

# The occurrence of Sumatran Tiger (*Panthera tigris sumatrae*) in an industrial plantation forest area, North Sumatra, Indonesia

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## ABSTRACT

Sumatran tiger lives in the remaining forests on the Sumatra island, both in conservation and production areas. There are not many tiger monitoring activities conducted in production forest. Using camera traps this occupancy survey of Sumatran tiger (*Panthera tigris sumatrae*) carried out in a plantation forest area of PT. Toba Pulp Lestari (PT. TPL) to obtain information and monitor tiger presence in the area. However, there were no Sumatran tigers captured by the camera traps during the occupancy activities. The existence of Sumatran tiger was proven by the finding of footprints and scrapes. Other species were photographed by the camera traps, such as marbled cat (*Pardofelis marmorata*), pig-tailed monkey (*Macaca nemestrina*), treeshrew (*Tupaia* sp.), Asian palm civet (*Paradoxurus hermaphroditus*), lizards (*Eutropis* sp.), Hoogerwerf's pheasant (*Lophura hoogerwerfi*), wood mouse (*Apodemus sylvaticus*) as well as birds. It is assumed that the Sumatran tiger didn't cross the location of research during the camera installation period. However, there are several other reasons why Sumatran tigers weren't captured by camera traps, such as the camera traps observation time was too short and didn't cover a larger area, so it lessens the opportunity of encounter with Sumatran tiger.

## ABSTRAK

Harimau Sumatera hidup di hutan yang masih tersisa di pulau Sumatera, baik di kawasan hutan konservasi maupun hutan produksi. Kegiatan pemantauan harimau di hutan produksi belum banyak dilakukan. Dengan menggunakan camera trap, survei okupansi harimau sumatera (*Panthera tigris sumatrae*) ini dilakukan di areal konsesi hutan tanaman industri PT. Toba Pulp Lestari (PT. TPL) untuk mendapatkan informasi dan memantau keberadaan harimau di kawasan tersebut. Namun, tidak ada harimau sumatera yang terfoto oleh kamera trap selama kegiatan survei okupansi. Keberadaan harimau sumatera dibuktikan dengan ditemukannya jejak tapak dan cakaran. Selain itu, terdapat ppecies lain yang terfoto oleh kamera trap, seperti kucing batu (*Pardofelis marmorata*), beruk (*Macaca nemestrina*), tupai tanah (*Tupaia* sp.), musang pandan (*Paradoxurus hermaphroditus*), kadal (*Eutropis* sp.), sempidan aceh (*Lophura hoogerwerfi*), tikus hutan (*Apodemus sylvaticus*) serta burung. Diasumsikan bahwa harimau sumatera tidak melintasi lokasi penelitian selama masa pemasangan kamera. Namun, terdapat beberapa alasan lain mengapa harimau sumatera tidak terfoto kamera trap, seperti waktu pengamatan kamera trap yang terlalu singkat dan tidak mencakup area yang lebih luas, sehingga memperkecil peluang perjumpaan dengan harimau sumatera.

**Keywords:** *Sumatran tiger, camera traps, plantation forest, North Sumatra*

## INTRODUCTION

Sumatran tiger (*Panthera tigris sumatrae* Pocock, 1929) is one of three tiger subspecies in Indonesia. Sumatran tigers are protected species based on the Ministry of Environment and Forestry Regulation No. P.92 of 2018 and included in the Appendix I category of CITES (*Convention on International Trade in Endangered Species of Wild Flora and Fauna*). Currently, the number of Sumatran tiger population is rapidly decreasing and getting harder to find in the natural habitat from time to time (Sumitran & Oktorini, 2014).

Declining the number of Sumatran tiger population is caused by various factors, such as the forest area is narrowed down due to land conversion for agricultural purposes, local inhabitant settlements, and industrial land which contribute to the decreasing number of

Sumatran tiger population. The declining rate of the Sumatran tiger population was triggered by the so-called "*The Evil Quartet*", or the term for habitat degradation and fragmentation, conflict with humans, overexploitation of natural resources, and exponential extinction (Sriyanto, 2003).

