IBJ
Indonesian Biodiversity Journal
http://ejurnal.unima.ac.id/index.php/ibj

indonesian.biodivers.j.
Vol. 5, No. 1. April 2024
ISSN : 2722-2659

LOCAL KNOWLEDGE ON TOWARDS THE CONSERVATION OF MACACA NIGRA IN KPHK TANGKOKO, NORTH SULAWESI

Sintia Dellys Djafar, Mercy Rampengan, Aser Yalindua

Biology Departement, Faculty of Matehematics and Natural Science, Universitas Negeri Manado, Tondano, Indonesia.

**Corresponding author: sintiadjafar015@gmail.com*

Received: January 23, 2024 *Accepted: April 28, 2024*

Abstract

The Yaki monkey (*Macaca nigra*) is a critically endangered endemic species of North Sulawesi and is listed in Appendix II of CITES as well as in-situ conservation at the Tangkoko Conservation Forest Management Union (KPHK Tangkoko). The public's knowledge of the conservation of *M. nigra* is a key factor inining the sustainability of this species. The aim of this research is to find out the level of public awareness about conservation of *M. nigra*. This research uses descriptive methods. Data collection is done with a questionnaire with scored using the Guttman scale. The results of this study show that the majority of the level of knowledge in the community in the buffer zone KPHK Tangkoko belongs to a level of good, sufficient, and insufficient to the conservation status of m. nigra. Respondents who have good knowledge are all respondents in the Batu Putih Bawah villages and Duasudara villages. While the majority of the population in the Kasawari villages (63%) and the Pinangunian villages (68%) have sufficient knowledge about the conservation status of the *M. nigra* while almost half of the Kasawari villages (37%) and Pinangunian villages (32%) have insufficient knowledge.

Keywords: *Macaca nigra, Buffer Zone, Tangkoko, Knowledge*

INTRODUCTION

Sulawesi is one of Indonesia's biodiversity hotspots, located in the Wallacea zone. Wallacea serves as an intermediary region connecting the biogeographical areas of Great Indo-Malaya and Australasia. It acts as a transitional zone between the Asian and Australis faunas. For millions of years, this area remained relatively isolated, leading to the development of a unique and diverse group of plants and animals. Consequently, the island of Sulawesi possesses a significant biodiversity value and is home to numerous species, including those that are unique to the region. This is exemplified by the fact that this island is home to seven of the twenty-two species of *Macaca* in the world. An example of such a species is the *Macaca nigra*, commonly known as the Yaki monkeys (Prasetha, 2019).

Macaca nigra also known as Yaki by the native people, is found only in a restricted range in the northern Sulawesi region, as well as on the island of Bacan and in Maluku as an introduced species. The *M. nigra* are under the protection of the Indonesian Government, as stated in the Decree of the Minister

indonesian.biodivers.j.
Vol. 5, No. 1. April 2024
ISSN : 2722-2659

of Agriculture No. 421/Kpts/um/8/1970 issued on January 29, 1970, the Decision of the Ministry of Forestry No. 301/KPts-II/1991 issued on June 10, 1991, and Law No. 5/1990. According to the IUCN's 2020 list, *M. nigra* are found in CITES Appendix II and are considered critically endangered. (Nailufar, 2015). The *M. nigra* inhabit the Northern Sulawesi Province and conserved in their natural habitat within the Tangkoko Conservation Forest Management Union (KPHK Tangkoko). KPHK Tangkoko is the largest *M. nigra* habitat in North Sulawesi, consisting of several nature reserves and Natural Tourism Parks (TWA) such as Duasaudara Nature Reserve, TWA Batu Putih, and TWA Batu Angus. A total of 1,951 *M. nigra* were discovered in this region (Febriyanti, 2019).

A buffer zone is a contiguous region that lies next to a nature conservation area with the purpose of safeguarding and promoting the ecosystems and wildlife present within the conservation zone. Buffer zones are crucial for ensuring the sustainability of nature conservation areas through ecologically conscious practises managementof natural resources by local communities. Buffer zones are recognized for their ability to offer ecological, social, economic, and institutional advantages. Furthermore, buffer zones provide ecological advantages such as restricting human entry and illegal actions, safeguarding conservation areas from invasive species, and serving as additional habitats for wide-ranging animals within the protected areas. Buffer zones offer various social advantages, such as facilitating conflict resolutions between conservation and community concerns, enhancing potential revenue streams enhancing the environmental conditions for the local community, as well as fostering local community support for conservation efforts. Buffer zones also provide economic advantages by offering local communities chances to utilize forest resources and ecosystem services through direct and indirect means (Nadhira, 2021).

