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An Analysis of the Sumatran Elephant's Existence (*Elephas Maximus Sumatranus*) in KPH Kotaagung Utara as a Potential Tourism Object

AGUS SETIAWAN¹, DELLA TIARA MONIK^{1*}, YOB CHARLES¹, ELLY R. LESTARI²

¹Departement of Environmental Science, Postgraduate Program, Lampung University, Jl. Prof. Dr. Sumantri Brojonegoro No. 1 Bandar Lampung, Lampung, Indonesia. Telp/Faks. +62-271-783682, *email: dellatiaraaa@gmail.com

²Program of Conservation Biology, Department of Biology, Faculty of Mathematics and Natural Sciences, Lampung University, Jl. Prof. Dr. Sumantri Brojonegoro No. 1 Bandar Lampung, Lampung, Indonesia

Abstract. KPH Kotaagung Utara is a region of estimated area $\pm 56,020$ ha, consisting of $\pm 8,82\%$ forest cover and $91,18\%$ non-forest. This region has a high diversity of flora and fauna and potential as a tourist destination for various and unique biophysical attractions. One of the uniqueness of this location is the Sumatran elephant's existence (*Elephas Maximus Sumatranus*). The existence of wild elephants in KPH Kotaagung Utara that has not been utilized is a potential that needs to be developed to become a tourism object. The objectives of this research were to find out the location of home range and the right time to get to see the Sumatran elephant (*Elephas Maximus Sumatranus*), additionally to find out its safety, security and convenience when visitors observe wild elephants in KPH Kotaagung Utara. The approach of the research was descriptive qualitative, primary data were obtained by observing and secondary data were obtained by GPS Collar (WWF). The result of the research showed that there were 16 wild elephants known as the Bunga group. Elephants can be observed from 7:30 to 12:00 am and 3:00 to 6:00 pm, with a duration of 3 hours. The innovations was done for the visitor's safety, security and convenience by building a treehouse, evacuation route, the use of binoculars, and Personal Protective Equipment (PPE).

Keywords: KPH Kotaagung Utara, sumatran elephant (*Elephas Maximus Sumatranus*), tourism object, visitors.

INTRODUCTION

Nature tourism is a form of activity that utilizes beauty, uniqueness, and value in the form of biodiversity and artificial nature, which have the potential and attraction for tourists. According to Samosir *et al.*, (2019) a model of developing natural tourism brings the joy of beauty nature, elements of education, and conservation-it is called ecotourism. With the existence of ecotourism, it is expected to give information for the potential tourists visiting the tourism object. In general, potential tourists are a group or person who will travel to tourism object, to get new experiences.

The potential tourism that is facilitated by the location of tourist destinations, utilizing the resources and services provided facilities supported by communities, businesses, and local government (Silitonga and Anom, 2016). One of region that has a high diversity of flora and fauna and potential as a tourist destination for various and unique biophysical attractions is Kesatuan Pengelolaan Hutan (KPH) Kotaagung Utara is the largest KPH in Lampung Province after KPH Batu Tegi, with an area of $\pm 56,020$ ha (RPH KPH Kotaagung Utara, 2013). One of the uniqueness found in this location is the Sumatran elephant's existence (*Elephas Maximus Sumatranus*).

The Sumatran elephant is the largest herbivore in Sumatra with the order *Proboscide* (Sekar and Sukumar, 2013). According to the *International Union for Conservation of Nature and Natural Resources* (IUCN) (2008), the Sumatran elephant in the *Red List Data Book* with the critically endangered category (*Critically endangered*). In Indonesia, the Sumatran elephant has been protected since 1931 by the Wild Animals Protection Ordinance No. 134 and 226 in 1931 (Sharifuddin, 2008; Abdullah *et al.*, 2009; Zein and Sulandari, 2016; and Mustafa *et al.*, 2018). Furthermore, the protection of Sumatran elephants is strengthened by Government Regulation no. 7 of 1999 concerning to Preservation of Plant and Animal Species and Regulation of the Minister of Environment and Forestry Number P.20/MenLHK/Setjen/Kum.1/6/2018 and it is Amendment P.92/MenLHK/Setjen/Kum.1/8/2018. However, the elephant population continues to decrease. According to the Directorate of Biodiversity Conservation, Directorate General of Natural Resources and Ecosystem Conservation, Ministry of Environment and Forestry Republic of Indonesia Jakarta (2020), in 2017, the Sumatran elephant population was estimated at 1,694-2,038 individuals found in 36 habitats and spread across seven provinces covering Aceh, North Sumatra, Riau, Jambi, South Sumatra, Bengkulu, and Lampung.

