

# Analysis of welfare levels, ecology, and animal management in Seblat Elephant Training Center, Bengkulu–Indonesia

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## ABSTRACT

The Sumatran elephant (*Elephas maximus sumatranus*) is a large mammal protected species and categorized as endangered according to the IUCN Red List. Habitat management includes control and regulation forest vegetation, open areas, water sources, salting sites, and resting areas for good animal welfare. The Seblat Elephant Training Center (SETC) is a conservation area to protect the Sumatran Elephant from extinction and is an ecotourism destination. This study aimed to analyze the welfare level and management of the Sumatran elephant in the SETC. This research used structured interview method to determine the indicators of the animal welfare level. Calculation of feed productivity and secondary data collection were used to improve the welfare level of the Sumatran Elephant. The research result stated that the welfare level of Sumatran elephant was classified as excellent (the implementation achievement value is 74.3%). In addition, the development of observations suggests that freedom from environmental discomfort needs to be improved by providing quarantine cages and reproductive cages to support natural behavior. Environmental conditions also support the welfare level of the Sumatran elephant. In conclusion, this facility is properly conducive to the welfare of Sumatran elephants.

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## 1. Introduction

The Sumatran elephant (*Elephas maximus sumatranus*) is one of the large mammal species found in the island of Sumatra–Indonesia. Elephants can be grouped into two, i.e. Asian elephants and African elephants. The Sumatran elephant is a rare animal that has been protected by Indonesian law since the Dutch era with the Regulation of the Protection of Wild Animals in 1931 No. 134 and 266 (Abdullah et al., 2012). In the balance of ecosystem, elephants have the role, among others, as agents of dispersal of plant seeds and control of floral growth (Meytasari et al., 2014). Elephants also have an essential role in supporting wild elephant conflicts, often used for economic purposes such as tourist attractions. This animal is protected under the Regulation of the Ministry of Environment and Forestry of the Republic of Indonesia Number P.20 of 2018 and is included in the critically endangered (CR) category according to the IUCN Red List; the Sumatran elephant is also included in Appendix 1. Estimates in 2007 put the number of elephants at 2,400–2,800, but in 2013 there were 1,970 elephants left. In the last report, during 2012–2016, the number even decreased. At least 150 elephants were killed due to conflict or poaching (Kuswanda, 2018). The threat to elephants results

from narrowing of habitat, extensive hunting, and conflicts with the community. Animal–human conflict is a serious threat to elephants and can cause economic losses (Garsetiasih et al., 2018). For that reason, it's essential to identify the level of welfare of elephants in a location, including conservation areas.

The remaining elephant habitat in Bengkulu Province–Indonesia lies in the landscape ranging from the Seblat Nature Park (SNP) to Kerinci Seblat National Park (KSNP). The current condition of this elephant's natural habitat has been fragmented and resulted in the splitting of a large group of Sumatran elephants into small groups consisting of only a few individuals. Known places of the Sumatran elephant population, such as Bengkulu–Indonesia, are at very high risk of extinction. Conservation program needs to be developed continuously, both protection in natural habitats (in-situ conservation) and sustainable use outside their habitats (ex-situ conservation). One of the efforts to establish ex-situ conservation is the management of tame elephants (captive). Captive elephants are captured due to conflicts with humans in residential areas, plantations, and other development activities. Catching elephants and placing and training tamed elephants are examples of elephant conservation outside their natural habitat (ex-situ) (Kuswanda et al., 2018). The Sumatran elephant is categorized as an Evolutionary Significant Unit (ESU). It is given high priority in conservation of Asian elephants concerning management in captivity such as zoos and safari parks. These two sub-species must be placed and managed to avoid interbreeding. Inter-marriage between the two is very much against the concept of ex-situ elephant management (Suhartono et al., 2007; Fernando et al., 2003).