The buffer zone of KPHK Tangkoko encompasses four districts and 16 villages within the city of Bitung. The residents of the suburban areas in this region, much like the general population of North Sulawesi, exhibit a significantly prominent party culture. To execute festive occasions, a substantial quantity of timber is required to serve as fuel, build shelter, and for boat construction. In order toTherefore, the locals frequently harvest wood from the surrounding forest. Furthermore, wild meat such as meat from *M. nigra* is consumed by some locals to celebrate special occasions. The demand for wild meat surges during festive occasions, and regrettably, it is not solely to meet household needs. Wild meats are also traded to increase the income of some households, thereby fueling a significant increase in hunting activities (Nailufar, 2015).

Success in conservation is vital for the future of conservation areas that help preserve biodiversity. The local communities play an important role in the sustainability of conservation areas. Knowledge and participation in promoting conservation are inextricably linked to people's everyday lives and the ways in which they use and care for their surroundings (Rahajeng, 2014). Public awareness will encourage positive attitudes toward *M. nigra* conservation and ecotourism in KPHK Tangkoko, particularly in the forest area. Sugandi (2013) states that knowledge has an impact on attitudes. Specifically, knowledge about conservation will be utilized in his study on how income, knowledge, and land ownership affect

indonesian.biodivers.j.
Vol. 5, No. 1. April 2024
ISSN : 2722-2659

attitudes and actions regarding population involvement in the conservation of KPHK Tangkoko. As per Notoatmodjo (2007), knowledge is the outcome of acquiring information, and it is obtained when an individual perceives a specific object. This sensation is experienced through the human senses, specifically vision, hearing, smell, taste, and touch. There is a strong correlation between a person's level of conservation knowledge and their attitude towards the environment. The extent of public engagement in conservation is impacted by knowledge. Due to the conservation methods and techniques that must be implemented, a high level of participation will result from increased knowledge (Kurniarum, 2015).

To improve the conservation of *M. nigra*, it is necessary to have an understanding and knowledge of conservation. This research provides current data on *M. nigra* in KPHK Tangkoko and assesses the public's understanding on *M. nigra* conservation specifically within the buffer zone of KPHK Tangkoko.

RESEARCH METHODS

The study was conducted in four villages, namely, Batu Putih Bawah, Duasudara, Pinangunian, and Kasawari. These villages are the buffer zones of KPHK Tangkoko, located in Bitung City, North Sulawesi. The study was conducted for one month, in December 2022.The equipment and materials include a voice recorder, a cell phone camera, a pen, and a questionnaire. Data analysis was performed on Microsoft Excel and R Studio (version 2023.06.0+421).

Respondents of this survey were from the villages of Batu Putih Bawah, Duasudara, Pinangunian, and Kasawari. Respondents were chosen through the process of random sampling. The sample size was determined using the Sample Size Calculator (https://www.calculator.net/sample-size-computers.html) with a 95% confidence level, a 5% margin of error, and a population proportion of 10%. 127 samples were acquired from a population of 1,524.

This research used a descriptive analysis method, which aims to describe the current situation at the research site and the subject of study in accordance with specific criteria (Sugiyono, 2010). Qualitative and quantitative data collection is done with a questionnaire as the primary instrument. The questionnaire consists of 15 questions, including 10 open-ended questions and 5 closed-ended questions. Open-ended questions allow respondents to delve into their thoughts, whereas closed-ended questions are intended to gauge specific responses from respondents.