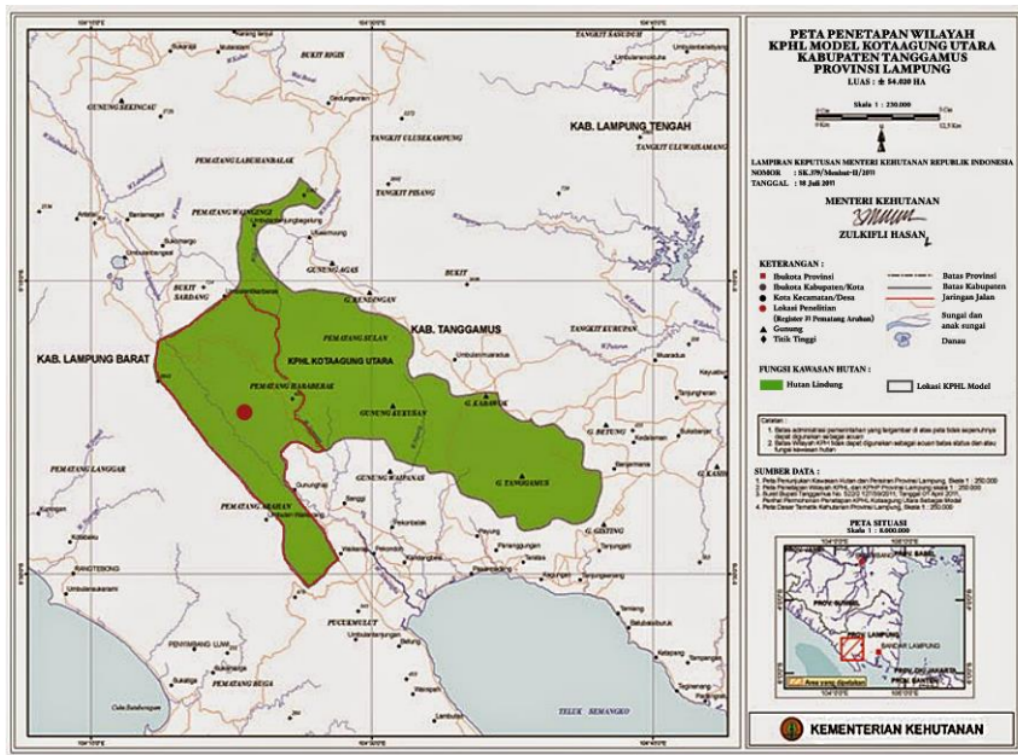
In general, Sumatran elephants can be found in the low altitude, swamps, tropical forests, up to an altitude of ± 1.000 meters above sea level (Saleh and Adriani, 2005). In line with Febryano and Rusita (2018) states that the Sumatran elephant tends to live near the water resources, as well as areas with adequate forage supplies. The elephant's sufficient food supply. It will affect the behavior of the elephant itself. Based on Sari *et al.*, (2016) behavior is the habits of animals in their daily activities, namely; active time, movement area, social relation between species, food hunting, nest building, communication behavior, reproduction, and giving birth process. The elephants live in group for specific activities such as food hunting

