

Short Communication:

Javan Leopard Cat (*Prionailurus bengalensis javanensis* Desmarest, 1816) in the Cisokan non-conservation forest areas, Cianjur, West Java, Indonesia

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Abstract. Shanidah SS, Partasasmita R, Hudoso T, Parikesit, Meganatara EN. 2018. Short Communication: Javan Leopard Cat (*Prionailurus bengalensis javanensis* Desmarest, 1816) in the Cisokan non-conservation forest areas, Cianjur, West Java, Indonesia. *Biodiversitas* 19: 37-41. Javan Leopard Cat (*Prionailurus bengalensis javanensis* Desmarest, 1816) in the Cisokan non-conservation forest areas, Cianjur, West Java, Indonesia. *Biodiversitas* 19: xx, xxx. There is no accurate data about the number of leopard individuals in Java Island in both conservation and non-conservation areas. Besides, human continue to deforestation for the necessities of life, such as agriculture, plantation, etc. Therefore, it is important to research about the existence of leopard cat in Cisokan of Cianjur Regency. The aim of this research is to investigate evidence of the leopard cat's existence, encounter rate of leopard cat and estimation of leopard cat individual in the non-conservation forest areas, Cisokan, Cianjur. Indirect observation *sign survey* and direct observation with camera trap were carried out to find evidence of the existence of leopard cat (feces and footprint). The results of the study showed that the evidence of leopard cat's existence are 6 footprints, 27 feces, and 1 individual which was able to observe. The encounter with camera traps was 29.16 independent detections /100 camera days, resulting in 7-12 estimated individuals.

Keyword: Abundance, camera trapping, Java Island, *Prionailurus bengalensis javanensis*

INTRODUCTION

Major drivers of deforestation are agriculture (e.g. oil palm and rubber) and logging, both of which result in modified landscapes that affect biodiversity (Sodhi et al. 2010; Chua et al. 2016; Partasasmita et al. 2016). The effects of such modifications have been a decline of many mammal species (Sodhi et al. 2009; Chua et al. 2016). Despite human-modified landscapes becoming dominant within the Sundaland (Sodhi et al. 2010; Chua et al. 2016; Partasasmita et al. 2017), there is a little data on how felids, especially small cats respond to these landscapes (Macdonald et al. 2010; Chua et al. 2016).

The leopard cat is known for its good ability to tolerate habitat modification and disturbance (Mohamed et al. 2013). Indeed, Mohamed et al. (2013) showed that leopard cat (*Prionailurus bengalensis*) population density increased with forest disturbance. Because of its wide geographic range and relatively high abundance (Nowell and Jackson 1996, Wilting et al. 2016a), as well as its ability to persist in altered habitat, the leopard cat is classified as Least Concern by The IUCN Red List of Threatened Species (Sanderson et al. 2008; Wilting et al. 2016). Although the species has been extensively hunted for fur in China (Yu

2010), populations are believed to be relatively stable in other parts of its range (Wilting et al. 2016b). Despite this, population densities are 9.6 to 16.5 individuals/100 km², which are relatively low for a small cat (Mohamed et al. 2013). The leopard cat is listed in Appendix II of CITES (2011).

This research was carried out in Cisokan because there was the remaining forest in the non-conservation forest areas that could be the key spaces for the conservation of Leopard cat (*Prionailurus bengalensis*). Non-conservation areas had less attention from environmentalists, due to lack of information about the existence of wildlife, thus monitoring activities of important animals were less in these non-conservation areas. Besides, the large number of urban and rural developments that are carried out continuously without any plant on the conservation of forest, thus, will bring the habitat of animals such as leopard cat to be disturbed and become threatened. Therefore, it is important to research about the status of leopard cat in the non-conservation forest areas, Cisokan, Cianjur, West Java. The aim of this study is to give a first approximation to the situation of the Javan leopard cat individual in the Cisokan non-conservation forest areas.

MATERIALS AND METHODS

Study area

This research was carried out in the non-conservation forest areas, Cisokan, Cianjur, West Java, Indonesia, include Batununggul, Ciawitali, Cigintung, Cilengkong, Cirumanis, Datarmala, Pasir Bedil, Pasir Taman, and Sarongge (Figure 1). This research was carried out for one month, in February-March 2017.