Regarding the analysis of closed questions, a quantitative method is employed, namely utilising the Guttman scale. The Guttmann scale is a precise and consistent measurement tool that provides definitive responses, such as "yes" and "no," "positive" and "negative," "agree" and "disagree," and "right" and "wrong," to questions or statements. These scales are typically designed in the form of a checklist. A correct answer is given a value of 1 and an incorrect answer is given a value of 0. Analysis of the Guttman scale is similar to the Likert scale (Hidayat, 2011). The criteria for interpreting the results are presented in the form of scores: A score of 76-100% indicates a high level of expertise. A knowledge level of 56-75% can be considered sufficient, whereas a knowledge level below 56% can be considered insufficient.

The measurement result is determined using the following formula:

indonesian.biodivers.j.
Vol. 5, No. 1. April 2024
ISSN : 2722-2659

$$P = \frac{x}{y} \times 100\%$$

Description:

P = Presentation

x = Number of correct answers

y = Total Answers

The study use distribution and frequency tables to present the research findings. The interpretation of the table, according to Arikunto (2009), is as follows:

Table 1. Interpretation of the findings

Score	Interpretation
100%	The Entire
76-99%	Almost the entire
51-75%	The Majority
50%	Half
26-49%	Almost half
1-25%	A few
0%	None

RESULTS AND DISCUSSION

Characteristics of The Respondents

According to the interview findings, 33% of the respondents were in the age range of 46–55 years, which accounted for half of the total number of participants. The majority of respondents (54.3%) were female, since fewer men were willing to participate in interviews. Merely 7% of the 127 participants had supplementary employment related to tourism, specifically in Kasawari Village and Batu Putih Bawah Village. These two communities have more prospective visitors than the other two due to their TWA areas. Moreover, the majority of individuals (39.3%) have completed their highest level of formal education at the high school level, while a significant proportion (37%) have completed it at the middle school level. The buffer zone of the KPHK Tangkoko's region is dominated by the tribes of Sangir and Minahasa. The Sangir majority lives in Bottom White Stone Village (95.7%) and Kasawari Village (63%), while the Minahasa majority lives in Duasudara Village (96.3%) and Pinangunian Village (88%).

Public Knowledge of *Macaca nigra*'s Conservation Status

All respondents in the Duasudara Village (n = 27) and the Batu Putih Bawah Village (n = 48) possess extensive knowledge about protected species, particularly *M. nigra*. This is due to the proximity of both villages the habitat of *M. nigra*, and even serve as a transit area for these animals. In contrast, it is evident that the respondents in the other two villages lack awareness regarding protected wildlife, such as *M. nigra*. The majority of individuals residing in the village of Kasawari and Pinangunian have adequate awareness on the conservation status of the *M. nigra*, whereas approximately half of the population has limited knowledge on this matter. The majority of respondents who were unaware of this fact responded that they had never participated in socialisation activities related to *M. nigra*, never encountered *M. nigra*,

or never visited the habitat of *M. nigra*.

