Spatial distribution and characteristics of destructive activities in Tahura Gunung Menumbing, West Bangka

M R Pratama*, H Marhaento

1Faculty of Forestry, Universitas Gadjah Mada, Yogyakarta, Indonesia

robbypratamakahiking@gmail.com

Abstract. Taman Hutan Raya (Tahura) Gunung Menumbing is a well-known protected area in West Bangka, Indonesia for its uniqueness of plants and animals that represent the low-land forest ecosystems of Bangka-Belitung Island. However, the biodiversity of Tahura Gunung Menumbing is currently facing threats from illegal encroachments. This research aims to map the spatial distribution of those illegal encroachments and investigate their characteristics such as dominances, frequencies, and time of activity. We interviewed 48 respondents that were selected by the snowball sampling technique. These respondents consisted of farmers, illegal tin miners, and poachers. The results showed that the spatial distribution of illegal encroachments such as illegal tin mining, wildlife hunting, and illegal agriculture mainly occurred on the west side of Tahura Gunung Menumbing. Illegal agriculture practices for rubber and oil palm were the most dominant activities (69%), while illegal tin mining and wildlife hunting contributed 25% and 6%, respectively. Illegal tin mining and agriculture practices almost occurred every day throughout the day. The findings of our study showed that Tahura Gunung Menumbing is facing serious threats and thus the biodiversity is potentially declining in the future. Therefore, conservation actions to preserve the biodiversity in Tahura Gunung Menumbing are urgently needed.

1. Introduction

Tahura Gunung Menumbing (TGM) is a well-known protected area in Bangka Belitung, Indonesia located in Muntok, West Bangka regency. It has been appointed as a protected area since 2016. Besides having the richness in biodiversity, TGM is also a popular heritage site for its old historical house located at the top of the mountain that was used by the Dutch to exile the founding fathers of the Republic Indonesia such as Ir. Soekarno, Mohammad Hatta, among others, during the war era. For this reason, Tahura Gunung Menumbing has attracted domestic as well as international tourists and significantly contributed to the Local Own-Source Revenue (PAD) of the West Bangka District. Also, TGM is the main water supply for the Sejiran Setason Regional Water Supply Company to provide clean water for almost 40% of Muntok residents [1].

However, the biodiversity existence and environmental benefits of TGM are currently facing threats from illegal encroachments such as timber logging, tin mining, expansion of smallholder plantations, and wildlife hunting. It is estimated that 50% of TGM area is degraded due to illegal tin mining [1]. As a result, biodiversity in TGM has declined including western tarsier (Cephalopachus bancanus), locally called mentilin, which is one of the most threatened animals in TGM [2]. In addition, illegal tin mining has affected in the reduced water quantity and quality. The residual sludge from mining excavation has...
been discharged directly into rivers which later caused water pollution and may trigger floods [3]. Illegal encroachment also caused land disputes within the locals and the authorities [4].

This study aims to map the spatial distribution of the illegal encroachments inside TGM and investigate their characteristics such as dominances, frequencies, and time of activity. To date, there is no study about the distribution and characteristics of the illegal activities inside TGM. The results of this study will be useful for the authorities to take controlled measures to mitigate environmental damage in the TGM.

2. Methodology

2.1. Study area

Tahura Gunung Menumbing (± 3,333.20 Ha) is administratively located in Air Belo village, Muntok sub-district, Bangka West Regency, Bangka Belitung province. Geographically, the area is located between 105°09'29” and 105°14'34” East Longitude and between 1°59'26” and 2°02'29” North Latitude. The topographical conditions range from flat to very steep slope, with the highest peak reach 450 meters above sea level (m.a.s.l.). TGM has A-type climate according to Schmidt-Ferguson climate classification indicating a very wet condition throughout the year with monthly rainfall variations between 0.8 (dry months) to 311.0 mm (wet months). The lowest rainfall occurs in September, while the highest rainfall occurs in January. The average air temperatures ranging between 23.5°C-26.5°C, and the air humidity ranges from 57-97%. Soil types in TGM are mostly occupied by Podzolic brown.