The survival of the Sumatran elephant also depends on habitat management which includes control and regulation of forest vegetation, open areas, water sources, salting places, and resting areas (Novitri & Abdullah, 2017). Animal welfare is how animals behave naturally following their natural habitat. Animals have a good level of interest if they are healthy, comfortable, well cared for, safe, can express innate behavior, and free from suffering (injury, fear, and stress). The study on condition of the Sumatran Elephant in the Minas Training Center–Sumatra, Indonesia, reported that the habitat is suitable for the Sumatran Elephant (Suhada et al., 2016). In addition, another elephant training center in Sumatra island, the Seblat Elephant Training Center (SETC), is a conservation area that protects Sumatran elephants from extinction, is an ecotourism destination, and an elephant conservation center (ECC). Research related to the analysis of the level of animal welfare and care conditions in this site requires further engagement as a consideration in improving the welfare and care conditions of Sumatran elephants in the SETC area.

The Sumatran elephant is protected wildlife animal, and its existence continues to decline due to many external factors. The level of animal welfare needs to be identified as a basis for improving the management of the Sumatran elephant care. Five principles of animal welfare must be considered and fulfilled by every conservation agency manager, such as freedom from hunger and thirst, freedom from discomfort, freedom from injury, illness, and disease, freedom from pressure and stress, and freedom to express natural behavior. This study analyses welfare levels, ecology, and animal management in SETC.

## 2. Method

### 2.1. Study Site

This research was conducted in the period of August–September 2020 in the Seblat Elephant Training Center (SETC) area (locally known as Pusat Latihan Gajah Seblat; PLG Seblat) with 03°03'12"–03°09'24" South Latitude and 101°39'18"–101°44'50" East Longitude with a total area of 6,865 Ha. Administratively, it is located in the North Bengkulu Regency, Bengkulu Province, the Republic of Indonesia, that is covering the Putri Hijau sub-district, with the following regional boundaries: to the north is the palm oil plantation company Alno Agro Utama, to the south are Suka Baru, Suka Maju, and Suka Merindu Villages, to the east is the palm oil plantation company Agrincinal, to the west are connecting of the Village Unit Settlement V (Cipta Mulya) and Village Unit Settlement VII (Air Pandan) and Dusun Pulau Village.

This facility is managed by the Bengkulu chapter of Natural Resources Conservation Agency (BKSDA Bengkulu); it serves to maintain, care for, and train the elephants, as well as prevent the extinction of elephants due to pressure and threats to the function and existence of the forest (such

as encroachment, illegal logging, and other illegal activities). It also increases the forest function from being the training center area into a conservation site to reduce the rate of damage, maintain the existence of the training center's forest area, and develop the potential of a tourism spot (Figure 1).