Tiger habitat is usually in lowland to mountainous rainforests at the altitude of 0 - 3,000 m above sea level (asl). Sumatran tigers require three basic needs, which are availability of prey, water sources, and dense vegetation to catch its prey (Ganesa & Aunorrohim, 2012). Their most active time period is between 2pm in the afternoon and 10pm in the evening (Priatna et al., 2012). However, forests on the island of Sumatra, which are the natural habitat of Sumatran tigers, have been converted into plantations, agriculture and settlements area. Within their natural habitat in

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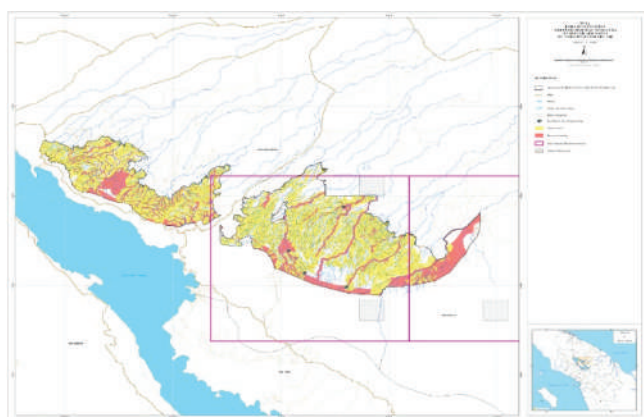
Sumatra, wild tigers utilize vegetation cover of plantation/regrowth (bush/young secondary forest with very high intensity (Priatna et al., 2012). Nowadays, Sumatran tigers could be found in plantation, agricultural and residential areas due to the limited space for movement and the difficulty of finding prey and eventually end up having conflicts with humans. Direct hunting of tigers and their prey also contribute greatly to the decline in the Sumatran tiger population in the wild (Sinaga, 2004).

Sumatran forests, which are natural habitats for Sumatran tigers, are having its forest cover area decreased significantly from time to time. Forest cover on the island of Sumatra was still 80% of the total land area in 1950. In 1985, the forest cover was reduced to 49%. The forest area decreased into 35% of total land area based on 1997 survey. The change of forest cover in Sumatra from 1985-1997 was around 6.7 million Ha (FWI / GFW, 2001).

The main objective of this study is to obtain information of tiger presence in industrial plantation forest concession area, which is dominated by monoculture of Eucalyptus trees, as a basis for routine tiger monitoring activities.

## METHODS

The study was carried out from March to November 2020 in an industrial plantation forest concession area that is dominated by monoculture of Eucalyptus trees at the Aek Nauli Sector, PT. Toba Pulp Lestari (PT. TPL). It is located in Sosor Ladang Village, Porsea Sub District, Toba Samosir Regency, North Sumatra. The area of the concession in the Aek Nauli Sector is 20,428 ha or around 10.9% from the total of concession area (Figure 1).

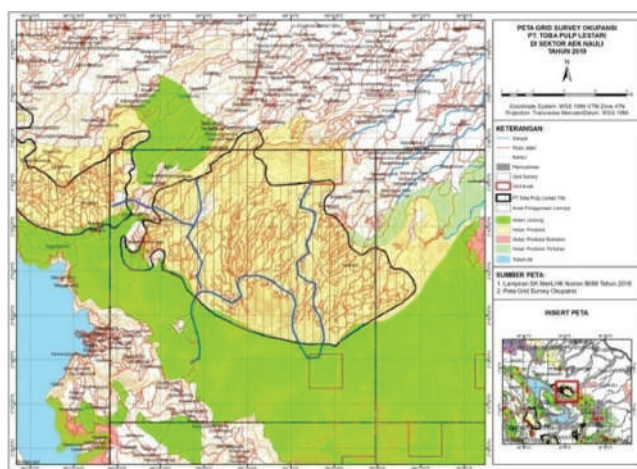


**Figure 1.** Map of the study area within protected area (red) of Aek Nauli Sector in the concession of PT. TPL, North Sumatra.

For the data collection, camera traps were employed as a main tool of observation. Global Positioning System (GPS), compass, memory card, and digital camera were also used as supporting research

equipment. All data gathered from the field were analysed using software of Microsoft Excel as well as ArcGIS 10.5.