(Kurniadi *et al.*, 2020). In addition, these animals will continue to explore and expand their home range, especially food hunting (Fadillah *et al.*, 2014). One of the methods that can be used to see the roaming area of wild elephants in KPH Kotaagung Utara is by mapping and observing. However, factors safety, security and convenience are important for a tourist destination. Every tourism object requires security guarantees, including environmental conditions, community activities, and road access to these attractions. To tolerate all forms of disturbance that will occur to tourists, such as the risk of contracting a disease or accident while in a tourist attraction. If a tourist attraction provides a sense of security and comfort, tourists will not feel disadvantaged, both physically and financially. With the potential for the existence of wild elephants in KPH Kotaagung Utara that has not been utilized, it is necessary to develop it to become a tourist attraction. The development of an area to be used as tourism object will increase regional income, especially for the people around the area. Based on the background, the objective of the research is to find out the existence of the home range and the right time to find wild elephants and to acknowledge the safety, security and convenience when visitors observe the Sumatran elephant (*Elephas Maximus Sumatranus*) in KPH Kotaagung Utara.

MATERIALS DAN METHODS

Research Location

Based on the administrative location of the research location, the research was conducted in KPH Kotaagung Utara which was in Kawasan Hutan Lindung (KHL), especially on Register 31 Pematang Arahan (Picture 1). The research was conducted in February 2021 to March 2021. The equipment used were stationery, camera, *Microsoft Excel*, binoculars, and a predetermined questionnaire.



Picture 1. Research Location KPH Kotaagung Utara, Kabupaten Tanggamus, Provinsi Lampung.

Procedure

Data Types and Sources

The data were collected from two sources: primary and secondary data. Primary data were obtained by direct observation, meanwhile secondary data were obtained by the theories or literature, internet, newspaper and journals (Pratiwi, 2017). The data used in this research are presented in (Tabel 1).

Tabel 1. Data Types and Sources

No	Data	Data Sources
1.	Tourist attraction coordinates	Observation
2.	Landscape of the area	Observation
3.	Potential tourist attraction	Observation and interview
4.	The time and place elephants visit frequently	Observation, interview and secondary data Gapoktan (<i>GPS Collar</i>)
5.	Constructing plan of tourist attractions, and tourism areas (safety, security and convenience) of visitors	Observation and interview

Data Collection

Register 31 Pematang Arahan is located in KPH Kotaagung Utara, Tanggamus Regency with a total area of 1505 ha. Secondary data obtained by mapping the range of Sumatran elephants in the Register 31 Pematang Arahan by overlaying data from *GPS Collar* by WWF for 4 years. *GPS (Global Positioning System) Collar* is a modern satellite-based navigation system, shaped like a necklace that can be tied to an animal. The installation of *GPS Collar* is intended to monitor the movement patterns and animal positions, so that it can be used to mitigate conflicts between humans and Sumatran elephant wildlife. Then, the suitability of primary and secondary data obtained by direct observation of the Sumatran elephant's gathering times and points at Register 31 Pematang Arahan, KPH Kota Agung Utara.

Direct observation and interview were used to collect the primary data. In-depth interviews were conducted with the society around KPH Kotaagung Utara by using *snowball* technique. Structured interviews were conducted with the Head of KPH Kotaagung Utara. Interviews were used to determine the society's perspective and the manager of KPH Kota Agung Utara towards the planning of tourism object. The method used for interview was questionnaires. The data were collected on interviews: the society's perspective of elephants, the elephant's existence specifically, and elephant's potential tourism object in KPH Kota Agung Utara.

Data Analysis

The data were processed and analyzed descriptively qualitatively. Descriptive analysis is a method used to solve problems that are not limited to data collection and organization but includes analysis and explanation of research results (Nasution, 2017). The analysis is a process where the data is generated, then defined by existing problems. The data were collected by getting information and the results are described in the form of words or sentences. For the preparation can be implemented accurately according to the facts in the field, therefore, it indicates that the results were obtained regarding the planning of tourism object in KPH Kotaagung Utara well-executed.