Field survey

This research was carried out by direct and indirect observation. An indirect observation was carried out by sign survey looking for leopard cat signs, such as feces and footprints. Reference of leopard cat footprints used a guidebook (van Strien 1983). Direct observation of camera trap installation was based on leopard cat signs. 6 units of camera were used as camera traps, 1 unit was programmed to capture images in photo-video format, 5 other units were programmed to capture images in photo format. Camera trap installation period was for 2 weeks. Camera traps were mounted on a tree trunk with an average height of 30-40 cm above the ground and facing a path of 2.5 to 3 meters

(Ancrenaz et al. 2012). Identification of the animals caught during the installation period was carried out using a mammal field guide (Francis 2001).

Data analysis

Identification of individual leopard cat

Determination of an individual was carried out based on the camera trap images capture and leopard cat signs. Individual images compared with the other individual images of leopard cats to notice the spotted pattern of an individual. The spotted pattern is identical in the same body part and side of the body. Haunch, tail, and abdomen are parts of the body in which the pattern of spots can be identified.

Encounter rate of leopard cat

The encounter rate (number of independent photos/100 trap days) was calculated from total number of independent photos divided by total number of days that cameras were operate, multiplied by 100 (O'Brien et al. 2003, O'Connell et al. 2011; Monterroso et al. 2014).