Camera traps were placed on the trail where tiger signs were found during tiger sign-based occupancy survey was conducted previously in this area (Figure 2). All camera traps were set up at a height of 30-40 cm from the ground level and at a distance of 2-3 meters from the target trail. The spacing between camera trap station was between 1.5 - 3 km, and at every station placed two cameras that set up in pair for allowing us to identify the stripes at the right and left sides of a tiger. Camera traps collected data in the field continuously for three months and were visited every one or two weeks for maintenance and data retrieval.



**Figure 2.** Sumatran Tiger Occupancy Grid in Aek Nauli Sector

Cameras were installed in the buffer zone area, KPPN (germ plasm preservation area) of Talun Sungkit, the border of Hapasuk River as well as along the Green Belt. The selection of camera installation location was not only based on the findings of tiger signs at that location, but also based on the other consideration such as altitude class, slope class and the distance from the river. The altitude class in Aek Nauli Sector area can be seen in Figure (3).

All the data recorded and obtained including the GPS coordinates of camera traps location, altitude, slope and distance from the river data which were processed using ArcGis 10.5 to produce a map of individual Sumatran tiger distribution in the Aek Nauli Sector of PT. TPL.

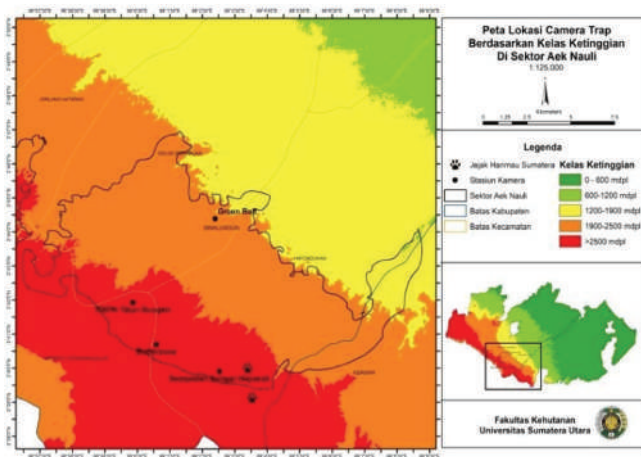


Figure 3. Location of camera traps placement based on altitude class in the Aek Nauli Sector area.

### RESULTS AND DISCUSSION

The habitat of the Sumatran tiger is in lowland areas and the altitude of 0-600 m asl (lowland) is the best altitude to set up the camera traps. Although the Aek Nauli sector is located at >1000 m asl which is a highland area, footprints of Sumatran tigers were still found based on previous occupancy surveys. Santiapilai & Romano (1993) stated that lowland forests are the main habitat for Sumatran tigers with a density of 1-3 tigers/ 100 km<sup>2</sup>, while mountain areas is 1 tiger/100 km<sup>2</sup>. However, the high rate of destruction of lowland forest in Sumatra (65-80%) has triggers the Sumatran tigers to migrate towards hill and mountain forests. The slope class is the next parameters that is considered in deciding location to install the camera traps. Data on the slope of the Aek Nauli Sector can be seen in Table 1 and Figure 4.

Table 1. Slope class of Aek Nauli Sector area.

Sector	Slope	Area (Ha)
AEN	0-8%	42,377.71
	8-15%	19,713.77
	15-25%	9,112.75
	25-40%	5,229.19
	> 40%	3,936.19
<b>Area sector AEN</b>		<b>80,369.62</b>

Figure 4 shows that the camera trap location was placed at areas with slope classes of 0-8% (flat) and 8-15% (ramps). The slope class is chosen based on the habits of Sumatran tigers which are active in flat areas. According to O'Brien et. al. (2003), tigers spent all their time (100%) in lowland areas and flat areas with a slope of 0-8%. Other than the altitude and slope class, the distance to the river is another important parameter to consider for camera trap placement. A map based on the distance to the river in the Aek Nauli Sector can be seen in Figure 5.