RESULTS AND DISCUSSIONS

General Condition of Research Field

Kesatuan Pengelolaan Hutan (KPH) Model Kotaagung Utara (Unit X) was determined based on Forestry Minister's Decree Republic of Indonesia No. SK.379/Menhut-II/2011 on July 18th, 2011 on Penetapan Wilayah Kesatuan Pengelolaan Hutan Lindung (KPH) Model Kotaagung Utara (Unit X) which was located in Tanggamus Regency, Lampung Province. KPH Kotaagung Utara was established by the District Regulation of Tanggamus Regency Number 21 of 2011 concerning to the Establishment of the Organization and Work Procedure of Kesatuan Pengelolaan Hutan (KPH) in Tanggamus Regency, Lampung Province. Geographically, KPH Kotaagung Utara in Tanggamus Regency was located at the position of 104°17' BT - 104°42' BT and 5°10' LS - 5°30' LS, Lampung. KPH Kotaagung Utara are divided into 3 main registers, namely Register 30 Gunung Tanggamus, KPH Register 31 Pematang Arahan, and also KHPL Register 39 Kotaagung Utara which is part of Tanggamus District Forestry Services management area. Management blocks in KPH Kotaagung Utara consisting of Core Blocks and Utilization Blocks with a total area of ± 56,020 ha, divided into 217 plots consisting of 55 core plots and 162 utilization plots.

Tourists Attraction

Law Number 10 of 2009 states that everything has uniqueness, and value in the form of biodiversity, culture and artificial nature, which have the potential and attraction for tourists. Attraction in tourism is the main capital that must be owned to develop a tourism object. Hence, the tourists attraction potential will loved to visit tourist areas (Devy dan Soemanto, 2017). Well-maintained natural views make it an attraction and a positive value for tourists (Pattiwael, 2018). According to Fandeli (2002), tourist areas must be attractive to attract people's attention and keep the requirements of regional development. These requirements are something to see, something to do, as well as something to buy.

Supporting Factors

In general, a tourist destination will provide treats to tourists in the form of attractions that can be enjoyed by tourists. The factors that influence tourists to travel is supporting factors (Alfisyahr and Lusy, 2019). Supporting factor describes that individual human desires, that is to relieve boredom (Uysal and Hagan, 1993). Boredom can be decreased by taking a vacation to relax and enjoyable. Besides, another factor refers to the facilities and attractions offered by tourism objects so that tourists tend to visit the same location frequently (Keliwar and Nurcahyo, 2015).

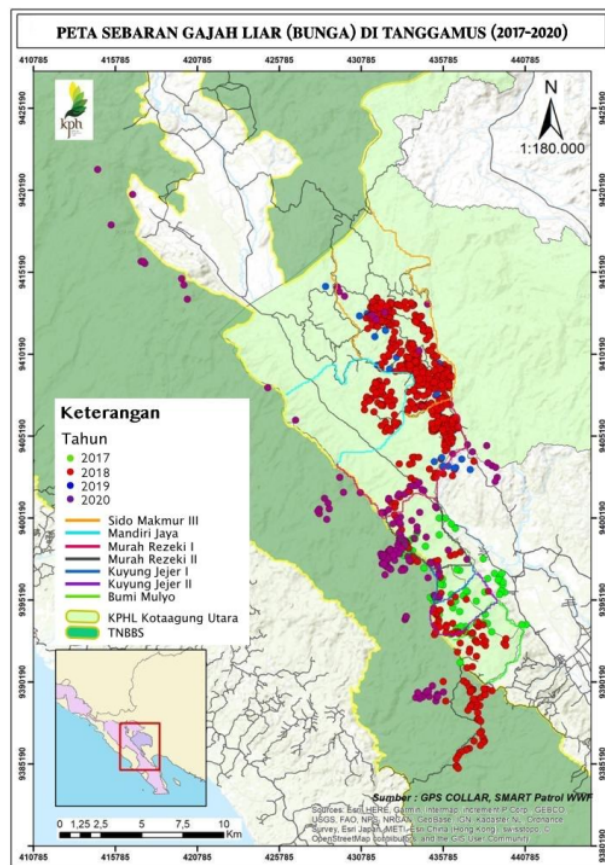
Behavior and Roaming Area (Home Range) Sumatran Elephant (*Elephas Maximus Sumatranus*)