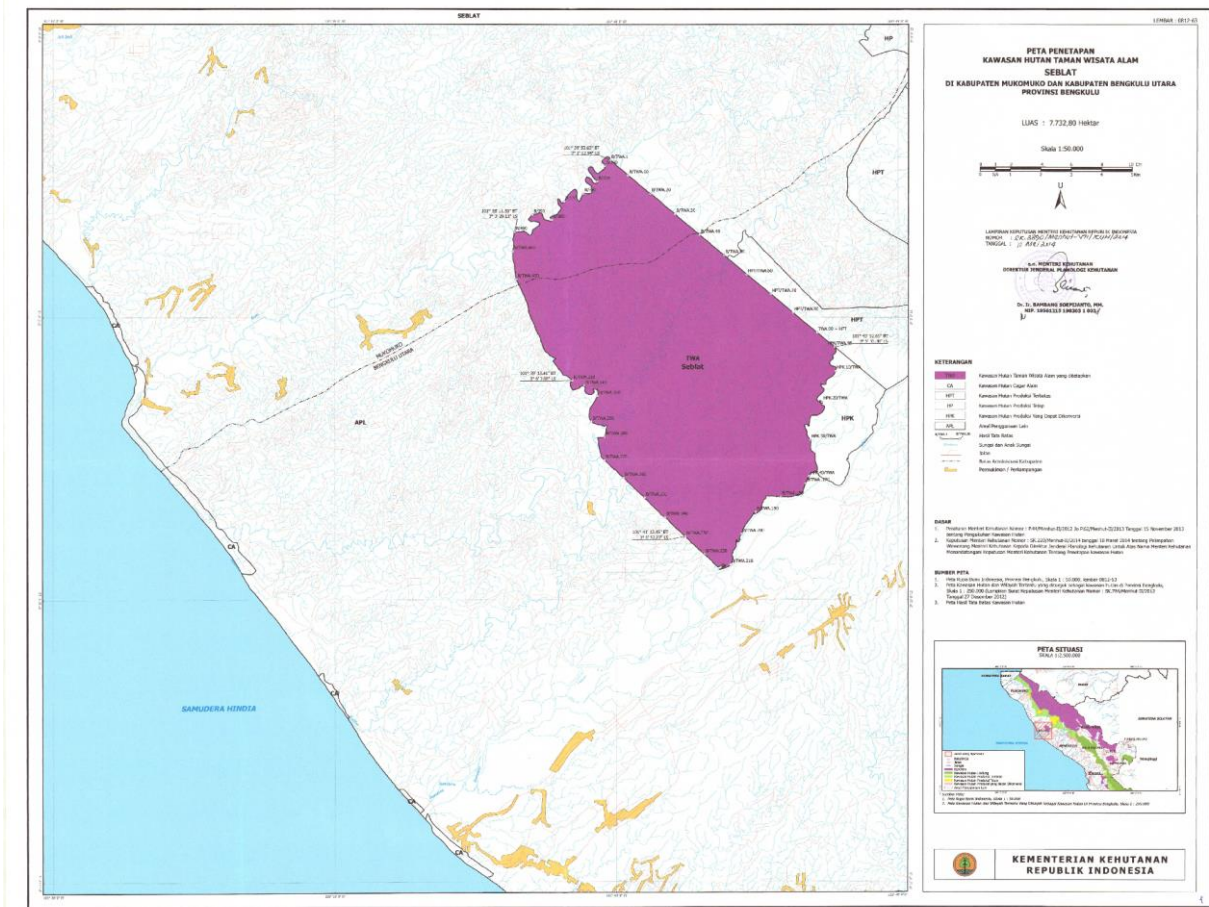


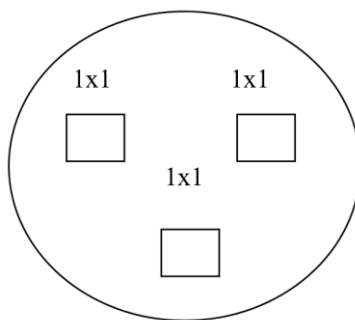
Fig. 1. Study site. The purple color represents the area of this research.

## 2.2. Sampling Method

The sampling method measured environmental factors (abiotic factors), green feed productivity, and assessed elephant welfare. Measurement of feed productivity was carried out in circular grazing locations with a radius of 30 m, and the amount was adjusted to the number of grazing locations per day. Halls (1964) stated that to observe the productivity of the area of each observation, plots of 1 m x 1 m are placed at the grazing location. Measurement of feed productivity was carried out at two grazing sites, with each area consisting of 3 plots (Figure 2). The grass in the plots was cut and then allowed to regrow for 20 days and then cut back and weighed to see its productivity.

Calculation of elephant feed productivity aims to determine the adequacy of elephant feed-in grazing areas. Productivity calculation was done by using equation 1. The abiotic factors were collected by secondary data, such as climate condition, humidity, altitude, rainfall, space, and elephant disturbance data by observation and literature study. Data collection regarding elephant welfare was carried out directly by looking at field conditions. Structured interviews were conducted with the mahout (elephant keeper) and SETC area manager to examine management aspects related to elephant welfare, including organization, elephant condition, cage management, feed, health, and reproduction.

Seblat Elephant Training Center (SETC) generally has a flat to wavy topography with an altitude ranging from ±56–113 m above sea level. The area in the north is relatively flat compared to the site in the south. The optimum area that can be combed by elephants when tied in chains with a length of 15–30 m based on the formula for the circle's location is 706.5–2,826 m<sup>2</sup> or 0.0007–0.003 Km.