![Figure 1. Location of Tahura Gunung Menumbing.](image)

2.2. Methods

2.2.1. Data collection. We used a snowball sampling technique to select the sample respondents. This technique was selected due to the unknown population of persons who practiced illegal encroachment inside TGM, such as wildlife hunters, oil palm planters, and illegal tin mining actors. This is rather investigative research than observative research because we should track and interview illegal offenders who do not want to reveal their existence [5]. In total, we found 48 respondents through this technique. Furthermore, we marked their positions using GPS to get the coordinates of the activity. Then we interviewed them to collect information about the activities. Table 1 shows the variables collected from each respondent.
Table 1. Variables collected during interviews with the respondents.

| Activity characteristic | Sub-characteristic | Descriptions |
|-------------------------|-------------------|--------------|
| ggRespondent profile    | Age               | Age of respondents in the moment of research is conducted. |
|                         | Number of family members | Number of family of respondents are categorized into the small family (≤ 4 peoples), moderate family (5-6 peoples), and large family (≥ 7 peoples). |
|                         | Level of education | The last formal education level completed by the respondents. |
| Type of activity        |                  | Type of activity performed by the respondents inside TGM. |
| Factors that influence activity |                | The reasons why the respondents do the activities. |
| Intensity of activity   | Based on time    | Time of the respondents do activity inside TGM. It is classified into the morning (06:00–10:00 am), daytime (10:00 am-14:00 pm), afternoon (14:00-17:00), and all day (06:00-17:00 pm). |
|                         | Based on frequency | Frequency of the respondents do activity in inside TGM. It is classified into rarely (1-2 in a week), sometimes (3-4 in a week), and often (almost every day). |
| Impact of activity      |                  | The impact of the activity on the environment. This was carried out by observing the situations around the activity. |

2.2.2. Data analysis. In order to map the distribution of illegal activities, we marked all the locations of each respondent activity. The marked positions then were overlaid with the management map of the TGM. We used ArcGIS v.10.4 to carry out the spatial analysis. The activity characteristics were analyzed.
using descriptive statistics to explain the distribution patterns of the results using graphs, tables, and pie charts [5]. Furthermore, we descriptively discussed the results obtained.

3. Results and discussion
The results show that all the 48 respondents were in the productive age between 15 – 64 years old and most of them are farmers. Most of the respondents have had small families with less than or equal to 4 people in a family. It was also revealed that the level of education of most of the respondents were elementary school graduates. Figure 2 shows the distribution of activities in TGM that were mainly grouped into three activities such as illegal agriculture practices, illegal tin mining, and illegal wildlife hunting.

3.1. Illegal agriculture practices
We found that 69% of respondents are active farmers of pepper, rubber, and oil palm inside TGM. They mentioned two reasons why they keep utilized the TGM area for agriculture. First was because the area around the TGM had been used for oil palm plantation concessions for years, thus encouraged people to cultivate inside the TGM. Second, lack of knowledge about the borders of TGM area. Figure 3 shows the distribution of illegal agriculture activities inside TGM that are mostly located in utilization and rehabilitation blocks. According to the interviews with the actors, this agricultural activity inside TGM has been carried out almost every morning from 6:00 am to 10:00 am. For the rubber planters, they do rubber tapping in the morning since it will produce more sap [6]. With this high frequency of agricultural practice in the TGM (i.e. 5-7 times a week), it shows that the local community is very dependent on the TGM. However, these agricultural activities have caused several environmental impacts such as increasing deforestation rates, reducing biodiversity, decreasing river water quality, and soil [7].

Figure 2. Type of illegal activities in Tahura Gunung Menumbing.

Figure 3. Matal distribution of illegal agriculture practices in the Tahura Gunung Menumbing.
3.2. Illegal tin mining
Tin mining cannot be separated from the life of people in Bangka Island, including surrounding TGM since it has become the main livelihood for years. Based on the interview results, we found 25% of respondents that practiced illegal tin mining inside the TGM area. These actors said that the tin quality inside TGM is good and thus generate a significant income from these activities. Although all these actors knew that tin mining inside TGM is illegal, they insisted to carry out these illegal activities since they can easily sell the tin to the market. Tin mining activities inside TGM were carried out almost every day (i.e. 5-7 times a week) throughout the day from 6:00 am to 5:00 pm. These high frequency of tin mining activities inside TGM has threatened the environment of TGM. We observed that illegal tin mining activities have damaged the river network inside TGM area. This is because during the tin mining, the miner would block the river flow by making small dams to drainage the soil so that the tin is separated from the soil. Furthermore, the mudding process due to soil excavation has triggered floods [3].