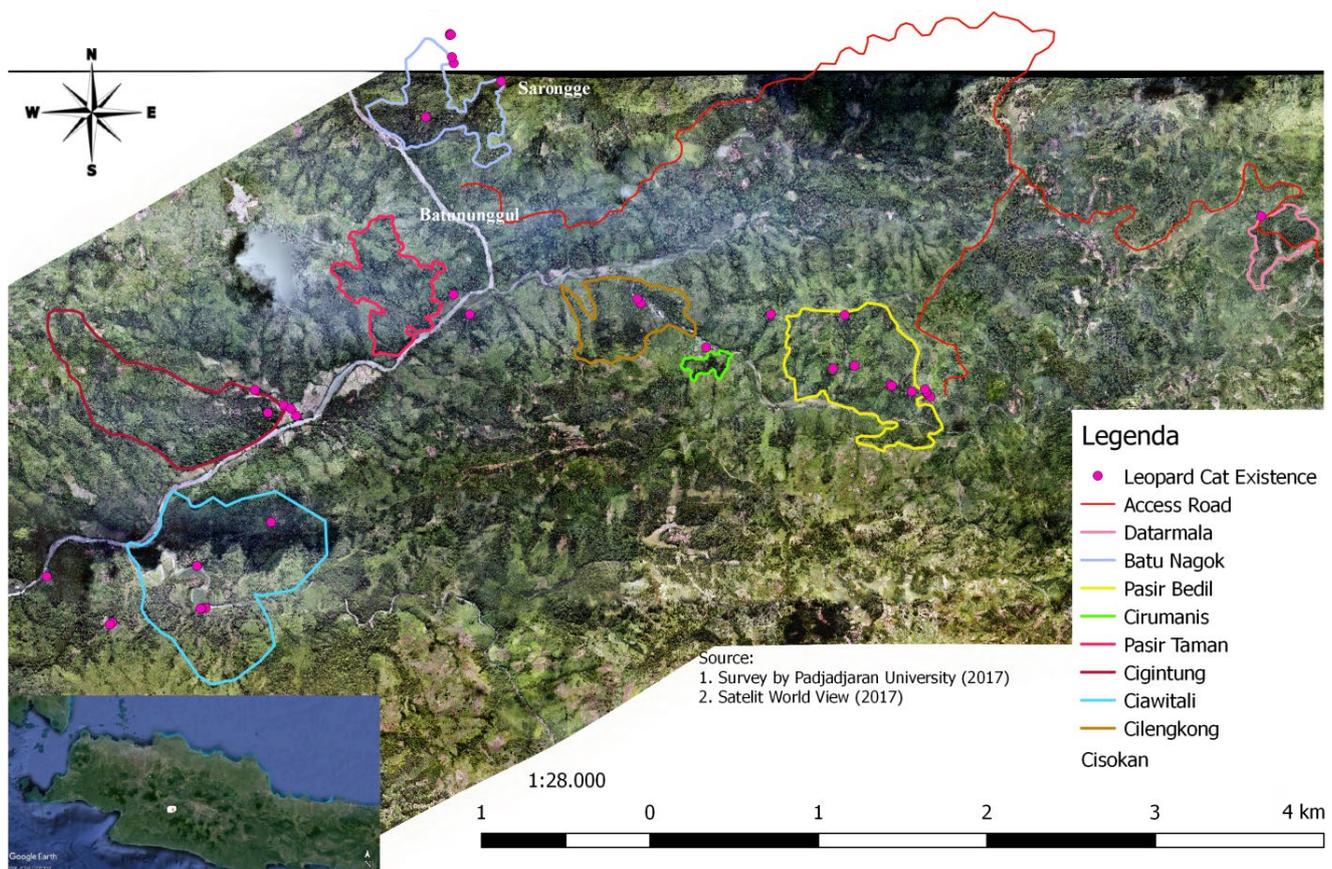


Figure 1. Location of study area (48 M 749789 m E 9231696 m S) in the non-conservation forest areas, Cisokan, Cianjur, West Java, Indonesia

RESULTS AND DISCUSSION

The existence of the Leopard cats

Indirect observation found evidences of leopard cat's existence such as 6 footprints and 27 feces, while direct observation obtained one direct encounter by the observer and 8 direct encounters via camera trap (Figure 2). Feces was more often to be found than others, this was because feces was a sign left more often and last longer than other sign, such as footprints that would immediately be lost due to rain (Avryandi 2014). Evidence of leopard cat's existence was found in several places, such as Datarmala, Pasir Bedil, Cirumanis, Cilengkong, Pasir Taman, Cigintung, Ciawitali, Batununggul, and Sarongge. The number of individuals was determined based on the results of direct and indirect observation, the possibility of a leopard cat's roaming area, and the presence of barriers bordering the home range of an individual.

Encounter of leopard cats in Cisokan was mostly found in Pasir Bedil, both direct and indirect encounters. Evidence of their existence was found for 6 consecutive days in Pasir Bedil. This showed that cats used Pasir Bedil as an intensive habitat for their daily activities. The cats in Pasir Bedil were assumed as single individual. Leopard cat's feces in Pasir Bedil was found along the path and it was supported by evidenced of individual leopard cat caught on camera trap, so it was assumed that there was one individual leopard cat. The next largest location was Sarongge. Based on the findings, it could be assumed that there was only one individual live in Sarongge.

In other locations, such as Datarmala, Cirumanis, Pasir Taman, and Batununggul, little evidence of leopard cat existence was found. In Datarmala, a single individual leopard cat was found with a direct observation on night and it was assumed that this individual was different from individual in other locations. This was because Datarmala was far from other locations. From the finding of feces, it was believed that one individual was found in Cirumanis. Pasir Bedil and Cirumanis were separated by the Cisokan River, but the cat can swim across the Cisokan River. The other evidence of existence was feces found on the path in Pasir Bedil. The location of the footprint was quite far from the camera traps in Pasir Bedil, it showed that the individual can walk freely from Pasir Bedil to Cilengkong. Thus, it was estimated that from the locations of Pasir Bedil and Cirumanis, there were 1-3 individuals.

In Pasir Taman and Batununggul, 1-2 individuals were thought to be existed. This was due to the barrier (Cisokan River) blocking the movement of a leopard cat between Pasir Taman and Batununggul. Other signs found in Cilengkong was feces, footprint, and picture caught by camera trap assuming that there was single individual. Other signs found in Cigintung was feces along the Cigintung River and it brought to an assumption that there was 1 individual. The only evidence of existence found in Ciawitali was feces along the Ciawitali River. Individual in Ciawitali was assumed to be 1 individual. This was because the feces found in the location showed us that it

was the same individual. Boitani and Powell (2012) said that the home range for adult leopard cats is 2 km²-15 km². Individual determination through leopard cat's spot patterns was difficult because the image on camera trap was less clear and the sides of the individual body can be seen clearly. Mean home range size for males in Sabah was 3.5 km² and for females was 2.1 km². In Thailand, mean home range size for males was 4.1 km² and for females was 2.5 km² (Grassman 2000; Mohamed et al. 2013).