**Fig. 2.** Feed productivity plots are based on two grazing sites, with each area consisting of 3 plots of 1x1 m (Tohir et al., 2016).

### 2.3. Data Analysis

The equation calculated the green feed productivity using equation 1 (Suhada et al., 2016).

$$Productivity = Feed\ biomass\ total \left( \frac{kg}{m^2} \right) \times grazing\ area \left( \frac{m^2}{day} \right) \quad (1)$$

In assessing the level of welfare of elephants, there is a weight of assessment on aspects of elephant welfare. Each assessment weight has a score between 1-5 (Table 1). Furthermore, after obtaining the weighted value of each element, the Achievement of Animal Welfare Implementation (AAWI) calculation was carried out with equation 2 (Tohir et al., 2016).

$$AAWI = \frac{\sum Weighted\ value\ of\ each\ parameter}{\sum Elephant\ welfare\ parameters} \quad AAWI = \frac{\sum Weighted\ value\ of\ each\ parameter}{\sum Elephant\ welfare\ parameters} \quad (2)$$

The classification of elephant welfare parameters and weighted values of elephant welfare are presented in Table 2.

Table 1. The weight value of parameters' welfare aspects.

Animal Welfare	Weight	Score	Weighted Score
Free from hunger and thirst	30	1-5	30-150
Free from environmental inconvenience	20	1-5	20-100
Free from pain, injury, disease	20	1-5	20-100
Free from fear and stress	15	1-5	15-75
Free to act naturally	15	1-5	15-75

Notes: score interval between 1 and 5, 1 is the lower score (bad condition), and 5 is the highest (best shape) score. Sources:(Ayudewanti, 2013).

Table 2. Classification of assessments and weighted values of elephant welfare.

No.	Rating classification	Implementation achievements
1	Very good	8-100
2	Well	70-79
3	Enough	60-69
4	Need coaching	<60

Source: (PHKA, 2011).

## 3. Findings and Discussion

### 3.1. Environmental Factors

Based on the climate classification of Schmidt and Ferguson, Seblat Elephant Training Center (SETC) is included in the type A climate, which is an area that experiences rain almost evenly throughout the year. The average air temperature ranges from 26.6 to 27.7°C. The average monthly maximum temperature ranges from 31.3 to 32.4°C, and the average minimum temperature ranges from 21.3 to 22.3°C. The average humidity is 86%, with wind speeds ranging from 7.2 to 13.3 knots. Seblat Elephant Training Center (SETC) is located ±150 Km from Bengkulu, can be reached by motorized vehicles with 2/4/6 wheels. Travel time is ±4.5 hours from Bengkulu. The condition of

the road up to Putri Hijau Subdistrict is quite good. Still, the state of the road to reach SNP through the Marga Sakti Subdistrict, North Bengkulu Regency, is in poor condition, or the ordinary asphalt road is in partially damaged condition.

The roaming area is the area covered by elephants in SETC that is included in the average distance of elephants in nature (Novitri & Abdullah, 2017). Elephants naturally need large areas to forage for food and meet their daily needs, so it is expected that the home range of tame elephants will be increased to provide good blood circulation if they get more variety of food. The visitor's presence does not affect the natural behavior of the elephant, and the food given by visitors is sorted first by the mahout—tourism activities in the form of group photos and elephant riding (Syarifuddin, 2008). The cage used in the SETC area is an open cage type. The barriers and doors used in the cell are made of sharp wire-shaped not to harm the elephants. The grazing of female elephants is done by tying the elephants using a 15 to 30-meter-long chain located in open land for 2–3 hours, and the transfer is carried out every day where the shift rotation is arranged in such a way (mahout rides the elephant during the grazing process). This type of cage is also applied by the flying squad elephant at Tesso Nilo National Park (TNNP). The characteristics of the pen are good cell, so it's suitable for elephant moving, can protect from weather effect, have good ventilation, have a sufficient area, has a floor that is easy to clean, has a drain, and has a strong chain link. To determine correct location of the cage, attention must be paid regarding the distance from the water source, away from the main road, facing north or south to reduce sun exposure, and built on a flat area (Phuangkum et al., 2005).