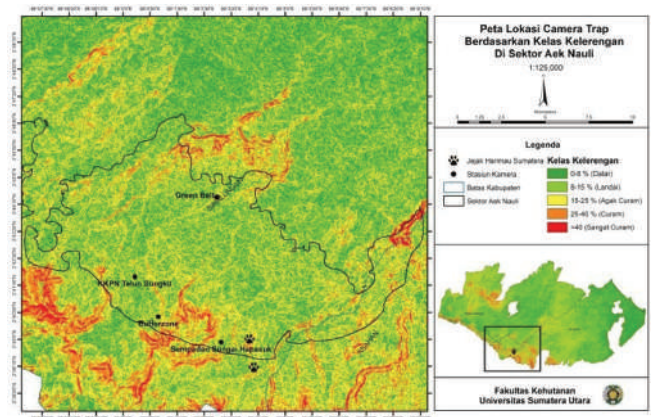


Figure 4. Location of camera traps placement based on slope class in the Aek Nauli Sector area.

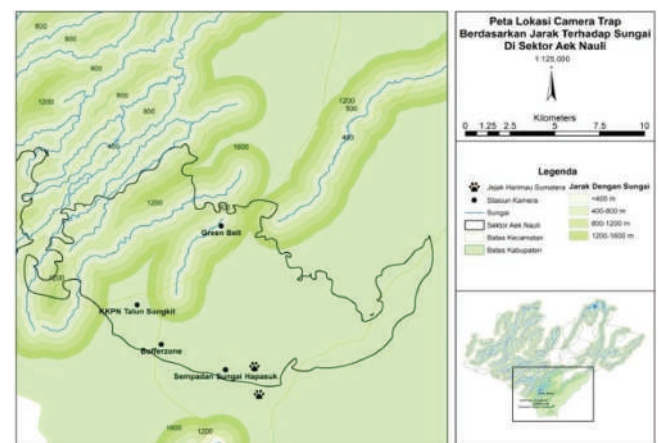


Figure 5. Location of camera traps placement based on distance to river in the Aek Nauli Sector area.

Figure 5 shows that the location of camera trap placement is close to the river. The location that is adjacent to the river is Green Belt area which has a <400 m distance based on the criteria. This location is selected because it is frequently visited by the Sumatran Tigers and it is also place where the prey animals do their activity. Karanth (2001) also states that tigers are animals that love water and able to swim. River is also a gathering place for animals, and it may lead to predation when tigers are on that area. The cameras that have been installed are then removed based on the determined schedule, which is 7 days of installation in buffer zone area, the KPPN of Talun Sungkit, Hapasuk River border and 13 days in Green Belt area, which is the farthest installation station.

During the study conducted, no photograph of tiger and their main prey were found. However, our camera traps recorded other wildlife that classified as tiger potential prey such as pig-tailed macaque (*Macaca nemestrina*). The other wildlife species that were captured by the camera trap which are marbled cat (*Pardofelis marmorata*), treeshrew (*Tupaia* sp.), Asian palm civet (*Paradoxurus hermaphroditus*), lizards (*Eutropis* sp.), Hoogerwerf's pheasant (*Lophura hoogerwerfi*), and wood mouse (*Apodemus* sp), and birds (Figure 6). Dinata

& Sugarjito (2008) argue, the existence of the main prey animals is directly correlated with the existence of the tiger in an area which tiger prefer to prey wild boar, muntjac, sambar deer, mouse deer, and serow, which are their main prey, while macaque and tapir as their optional prey. Rudiansyah (2007) stated that tigers always follow the movements of their prey and are always close to their preys.

There is a direct correlation between the existence of Sumatran tiger and its prey which is also affected by the

altitudinal factor. Griffith & Schaik (1994) stated that prey species found in forest at 100 – 600 m asl altitude have higher density and diversity compared to forests at the altitude of 600-1,700 m asl. Aek Nauli is located at the altitude of > 1000 m asl, which means that the diversity and density of prey species is limited so that it also affects the existence of the Sumatran tigers.



**Figure 6.** Wildlife species encountered by camera traps during field study in Aek Nauli Sector: (a) marbled cat (b) pig-tailed macaque (c) treeshrew (d) Hoogerwerf's pheasant (e) Hoogerwerf's pheasant (f) Asian palm civet.

## CONCLUSSION

Based on the result we conclude were the presence of tiger main prey in this study area is very low and it is affected to tiger existences in this area. Camera trap operation in each location very short and cover area

survey quite small could be other factors where this study could not record tiger photograph. Furthermore, regular tiger monitoring activities need to be carried out followed by conducted protection activities with

stakeholders collaboration to conserve and maintain tiger existence in plantation forest area of PT. TPL.

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