Table 1. Leopard cat encounter data directly and indirectly by time and location

No.	Location	Time	Data type	Number of Individual	
1	Datarmala	19/02/2017	OB	1	
2	Pasir Bedil	09/03/2017	TR	1-3	
3		15/03/2017	FC		
4					
5		16/03/2017	FC		
6					
7		17/03/2017	CT		
8		18/03/2017	FC		
9		19/03/2017	TR		
10			FC		
11					
12					
13					
14		20/03/2017	TR		
15			CT		
16		05/04/2017	CT		
17	Cirumanis	18/03/2017	FC		
18	Cilengkong	15/03/2017	FC	1	
19		19/03/2017	TR		
20		03/04/2017	CT		
21	Batununggul	19/03/2017	TR	1-2	
22		09/04/2017	CT		
23	Pasir Taman	08/03/2017	FC	1	
24		Cigintung	16/02/2017		FC
25			18/02/2017		
26					
27					
28					
29					
30	Ciawitali	12/02/2017	FC	1	
31					
32		14/02/2017			
33					
34					
35	Sarongge	09/03/2017	FC	1	
36			TR		
37		11/03/2017	FC		
38		19/03/2017			
39		20/03/2017			
40		19/03/2017	CT		
41		27/03/2017	CT		
42		27/03/2017	CT		

Note: OB: Observation, FC: Feces, CT: Camera trap, TR: Track



Figure 2. Existence of a Leopard Cats. A. Direct Encounter at Datarmala, B. Footprint in Pasir Bedil, C. Feces in Pasir Bedil. Bar = 2 cm

Table 2. Leopard cat encounter based on land cover type

Location	Land cover type (estimation of individual)				Talun
	Natural forest	Production forest	Bush/field	Rice field	
Batununggul			1		
Ciawitali			1	1	
Cigintung				1	
Cilengkong	1	1	1		
Cirumanis			1		
Datarmala			1		
Pasir Bedil	1	1	1		
Pasir Taman			1		
Sarongge	1-2		1		

Based on above discussion, the number of individual cats in Cisokan were 7-12 individuals. Determination of sex in an individual was difficult, because there was no clear picture on the genital part of an individual. Because of the small size of leopard cats, identifying their sex, especially on the unambiguous identification of females, is much more difficult than on larger cat species, and thus sex could not be determined on many individuals (Mohamed et al. 2013).

Based on the encounter rate analysis, leopard cat had an ER value of 29.16 leopard cat photos/100 traps. This was because some camera traps captured multiple images of one individual. As happened in Cilengkong, the camera captured 9 individual photos of the same cat and it captured 6 individual photos of the same cat in Batu Nagok. The number of individual images captured in the camera trap was influenced by the activity of the individual in roaming its home range.

Encounter based on land cover type

Evidence of the existence of leopard cats either directly or indirectly was found in various types of land cover, such as natural forest, production forest (pine), bush/fields, and rice fields. Of the four types of land cover, only in *talun*

that the evidence of leopard cat's existence could not be found. In the previous section, most leopard cats were found in Pasir Bedil with land cover types of production forest (pine), natural forests, and shrubs. In Indonesia and in Philippines, leopard cats are known to frequently visit plantations to feed on rodents (Silmi et al. 2013).

Leopard cat encounters based on land cover types can be seen in Table 1. The number of each land cover type estimates the number of individual cats in a land cover type.

According to Table 2, evidence of leopard cat's existence was commonly found in bushes in Datarmala, Pasir Bedil, Cirumanis, Cilengkong, Pasir Taman, Ciawitali, Sarongge, and Batununggul. In Datarmala, the discovery of a leopard cat was directly at night in the land cover type of bush. Other evidence of its existence was found in natural forestland cover types located in Pasir Bedil, Cilengkong, and Sarongge. Then, in another type of land cover, the irrigated rice fields in Ciawitali and Cigintung, the evidence was also found. The evidence of existence found in the rice fields can give an assumption that the leopard cats just have looked for prey such as rats and snakes in the fields.