The grazing of male Sumatran elephants is carried out in the area around the site to avoid disturbance and conflict with the surrounding community. The barriers and doors used in the cage are made of sharp wire-shaped to be safe for elephants. The selection of grazing sites is adjusted by considering the presence of tree vegetation as shade and the availability of sufficient feed. Vegetation serves as a shade to protect the elephants from the hot sun. Temperature and humidity are aspects in supporting elephant comfort since elephants are sensitive to heat. Elephants generally cover their bodies with soil or mud to cool their bodies. If it is not often muddy or wallowing, elephant skin will experience dryness due to sunlight, insect bites, and moisture loss.

### 3.2. Green Feed Productivity

Measurement of green feed productivity was carried out to determine the amount of natural feed found in the site area, then calculated against the size of grazing per day presented in Table 3.

Table 3. Green feed productivity in SETC

No	Local Name	Scientific name	Total biomass (Kg/m <sup>2</sup> /day)	Productivity at grazing sites (Kg/day)
1.	Rumput Gajah	<i>Cyperus imbricatus</i> Retz.	0.053	299.56
2.	Alang-Alang	<i>Imperata cylindrica</i> (L.)	0.08	452.16
3.	Akar Petaian	<i>Caesalpinia</i> sp.	0.015	84.78
4.	Rumput Bambu	<i>Selaginella plana</i> Hieron	0.05	282.6
5.	Salak Hutan	<i>Calamus cf. Javensis</i> Blume	0.005	28.26
6.	Sedunduk	<i>Melastoma malabathricum</i> L.	0.14	791.28
	<b>Total</b>		<b>0.343</b>	<b>1938.64</b>

The total biomass of the six types of feed was 0.343 Kg/m<sup>2</sup>/day. The calculation of forage productivity for elephants per day at grazing locations obtained a value of 1938.64 Kg, with the most extensive feed dominance being *Melastoma malabathricum* (791.28 Kg/day), at 40.81% of the total forage productivity of elephants. This result is the same as previous research reporting that the most elephant's feed dominance is *Melastoma malabathricum* (28.26 Kg/day) (Tohir et al., 2016); in addition, another study said that the most preferred of elephant's feed dominance is *Imperata cylindrica* (Rahmanda et al., 2020). The entire productivity value obtained for the area of grazing sites per day is almost sufficient for the needs of Sumatran elephants. According to Shoshani & Eisenberg (1982), on daily basis, an elephant need to feed as much as 10% of the bodyweight. The bodyweight of the Sumatran elephant in the area is an average of 2,200 Kg, so it requires as much as 220 Kg of feed/head/day. There are ten Sumatran elephants, so they need 2,200 Kg/day of feed. This feed shortage can be corrected by extending the chain-link or developing habitat. Adequacy of

additional feed and supplements must be met by weighing the weight of the meal according to the elephant's needs and establishing a system of cooperation with the community as a supplier of elephant feed (Martiani, 2002).

The additional feed given to elephants is King grass (*Pennisetum purpuphoides*) and palm fronds. SETC does not yet have a tool to measure the weight of appropriate elephant feed, so *mahout's* weight measurement is carried out using estimates based on Olson (2004). Size of feed weight is essential because it will affect spread needed for elephant health measurement. SETC facility seeks to increase the quantity of elephant feed availability by planting a 2 Ha area with King grass so that the King grass can be fed fresh. After harvesting, *mahout* immediately passes it to the elephants for immediate consumption. Supplements are foods with unique ingredients usually only given to elephants in fatigue, illness, malnutrition, and old age. Supplements available in SETC are bran or pellets, brown sugar, brown rice, and sugarcane stalks given once a month or according to the elephant's needs. *Mahout* adjusted the supplementation because not all elephants wanted to take supplements as a whole, seeing some elephants being selective in the choice of feed they consume; this is because elephants are very subjective in choosing the type of food (Olson, 2004). Some *mahouts* provide supplements by giving separate doses while still paying attention to the nutritional content and rules according to the SETC's manager's standards, such as rice bran. Rice bran contains high nutrients and is very useful for elephants who have strenuous activities and can increase the bodyweight of thin elephants. Sugarcane pellets and stalks are highly nutritional and thus suitable for tired and overworked elephants (Phuangkum et al., 2005).