Table 2. Characteristics of the respondents

	Batu Putih Bawah (n = 48)	Duasudara (n = 27)	Pinangunian (n = 25)	Kasawari (n = 27)	Total (n = 127)
Gender					
Male	24 (50%)	16 (59.3%)	12 (48%)	6 (22.2)	58 (45.6%)
Female	24 (50%)	11(40.7%)	13 (52%)	21 (77.8%)	69 (54.3%)
Age					
17-25	0 (0%)	1 (3.7%)	0 (0%)	2 (7.4%)	3 (2.3%)
26-35	8 (16.7%)	2 (7.4%)	3 (12%)	4 (14.8%)	17 (13.3%)
36-45	13 (27.1%)	4 (14.8%)	5 (20%)	10 (37.0%)	32 (25.1%)
46-55	16 (33.3%)	11 (40.7%)	9 (36%)	6 (22.2%)	42 (33%)
56-65	4 (8.3%)	4 (14.8%)	4 (16%)	4 (14.8%)	16 (12.5%)
>65	7 (14.6%)	5 (18.5%)	4 (16%)	1 (3.7%)	17 (13.3%)
Highest Education					
None	0 (0%)	1 (3.7%)	0 (0%)	0 (0%)	1 (0.7%)
Elementary School	23 (47.9%)	5 (18.5%)	11 (44%)	8 (29.6%)	47 (37%)
Middle School	9 (18.8%)	5 (18.5%)	6 (24%)	2 (7.4%)	22 (17.3%)
High School	14 (29.2%)	13 (48.1%)	7 (28%)	16 (59.3%)	50 (39.3%)
Associate Degree	1 (2.1%)	0 (0%)	0 (0%)	0 (0%)	1 (0.7%)
Bachelor Degree	1 (2.1%)	3 (11.1%)	1 (4%)	1 (3.7%)	6 (4.7%)
Tribe					
Sangir	46 (95.8%)	0 (0%)	2 (8%)	17 (63%)	65 (51.1%)
Siau	0 (0%)	0 (0%)	0 (0%)	8 (29.6%)	8 (6.2%)
Talaud	1 (2.1%)	0 (0%)	0 (0%)	0 (0%)	1 (0.7%)
Minahasa	1 (2.1%)	26 (96.3%)	22 (88%)	1 (3.7%)	50 (39.3%)
Maluku	0 (0%)	0 (0%)	0 (0%)	1 (3.7%)	1 (0.7%)
Jawa	0 (0%)	1 (3.7%)	1 (4%)	0 (0%)	2 (1.5%)
Primary Job					
Civil Servant	1 (2.1%)	2 (7.4%)	1 (4%)	1 (3.7%)	5 (3.9%)
Honorary Employees	5 (10.4%)	2 (7.4%)	2 (8%)	1 (3.7%)	10 (7.8%)
Corporate Employees	1 (2.1%)	1 (3.7%)	0 (0%)	2 (7.4%)	4 (3.1%)
Housewife	17 (35.4%)	8 (29.6%)	10 (40%)	15 (55.6%)	50 (39.3%)
Fishermen	15 (31.2%)	0 (0%)	0 (0%)	3 (11.1%)	18 (14.1%)
Merchants	0 (0%)	0 (0%)	3 (12%)	1 (3.7%)	4 (3.1%)
Students	0 (0%)	0 (0%)	0 (0%)	2 (7.4%)	2 (1.5%)
Tailors	0 (0%)	1 (3.7%)	0 (0%)	0 (0%)	1 (0.7%)
Farmers	8 (16.7%)	9 (33.3%)	8 (32%)	2 (7.4%)	27 (21.2%)
Drivers	0 (0%)	2 (7.4%)	0 (0%)	0 (0%)	2 (1.5%)
Laborers	1 (2.1%)	0 (0%)	1 (4%)	0 (0%)	2 (1.5%)
Entrepreneurs	0 (0%)	2 (7.4%)	0 (0%)	0 (0%)	2 (1.5%)
Side Employment In Tourism					
Yes	5 (10.4%)	0 (0%)	0 (0%)	4 (14.8%)	9 (7%)
No	43 (89.6%)	27 (100%)	25 (100%)	23 (85.2%)	118 (93%)

indonesian.biodivers.j.
Vol. 5, No. 1. April 2024
ISSN : 2722-2659

Table 3. Respondent's Knowledge of *M. nigra* Conservation

	Batu Putih Bawah (n = 48)	Duasudara (n = 27)	Pinangunian (n = 25)	Kasawari (n = 27)	Total (n = 127)
Respondents are aware of animals under protection					
Yes	48 (100%)	27 (100%)	25 (100%)	26 (96.3%)	126 (99.2%)
No	0 (0%)	0 (0%)	0 (0%)	1 (3.7%)	1 (0.8%)
Respondents are aware that *M. nigra* are under legal protection					
Yes	48 (100%)	27 (100%)	25 (100%)	26 (96.3%)	126 (99.2%)
No	0 (0%)	0 (0%)	0 (0%)	1 (3.7%)	1 (0.8%)
Respondents that are aware that *M. nigra* is endemic to North Sulawesi					
Yes	48 (100%)	27 (100%)	17 (68%)	17 (63%)	109 (85.9%)
No	0 (0%)	0 (0%)	8 (32%)	10 (37%)	18 (14.1%)

Public Knowledge of *Macaca nigra* Food

When questioned about the diet of *M. nigra*, all respondents unanimously stated that the primary food consumed by *M. nigra* is fruit. Out of the 76 participants, 46 (36.2%) chose coconut as their answer, while 35 (27.6%) mentioned Pacific walnut or Papuan walnut (*Dracontomelon dao*), also known as rao fruit by the locals.

