF) FOR LONG-TAILED MACAQUE (*Macaca fascicularis*)

2.13 Harvest purposes in the management plan: What is the intended outcome of the harvest?	Provide benefits for conservation	1	2	Harvesting aims at population control in conflict areas.
	Population management/control	2		
	Maximising economic yields	3		
	Opportunistic, non-selective, or non-existent harvest	4		
	Uncertain	5		
2.14 Quota: Is the harvest quota-based?	Established national quotas: based on local quotas considering biological aspects as well as inventory and monitoring results	1	1	A quota mechanism is in place for sustainable use control.
	Established quota: "cautious", national or local	2		
	Untried quotas: up-to-date and based on local quotas that consider biological aspects	3		
	Market-based quota, arbitrary quota, or no quota	4		
	Uncertain	5		
D. HARVEST CONTROL				
2.15 Harvest in conservation area What percentage of national legal harvest occurs in state-controlled areas? (*conservation areas?)	Not available	1	1	No harvesting in the conservation area, as per Minister of Forestry Decree No. 447/2003.
	Low	2		
	Average/medium	3		
	High	4		
	Uncertain	5		

NON-DETRIMENTAL FINDINGS (NDF) FOR LONG-TAILED MACAQUE (*Macaca fascicularis*)

<p>2.16 Harvest in areas with resources that have strong ownership control</p> <p>What percentage of the legal national harvest occurs outside protected areas (particularly in areas with strong local control over resource use)?</p>	High	1	1	
	Average/medium	2		
	Low	3		
	Not available	4		
	Uncertain	5		
<p>2.17 Harvest in area with open road access:</p> <p>What percentage of legal national harvest occurs in areas where no strong local control available, with de facto or actual open access</p>	Not available	1	1	Surveillance is carried out by BKSDA with a catch permit that contains location, quantity, species, catcher, and other information.
	Low	2		
	Average	3		
	High	4		
	Uncertain	5		
<p>2.18 Confidence level in harvest management:</p> <p>Do budgetary and other factors allow de facto implementation of the harvest management and control plan?</p>	High confidence	1	1	Quota and monitoring mechanisms for Long-tailed Macaque are present.
	Average/medium confidence	2		
	Low confidence	3		
	No confidence	4		
	Uncertain	5		
E. HARVEST MONITORING				
<p>2.19 Monitoring methods used:</p> <p>What is the main method used to monitor harvest impacts?</p>	Direct population estimation	1	2	Population surveys have been conducted on several habitats in determining quota (quantitative).
	Quantitative indicator	2		
	Qualitative indicator	3		
	National export monitoring	4		
	No monitoring took place or uncertain	5		

NON-DETRIMENTAL FINDINGS (NDF) FOR LONG-TAILED MACAQUE (*Macaca fascicularis*)

<p>2.20 Confidence in harvest monitoring:</p> <p>Do budgetary and other factors allow de facto harvesting?</p>	High confidence	1	1	Budget allocation and harvest monitoring mechanisms are in place (Catching Investigation Report/BAP).
	Average/medium confidence	2		
	Low confidence	3		
	No confidence	4		
	Uncertain	5		
F. HARVESTING INCENTIVES AND BENEFITS				
<p>2.21 The use compared to other threats:</p> <p>What are the impacts of harvesting when it is observed in conjunction with the main threats identified for this species?</p>	Useful	1	1	Harvesting is beneficial in reducing the main threats identified. If the species is not harvested, it is at high risk of hunting.
	Neutral	2		
	Hazardous	3		
	Extremely harmful	4		
	Uncertain	5		
<p>2.22 Incentive for species conservation</p> <p>At national level, how much conservation benefit does this species gain from harvesting?</p>	High	1	2	Harvesting is useful for controlling overpopulation.
	Average	2		
	Low	3		
	Not available	4		
	Uncertain	5		
<p>2.23 Incentives for habitat conservation</p> <p>At national level, how much habitat conservation benefit is gained from harvesting?</p>	High	1	2	Harvesting is beneficial in habitat development through planting and ecosystem restoration activities.
	Average	2		
	Low	3		
	Not available	4		
	Uncertain	5		

NON-DETRIMENTAL FINDINGS (NDF) FOR LONG-TAILED MACAQUE (*Macaca fascicularis*)

G. PROTECTION FROM HARVESTING				
2.24 Strictly-protected proportion: What percentage of the natural range or population of the species that is legally excluded from harvesting?	> 15%	1	1	Minister of Forestry Decree No. 447/2003, Capture Quota
	5-15%	2		
	<5%	3		
	Not available	4		
	Uncertain	5		
2.25 Effectiveness of protection measures Do budgetary and other factors contribute to confidence level in the effectiveness of protection measures?	High confidence	1	2	Protection efforts at the field level are carried out by Technical Implementing Unit with sufficient budget, personnel and facilities.
	Average confidence	2		
	Low confidence	3		
	No confidence	4		
	Uncertain	5		
2.26 Harvesting regulations How effective are harvest restriction criteria (related to age, size, season or equipment) to prevent overuse?	Highly effective	1	2	Harvest restrictions (age factor) are applied at the time of quota setting as recommended by Scientific Authority and at the time of capture in the field.
	Effective	2		
	Not effective	3		
	Not available	4		
	Uncertain	5		