There are 24 Sumatran elephants (*Elephas Maximus Sumatranus*) in Tanggamus, consisting of two groups, namely Bunga group (16 elephants) and Citra group (8 elephants). In line with Alpiadi *et al.*, (2019) who stated that elephants are animals that behave in a matriarchal pattern or live in groups. The roaming areas of the two groups include KPH Kotaagung Utara and TNBBS, with an estimated movement time of 1 to 2 years. However, the Bunga group dominates Kotaagung Utara KPH area, meanwhile the Citra group dominates Pemerihan area (TNBBS). The movement of each group is influenced by the season and the condition of their habitat, especially food and home range. Amount of the wild elephant group ranges from 2 to 50 individuals (Larisha *et al.*, 2016). Each group is led by the largest female parent, while the adult males only stay for a certain period to mate with several females in the group (Meytasari *et al.*, 2014). Male elephants who have grown up being forced to leave their groups and join other male groups. Meanwhile, old elephants will live alone because they are no longer able to follow the group, and will look for their food sources (Shoshani and Eisenberg, 1982).

The population of Sumatran elephants (*Elephas Maximus Sumatranus*) always decreases from year by year. Sunardi (2012) states the biggest factor that causes the elephant population is due to shifts and changes in habitat. Habitat change in the form of conversion of primary forest land into agricultural and plantation areas is a fundamental problem for elephant-human conflicts (Mustafa *et al.*, 2018). Ministry of Environment and Forestry in RTMPPGS (2020) also addressed to minimize elephant-human conflicts through optimizing barrier management and encouraging coexistences practice between humans and elephants. To get over the conflict, it is directed to mobilize local resources to include cooperation with village areas—such as education programs about elephants, capacity of the team tasks in monitoring wild elephants and monitoring programs for the sustainability of society's resources in the long term. The prevention executed by the society around the KPH Kotaagung Utara area to prevent wild elephants go into their plantation areas by using batons. These efforts were quite successful chase away elephants, so that minimizing the occurrence of non-natural elephant deaths and human deaths due to conflict.

Another prevention way to minimize conflicts was to observe the roaming path and distribution of elephants in a location. WWF and KPH Kotaagung Utara tracked using a GPS Collar to observe the elephant group. The purpose of installing a GPS Collar is to monitor the position and movement patterns of the animal, so that the range of the animalis obtained (Sabri *et al.*, 2014). The home range is the total area used by animals group in e ffectuate their activities for a certain period (Ahmadi *et al.*, 2016).

Identifying home range restrictions by looking at the path each group chooses during roaming. Based on the results of observations in 2017-2020 conducted by WWF and KPH Kotaagung Utara using a GPS Collar, the home range of two groups of wild elephants in Tanggamus covers the area of Sido Makmur III, Mandiri Jaya, Murah Rezeki I, Murah Rezeki II, Kuyung Jejer I, Kuyung Jejer II, dan Bumi Mulyo. However, the dominant home range are in the Sido Makmur III, Murah Rezeki I, and Mandiri Jaya (Picture 2).



Picture 2. Distribution map of wild elephants (Bunga group) in Tanggamus for 2017-2020.

The elephant's various food supplies in each area is the main factor that causes the wild elephant group in KPH Kotaagung Utara has a wide-roaming area. The number of species that grow under trees are rare because the composition of forest vegetation has reached a climax, thus the elephants rarely pass through the area. It is supported by Djufri (2013) who asserted that if the primary forest has reached the climax stage of succession, plant species diversity and abundance at the forest floor are relatively low. A high canopy forest may protect elephants from threats (Abdullah *et al.*, 2009). Furthermore, according to Riba'i *et al.*, (2013), the elephant's food supply is reduced due to forest conversion effects, so that Sumatran elephants have to move away from one to another forest area to meet their needs. Other factors such as choosing a safe location in carrying out daily activities; rest, communicate, and grooming, are elephant behaviors to defend themselves from threats (Yudarini *et al.*, 2013). If environmental conditions are not safe, the elephant will sleep standing up to minimize disturbance.