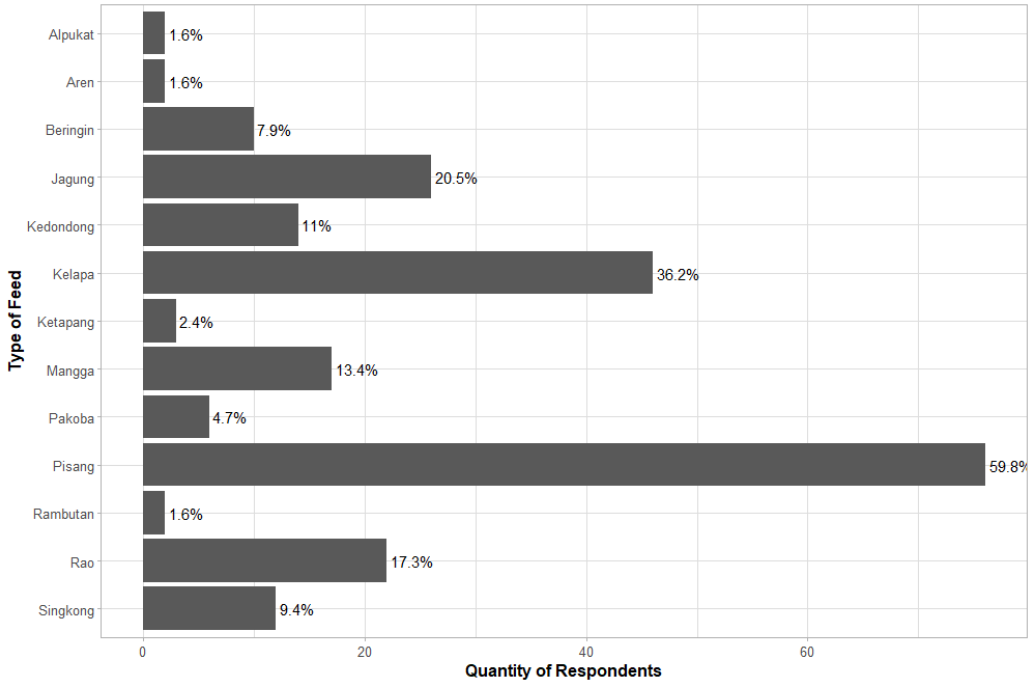

Figure 1. The respondents' knowledge of the *M. nigra's* diet

indonesian.biodivers.j.
Vol. 5, No. 1. April 2024
ISSN : 2722-2659

Table 4. Respondents' feeding activity to *M. nigra*

	Batu Putih Bawah (n = 48)	Duasudara (n = 27)	Pinangunian (n = 25)	Kasawari (n = 27)	Total (n = 127)
Respondents have observed *M. nigra* being fed by another individual					
Yes	11 (22.9%)	12 (44.4%)	1 (4%)	10 (37%)	34 (26.8%)
No	37 (77.1%)	15 (55.6%)	24 (96%)	17 (37%)	93 (73.2%)
Respondents fed *M. nigra* themselves					
Yes	3 (6.2%)	6 (22.2%)	0 (0%)	6 (22.2%)	15 (11.8%)
No	45 (93.8%)	21 (77.8%)	25 (100%)	21 (77.8%)	112(88.2%)
Type of food					
Fruits	4 (8.3%)	12 (44.4%)	1 (4%)	9 (33.3%)	26 (20.4%)
Snacks	7 (14.6%)	0 (0%)	0 (0%)	2 (7.4%)	9 (7%)
Purpose of providing sustenance to *M. nigra*					
Pity	2 (4.2%)	1 (3.7%)	1 (4%)	2 (7.4%)	6 (4.7%)
Having extra food	3 (6.2%)	5 (18.5%)	0 (0%)	5 (18.5%)	13 (10.2%)
Habit	0 (0%)	0 (0%)	0 (0%)	3 (11.1%)	3 (2.3%)
Seeking to interact	2 (4.2%)	0 (0%)	0 (0%)	0 (0%)	2 (1.5%)

According to Table 4, 26.8% of the respondents (n = 34) witnessed someone feeding *M. nigra*. The provision of food is contingent upon the availability of resources at the moment. The respondents do not actively seek out the *M. nigra* to feed them, but rather, the feeding occurs spontaneously upon sighting the *M. nigra*. These animals are frequently fed two sorts of food: fruits, such as bananas, and snacks, such as bread, waffles, or traditional cakes.