Figure 4 shows the distribution of illegal tin mining activities inside TGM. From this figure, it is known that illegal tin mining has been done in the rehabilitation block which almost cut the TGM into two parts: the west part and east part. It should be noted that when we observed these illegal tin mining activities, we still found active miners, miners' huts, water pump machines, and large hoses for draining water, and small dams that function as water reservoirs to support mining activities. Inside the utilization block, we found several locations of illegal tin mining starting from near Pos 1 (ticket purchase post) to Kolong Argotirto. We also found that illegal tin mining activities not only occurred at the surface but also occurred beneath the ground until 5-10 meters depth.

3.3 Wildlife hunting
Wildlife hunting activities were not dominant in TGM. We found only 6% of respondents that still hunting inside TGM distributed all over the area. These hunting activities were carried out for various purposes. Most of the hunters have carried out animal hunting activities for consumptions, hobbies, or trades [8]. This hunting activity was mostly carried out in the morning start from 6:00 to 10:00 am, since according to them this is the best time for animals to find food [9]. It was only 1-2 times a week the hunter went to TGM to hunt animals, and they do not always get one. This hunting activity has threatened the existence of wildlife biodiversity in TGM such as Mentilin bangka (Tarsius bancanus) that is a
protected primate species based on Minister of Environment and Forestry Regulation No. 106/2018. This wildlife hunting activity is almost carried out in all blocks of the TGM area.

4. Conclusion

Illegal and destructive activities in the Tahura Gunung Menumbing area can be categorized into three such as illegal agriculture practices (69%), illegal tin mining (25%), and wildlife hunting (6%), that were mostly located inside the utilization and rehabilitation blocks. The frequency of illegal agriculture practices and illegal tin mining activities inside TGM was high with 5-7 times a week, while the frequency of wildlife hunting activities was quite low with 1-2 times a week. Illegal agriculture practices and wildlife hunting activities were carried out in the morning (06.00-10.00 am.), while illegal tin mining activities were carried out throughout the day (06.00-17.00). From these results, we urge the authorities to increase the surveillance all over the TGM area in order to avoid illegal activities that can damage the biodiversity and environment.

Acknowledgments

The first author would like to express appreciation for the support of all who either helped with administrative and technical issues or gave feedback during the research and writing process. The authors would like to thank UGM for partly funding this research through Rekognisi Tugas Akhir (RTA) 2020 program.

References

[1] West Bangka Environmental Service (DLH) 2019 Long Term Management Plan (RPJP) of Tahura Gunung Menumbing (Yogyakarta: Universitas Gadjah Mada) p 2-3
[2] Syafutra R Alikodra H S and Iskandar E 2019 Asian Primates Journal 8(1) 13-24
[3] Yuliana H S 2016 Journal of Disaster Management Study Program 3(1) 57-73
[4] Sari E 2017 Perception of Surrounding Communities about the Impact of PT Surya Agrolika Reksa and PT Adimulia Agrolestari Oil Palm Plantations (Bogor: Bogor Agriculture university) p 1
[5] Neuman W L 2003 Social Research Methods: Qualitative and Quantitative Approaches (New York: Allyn and Bacon)
[6] Ulfah D Thamrin G A R and Natanael T W 2015 Journal of Tropical Forests 3(3) 247-52
[7] Obidzinski K Andriani R Komarudin H and Andrianto A 2012 Ecologi and Society 17(1) 25
[8] Pattiselanno F 2007 Biodiversity 8(4) 274-78
[9] Rudiansyah Radhi M 2019 Wildlife Behavior in the Bird Class (Aceh: Almuslim University Forestry Study Program) p 3