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REFERENCES

- Ancrenaz M, Andrew JH, Joanna R, Rahel S, Andreas W. 2012. Handbook for Wildlife Monitoring Using Camera-traps. BBEC Publication, Malaysia.
- Avriandy R. 2014. Inventory and Identification of Felidae and Lutrinae in Natural Forest RPH Cijedil and Rice Field, Cijedil Village, Cugenang District, Cianjur. [Dissertation]. Padjadjaran University, Sumedang.
- Boitani L, Powell RA. 2012. Carnivore Ecology and Conservation. A Handbook of Techniques. Oxford University Press, New York.
- Chua MAH, Sivasothi N, Rudolf M. 2016. Population density, spatiotemporal use and diet of the Leopard Cat (*Prionailurus bengalensis*) in a human-modified succession forest landscape of Singapore. Mammal Res. DOI 10.1007/s13364-015-0259-4.
- CITES. 2011. Convention on International Trade in Endangered Species of Wild Fauna and Flora. 9th edition – 2011. Appendices I, II and III (27/04/2011). Geneva, Switzerland. <http://www.cites.org>
- Grassman L Jr. 2000. Movement and diet of the leopard cat *Prionailurus bengalensis* in a seasonal evergreen forest in south-central Thailand. Acta Theriologica 45 (3): 421-426
- Macdonald DW, Loveridge AJ, Nowell K. 2010. Dramatis personae: an introduction to the wild felids. In: Macdonald DW, Loveridge AJ (eds). Biology and Conservation of Wild Felids. Oxford University Press, New York.
- Mohamed A, Sollmann R, Bernard H, Ambu LN, Lagan P, Mannan S, Hofer H, Wilting A. 2013. Density and habitat use of the Leopard Cat (*Prionailurus bengalensis*) in three commercial forest reserves in Sabah, Malaysian Borneo. J Mammol 94 (1): 82-89.
- Monterroso P, Alves PC, Ferreras P. 2014. Plasticity in circadian activity patterns of mesocarnivores in Southwestern Europe: implications for species coexistence. Behav Ecol Sociobiol 68: 1403-1417.
- Nowell K, Jackson P. 1996. Wild cats: status survey and conservation action plan. IUCN, Gland, Switzerland and Cambridge, UK
- O'Brien T, Wibisono H, Kinnaird M. 2003. Crouching tigers, hidden prey: Sumatran Tiger and prey populations in a tropical forest landscape. Anim Conserv 6: 131-139.
- O'Connell AF, Nichols JD, Karanth KU. 2011. Camera Traps in Animal Ecology: method and analysis. Springer, New York.
- Partasasmita R, Iskandar J, Malone N. 2016a. Karangwangi people's (South Cianjur, West Java, Indonesia) local knowledge of species, forest utilization and wildlife conservation. Biodiversitas 17 (1): 154-161.
- Partasasmita R, Shanida SS, Iskandar J, Megantara EN, Husodo T, Malone N. 2016b. Human-Leopard conflict in Girimukti Village, Sukabumi, Indonesia. Biodiversitas 17 (2): 783-790.
- Prancis CM. 2001. A photographic guide to the Mammals of South-East Asia: Including Thailand, Malaysia, Singapore, Myanmar, Laos, Vietnam, Cambodia, Java, Sumatra, Bali, Bornea. Ralph Curtis Pub. Sanibel Island, FL.
- Sanderson J, Sunarto S, Wilting A, Driscoll C, Lorica R, Ross J, Hearn A, Muijkerjee S, Khan JA, Habib B, Grassman L. 2008. *Prionailurus bengalensis*. In: IUCN 2011; IUCN Red List of Threatened Species. Version 2011.2.
- Silmi M, Mislan, Anggara S, Dahlen B. 2013. Using Leopard Cats (*Prionailurus bengalensis*) as a biological pest control of rats in a palm oil plantation. J Indon Nat Hist 1 (1): 31-36.
- Sodhi NS, Koh LP, Clements R, Wanger TC, Hill JK, Hamer KC, Clough Y, Tschamke T, Posa MRC, Lee TM. 2010. Conserving Southeast Asian forest biodiversity in human-modified landscapes. Biol Conserv 143: 2375-2384
- Sodhi NS, Lee TM, Koh LP, Brook BW. 2009. A meta-analysis of the impact of anthropogenic forest disturbance on Southeast Asia's biotas. Biotropica 41: 103-109
- Strien NJ van. 1983. A guide to the tracks of the mammals of western Indonesia. School of Environmental Conservation Management, Ciawi, Bogor.
- Wilting A, Azlan M, Joanna R, Andrew JH, Susan MC, Raymond A, Henry B, Ramesh B, Hiromitsu S, Matt H, Dave MA, Jedediah FB, Anthony G, Gabriella F, Jon H, Brent L, Yoshihiro N, John DP, Rustam, Gono S, Tim van B, Jason H, Norman TL, Andrew J, John M, David WM, Christine BW, Stephanie KS. 2016b. Predicted Distribution of The Leopard Cat *Prionailurus bengalensis* (Mammalia: Carnivora: Felidae) on Borneo. Raffles Bull Zool Suppl 33: 180-185.
- Wilting A, Duckworth JW, Belant JL, Duplaix N, Breitenmoser-Würsten C. 2016a. Introduction: distribution of and conservation priorities for Bornean small carnivores and cats. Raffles Bull Zool Suppl 33: 1-8.
- Yu J. 2010. Leopard cat *Prionailurus bengalensis*. Cat News, Special Issue 5: 26-29.