M. nigra was fed by 10.2% of respondents because they had leftover food (the feeling of being pity). Furthermore, 2.3% of participants engage in the practice of providing sustenance to *M. nigra*, while the remaining 1.5% openly admitted feeding *M. nigra* to interact with the macaques. The primary objective behind this feeding behaviour is to entice *M. nigra* to approach closer, enabling individuals to capture and record their encounters with the goal of sharing them on social media platforms.

Respondent.s Activities in KPHK Tangkoko

Out of all the participants, a mere 7% (n = 9) have never been to KPHK Tangkoko. When questioned about their reasons, the typical participant stated that they were preoccupied with work and lacked any inclination or enthusiasm to visit KPHK Tangkoko, despite residing in the vicinity of the KPHK Tangkoko. Meanwhile, a total of 118 respondents, accounting for 93% of the sample, have visited the KPHK Tangkoko. The majority of respondents (54.4%, n = 69) had visited this location more than five times, with the largest group being respondents from Batu Putih Bawah Village (n = 29).

The activities conducted at KPHK Tangkoko encompass a diverse range that are categorized into three distinct groups: travel, work, and study. About 72.4% (n = 92) traveled to KPHK Tangkoko. Additionally, 25.2% of respondents visited KPHK Tangkoko for work and 6.2% for study or research. Increased rivalry for space and resources is one of the factors that led to interactions between humans and *M. nigra*. The population expansion in the buffer zones of KPHK Tangkoko has led to heightened encounters between human communities and fauna, particularly *M. nigra*. This study revealed that 52.8%

indonesian.biodivers.j.
Vol. 5, No. 1. April 2024
ISSN : 2722-2659

of the respondents own land close to KPHK Tangkoko; in fact, some of their properties directly border the region. As to the community's assessment, the forest boundaries in KPHK Tangkoko are indistinct or have suffered damage, leading to widespread forest exploitation by local populations for cultivation purposes (Palacios et al, 2012).

Table 5. Respondents' Activities at KPHK Tangkoko

	Batu Putih Bawah (n = 48)	Duasudara (n = 27)	Pinangunian (n = 25)	Kasawari (n = 27)	Total (n = 127)
Have the respondents ever visited KPHK Tangkoko?					
Yes	45 (93.8%)	25 (92.6%)	21 (84%)	27 (100%	118 (93%)
No	3 (6.2%)	2 (7.4%)	4 (16%)	0 (0%)	9 (7%)
Frequency of visits to KPHK Tangkoko					
1	0 (0%)	3 (11.1%)	3 (12%)	2 (7.4%)	8 (6.3%)
2-4	16 (33.3%)	11 (40.7%)	8 (32%)	6 (22.2%)	41 (32.3%)
> 5	29 (60.4%)	11 (40.7%)	10 (40%)	19 (70.4%)	69 (54.4%)
Activities conducted at KPHK Tangkoko					
Travel	36 (75%)	17 (63%)	17 (68%)	22 (81.5%)	92 (72.4%)
Work	12 (25%)	7 (25.9%)	8 (32%)	5 (18.5%)	32 (25.2%)
Study	0 (0%)	1 (3.7%)	1 (4%)	6 (22.2%)	8 (6.2%)
Do the participants own land in close proximity to KPHK Tangkoko?					
Yes	21 (43.8%)	19 (70.4%)	15 (60%)	5 (18.5%)	60 (47.2%)
No	27 (56.2%)	8 (29.6%)	10 (40%)	22 (81.5%)	67 (52.8%)

The public's perspective on the conditions and benefits of KPHK Tangkoko

The majority of respondents perceive that the KPHK Tangkoko, which borders their village, is still in good condition. Respondents have indicated that KPHK Tangkoko remains sustainable, with the forest maintaining its visual appeal and abundant flora and wildlife. In addition, several positive remarks highlight the improved organization and visitor-friendly nature of Tangkoko KPHK. Nevertheless, certain participants find that the present state of the KPHK Tangkoko is unsatisfactory. Land development in several regions of KPHK Tangkoko resulted in significant damage. Some respondents noted the presence of waste at KPHK Tangkoko, particularly in tourist spots like TWA Batu Putih or TWA Batu Angus, which is believed to have been left by visitors or tourists.