According to Ofrinaldi *et al.*, (2016) elephants spend approximately 16 hours a day eating and become more active at night. Elephants need as much as 250kg of food day (Lekagul and Mc. Neely, 1975). The dominant plant species in the Sido Makmur III, Murah Rezeki I, and Mandiri Jaya areas are kans grass (*Saccharum spontaneum*), weeds (*Imperata cylindrica*), robusta coffee (*Coffea canephora*), arabian coffee (*Coffea arabica*), gamal (*Gliricidia maculata* L), dadap (*Erythrina variegata*), java palisander (*Dalbergia latifolia*), fern palm (*Cycas rumphii* Miq), sengan buto (*Enterolobium cyclocarpum* L.), rambutan (*Nephelium lappaceum*), and mangosteen (*Garcinia mangostana*). Borah and Deka (2008) also addressed the same view when he stated the food chosen by elephants consists of grass, shrubs, foliage, bark, as well as hydrophyte and fruit. Sugiyanto *et al.*, (2017) also revealed that elephants have a strategy in determining the consumption of grass and leaves in the dry and wet season. Elephants choose a *fresh grass* in wet season because it contains carbohydrates and low fiber content (*lignohemicellulose*). Meanwhile, in the dry season, elephants tend to prefer leaves that contain high protein content (8-10% *Malvaceae* and 10 to 20% *Leguminosae*) (Syarifuddin, 2008). The images were taken by the World Wide Fund for Nature Indonesia Southern Sumatra Program team (Picture 3).



Picture 3. A wild elephants (Bunga) group were looking for food in KPH Kotaagung Utara (Photo: Rusmani, 2020).

Sido Makmur III, Murah Rezeki I, and Mandiri Jaya areas were also areas large river flows, it can be seen in (Picture 4). Elephants depend on water, so in the afternoon elephants will usually look for water sources to drink, bath and wallow (Ramono, 2001). It is supported by Yanti *et al.*, (2017) the purpose of the elephant looking for a water source is to cool their body from hot sun and repel insects that stick to their body.



Picture 4. Sido Makmur River Area III, Register 31 Pematang Arahan (Photo: Della Tiara Monik, 2021).

An elephant needs as much as 20-50 liters of drinking water/day (Poniran, 1974). The elephant's water and food supplies are influenced by physical environmental habitat factors—such as climate and soil. A nice habitat will influence and determine the level of animal welfare, both in the ability to be reproduction and disease resistance (Alikodra, 1979). The habitat will nice if the elephant's sufficient water and food supply (Alikodra, 2010). According to Kuncoro *et al.*, (2017) elephants are susceptible to ectoparasite infections caused by flies in dirty rivers. Ectoparasites are parasites which live on the body surface of the host (Hidayajati *et al.*, 2009). The ectoparasites' existence is caused by various diseases, such as irritation, itching, inflammation, scabies, myiasis, various allergic and its kind. These symptoms effects an inconvenience caused and anxiety that may interfere the elephant's activity (Prince and Graham, 1997). The thing that elephants do to keep

their metabolism balanced is by saltlicks (Resphaty *et al.*, 2015). Mineral salts such as calcium, magnesium and potassium contained in the soil or cliffs taken by the elephant's trunk (Sukumar, 2003) will be useful for elephants to strengthen their bones, teeth, and tusks.

Safety, Security and Convenience Factors (*Elephas Maximus Sumatranus*)

The tourism sector was admitted as a form of activity that can provide capital for sustainable development, will not sacrifice the environment, and provide benefits for the next generation. However, maintaining a tourist attraction so that it is always visited by tourists and making it sustainable also requires special attention. According to Fanani and Pangestuti (2017) tourism object requires security guarantee, including environmental conditions, society activities and road access to the tourists attraction—to tolerate any kind of disturbance that will occur to tourists, such as the risk of contracting a disease or accidents while in a tourist attraction. Mahagangga and Ariwangsa (2013) also stated that tourist's convenience and safety is a relaxed situation without worrying during a tourist attraction for a certain time. Tourists will not be pleased to travel if the area to be visited is run into conflict, war, or natural disaster (Sutrisnawati, 2018). The treehouse was created by KPH Kotaagung Utara to observe wild elephant's activities more closely (Picture 5).