indonesian.biodivers.j.
Vol. 5, No. 1. April 2024
ISSN : 2722-2659

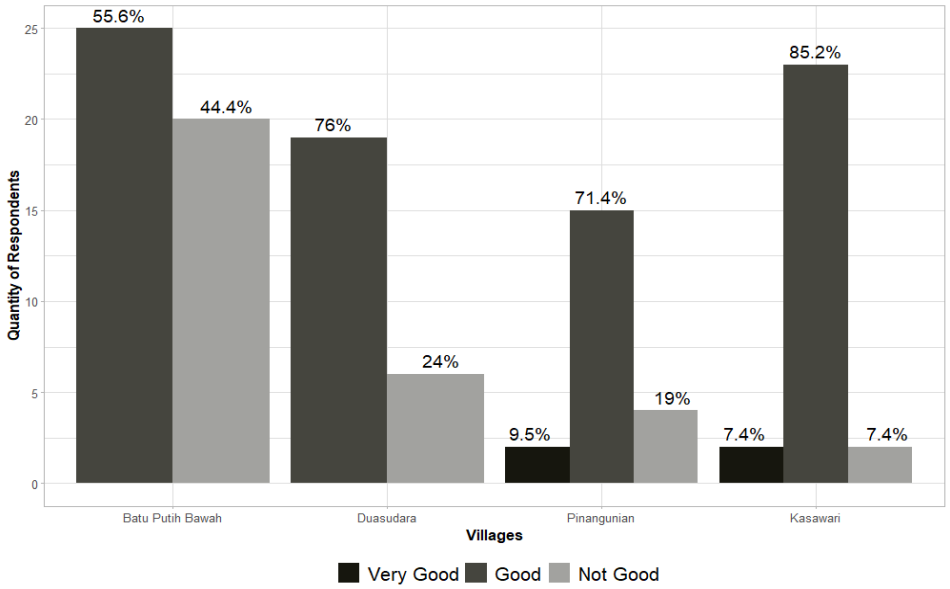

Figure 2. Condition of KPHK Tangkoko according to respondents

Figure 3. Benefits of KPHK Tangkoko According to Respondents

Discussion

The buffer zone provides a crucial function in wildlife conservation as it serves as an interface between human activities and the natural habitat of many wildlife species. This study reveals that the people who live in the buffer zone of Kphk Tangkoko demonstrated a comprehensive understanding and knowledge of protected species. They were able to accurately identify and name many protected animals, including the macaca nigra, which is an endemic animal in North Sulawesi and is protected by the government. Communities with higher levels of education generally possess a greater understanding of environmental and conservation matters.

Nevertheless, there exist misunderstandings regarding the general awareness of *M. nigra*'s diet. The respondents chose bananas as their answer due to their familiarity with *M. nigra's* food preferences, which they acquired through exposure to television or social media content. Subconsciously, the

association between monkeys and bananas is commonly made, leading to the misconception that bananas are the only food for monkeys, include the *M. nigra*. Additionally, *M. nigra* is known to consume coconuts due to the significant damage caused by these animals to the community's coconut corps. As a result, society has come to see coconuts as a staple meal for *M. nigra*. It is speculated that the *Dracontomelon dao* is the main food for the *M. nigra* because it grows in the woods where it lives. *M. nigra* mostly consumes fruit and other plant components, including new leaf buds, along with occasional invertebrates. In other words, *M. nigra* is an omnivore species. Nevertheless, as agricultural activities encroached over the forest, which served as the customary habitat for *M. nigra*, these primates started consuming the cultivated crops. Consequently, this led to a clash between *M. nigra* and the farmers (Riley, 2010).

After all, preserving biodiversity, ecological balance, and the sustainability of natural resources are the main goals of conservation. These goals should support initiatives aimed at enhancing social stability and the standard of living in the local communities (Effendi and others, 2014). According to the respondents, Tangkoko serves as a highly beneficial Conservation Forest Management Unit. The ecological activities in the area has created new employment opportunities for the people. That could perhaps serve as a means to enhance the economic well-being of the locals. In addition, KPHK Tangkoko serves as a significant subject of study, attracting both academics and students.