Picture 5. (a) Treehouse (1) 55 m from the elephant cross trail (Photo: Della Tiara Monik, 2021);
(b) Treehouse (2) 70 m from the elephant cross trail (Photo: Della Tiara Monik, 2021).

KPH Kotaagung Utara has two treehouses of different sizes. The treehouse (a) from the Main Door/Rhino Camp is 1.1 km, size 2.5 x 2 m and height of 12 m. Meanwhile, the treehouse (b) from the Main Door/Rhino Camp is 1.8 km, with a size of 2.2 x 2 m and a height of 14 m. The two treehouses has a capacity of 4-5 people. The construction of a treehouse has a special concept, and the results were in different sizes. Considering in building a treehouse was to determine the right location (one way with the elephant's roaming area), accurate geographical conditions, considerate the cardinal directions and selecting the strongest and particular trees to develop into as building pillar. An ideal tree used as a building pillar should have strong trunks and branches, deep and strong roots, and no signs of parasites or disease that could weaken the tree. These movements were taken to reduced the occurrence of threats caused by various factors, such as natural factors, the environment, economic activity factors, and of course road access factors too (Khalik, 2014).

The purpose of building a treehouse in KPH Kotaagung Utara was to facilitate for officers to observe elephants more closely. In addition, the use of innovation of a treehouse can be the right action for tourists who want to see elephants directly. The society and field members during the observation confirmed that they felt more secure and comfortable. The finding in line with Maryone's (2015) stated that the purpose of building a treehouse is to avoid wildlife and also interference from bad spirits. Therefore, a innovation treehouse can be utilized in planning and developing tourism objects in KPH Kotaagung Utara.

Henceforth, an appropriate time for tourists who want to see a wild elephants in KPH Kotaagung Utara around 7:30 to 12:00 am and 3:00 to 6:00 pm, with a duration of 3 hours. During the day the elephant's feeding activity will stop, due to the hot weather. It also supports Riba'i *et al.*, statement (2016) who said that the Sumatran elephants are warm-blooded animals, if the weather is very hot they would seek shade (thermal cover) to stabilize the body temperature to suit the environment. Illumination factors during the day is relatively brighter than at night, also one of the reasons tourists who want to see wild elephants in the daytime. However, if tourists want to see wild elephant's activity at night, they can use binoculars with infrared sensors. Binoculars with an infrared sensor can assist travelers see in the dark and foggy. According to Hamdani *et al.*, (2021) elephants are the land mammals that are active at night (nocturnal), from 01.00 pm to 04.00 am. One of the reasons elephants are not active during the day was because elephants have a bad eyesight. The eyes morphology which is on the side of head and hair, but rarely in the eye will have a glare effect for the elephant.

One of safety factors used to observe wild elephants in KPH Kotaagung Utara, such as evacuation route, the use of binoculars, and Personal Protective Equipment (PPE). The evacuation route is a path that connects one area to safe area, to deal with the dangerous emergency response (Syukri and Mukhlis, 2016). The use of binoculars provides several advantages: visual acuity, contrast sensitivity, and a better vision compared to monocular/direct vision (Syauqie and Putri, 2014). Thus, it facilitates for tourists to see the object. The use of Personal Protective Equipment (PPE) has an important role in maintaining the safety and security of tourists in observing wild elephants. An accident occurred at the time of observation, it has a big problem for tourist destinations. These losses can cause fatalities, so the use of PPE is necessary (Indrayani and Sukmawati, 2018). Despite using Personal Protective Equipment (PPE), technical prevention is the most important. Therefore, the main benefit of using PPE is to avoid and reduce the accident occurs or health issues for tourists.

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