CONCLUSION

In conclusion, the local knowledge regarding the conservation status of *M. nigra* in the buffer zone of KPHK Tangkoko falls into the categories of good, sufficient, and inadequate. All respondents with a high level of knowledge are those residing in Batu Putih Bawah and Duasudara villages. The majority of the population in the Kasawari villages (63%) and the Pinangunian villages (68%) possess adequate awareness regarding the conservation status of the *M. nigra*. However, over half of the Kasawari villages (37%) and Pinangunian villages (32%) lack appropriate understanding of the subject.

REFERENCE

Arikunto, S. (2010). *Prosedur Penelitian Suatu Pendekatan Praktik*. Jakarta: Rineka Cipta.

Effendi, W. N., Tasirin, J. S., Langi, M. A., & Rotinsulu, W. (2014). Penentuan Blok Pengelolaan Cagar Alam Tangkoko “Cagar Alam Duasudara dengan Pendekatan Sistem Informasi Geografis (SIG). *In Cocos 4(3).*

Febriyanti, D. Y., & Kiroh, H. J. (2019). Kajian Kualitas Habitat dan Tingkat Kepadatan Monyet macaca nigra (Macaca nigra) Di Kesatuan Pengelolaan Hutan Konservasi (Kphk) Tangkoko Sulawesi Utara. *Agri-Sosioekonomi, 15(1), 65-70.*

Hidayat, A. A. A. (2011). *Metode penelitian keperawatan dan teknik analisis data*. Jakarta: Salemba Medika

Nadhira, S., & Basuni, S. (2021). Implementation of the concept of conservation area buffer zone in Indonesia. *Jurnal Manajemen Hutan Tropika, 27(1),* 32-32.

Nailufar, B. Manajemen Lanskap Untuk Penanggulangan Konflik Dengan Monyet macaca nigra (Macaca nigra) Di Sulawesi Utara.

Notoatmodjo, S. 2007. *Promosi Kesehatan dan Ilmu Perilaku*. Jakarta: Rineka Cipta.

indonesian.biodivers.j.
Vol. 5, No. 1. April 2024
ISSN : 2722-2659

Kurniarum, M., Prihanta, W., & Wahyuni, S. (2015). Pengetahuan dan sikap masyarakat terhadap konservasi penyu dan ekowisata di Desa Hadiwarno Kabupaten Pacitan sebagai sumber belajar biologi. *JPBI (Jurnal Pendidikan Biologi Indonesia), 1(2).*

Palacios, J. F. G., Engelhardt, A., Agil, M., Hodges, K., Bogia, R., & Waltert, M. (2012). Status of, and conservation recommendations for, the Critically Endangered crested black macaque Macaca nigra in Tangkoko, Indonesia. *Oryx, 46(2),* 290-297.

Prasetha, A., & Farajallah, D. P. (2019). Perilaku Harian Monyet macaca nigra (Macaca nigra) pada Masa Kebuntingan di Cagar Alam Tangkoko-Batuangus, Sulawesi Utara. *Jurnal Sumberdaya Hayati. 5(1),* 25-34.

Rahajeng, M. A., Hendrarto, B., & Purwanti, F. (2014). Pengetahuan, persepsi dan partisipasi masyarakat dalam konservasi di kawasan Cagar Alam Pulau Sempu Kabupaten Malang. *Management of Aquatic Resources Journal (MAQUARES), 3(4),* 109-118.

Riley, E. P. (2010). The endemic seven: Four decades of research on the Sulawesi macaques. *Evolutionary Anthropology, 19(1),* 22-36.

Sugandi, D. 2013. *Pengetahuan dan Kepemilikan Lahan terhadap Sikap dan Implementasinya pada Partisipasi Penduduk dalam Konservasi Lingkungan Segara Anakan. (Tesis).* Jakarta: Universitas Pendidikan Indonesia.

Sugiyono, P. D. (2006). *Statistika untuk penelitian*. Bandung: CV. Alfabeta.