### 3.3. Elephant Welfare Assessment

Table 4 shows a list of elephants found in SETC. There are ten elephants, with three males and seven females.

Table 4. List of elephants living in SETC

No.	Name	Sex	Weight (Kg)	Age (Year)	Source (Adopted from)
1	Anggraeni	Female	1664	28	<i>Ipuh, Muko Muko, Bengkulu</i>
2	Bona	Female	1269	9	<i>PT. Sapta Buana, Alno Group</i>
3	Desi	Female	2196	36	<i>Seblat, North Bengkulu</i>
4	Devi	Female	1860	26	<i>Ipuh, Muko Muko, Bengkulu</i>
5	Fatma	Female	2298	33	<i>Ipuh, Muko Muko, Bengkulu</i>
6	Mega	Female	2010	31	<i>Ipuh, Muko Muko, Bengkulu</i>
7	Nelson	Male	3011	42	<i>Seblat, North Bengkulu</i>
8	Robi	Male	2711	24	<i>Ipuh, Muko Muko, Bengkulu</i>
9	Sari	Female	2706	43	<i>Ipuh, Muko Muko, Bengkulu</i>
10	Ucok (Cokro)	Male	2276	26	<i>Seblat ECC, North Bengkulu</i>

Based on Table 4, all elephants look excellent and healthy. The weight of these elephants is said to be ideal or fit because the ideal weight of an elephant or declared to be healthy ranges from 1000–3000 Kg (Sukumar, 2003). Health management was carried out by preventive activities every day by *mahout* and every three months by veterinarians through providing vitamins and examining feces to examine the physiological condition. Curative actions are treatment activities carried out with sick animals and are coordinated between *mahout*, managers, and veterinarians. If there are mildly ill animals, *mahout* will handle them directly through coordination with the veterinarian and the procedures set out in the standard guidebooks. Elephant health reports are available in detail and are well archived. It is essential to know the medical history and handling when an elephant is sick. Medical care is critical, and even *mahout* must have basic medical skills such as treating minor injuries to elephants (Phuangkum et al., 2005).

Health facilities at SETC are complete with supporting elephant welfare. Medicines and medical supplies are available and neatly stored in storage warehouses. Every year, there are medical examination activities for elephants in collaboration with VESSWIC (Veterinary Society for Sumatran Wildlife) including examination of feces, feet, and care and handling. Routine foot care is carried out and provided, including essential radiographs and exercise program to support elephant health (Brown, 2019). In addition, the diseases that are often found in elephants in SETC are intestinal worms and eye pain. Deworming is carried out routinely by the manager. The level of

welfare of elephants in the SETC facility is classified as good, with the achievement of implementation reaching a value of 76.78% in Table 5.

Table 5. The level of welfare of elephants in SETC.

No	Welfare aspect	Weight	Score	Weighted value
1.	Free from Hunger and Thirst	30	3.71	111.3
2.	Free from Environmental Discomfort	20	3.33	66.6
3.	Free from Pain, Wounds, and Disease	20	3.7	74
4.	Free from Fear and Depression	15	4	60
5.	Free to Behave Natural	15	4.8	72
	<b>Total</b>	<b>100</b>	<b>19.54</b>	<b>383.9</b>
	<b>Average</b>		<b>3,908</b>	<b>76.78</b>
	<b>AAWI score</b>		<b>Well</b>	<b>76.78%</b>

Notes: assessment completed using equation 2 of interview observation.

Based on Table 5, the management reasonably considers the control of the welfare level of elephants on the aspect of being free from hunger and thirst, which is the most influential factor in the level of welfare of elephants in SETC with a weighted value of 111.3. Being free from fear and depression had the lowest weighted value of 60—provision of quarantine and reproductive cages under the criteria and condition of reproductive cells to support natural behavior. According to Rahmanda et al. (2020), elephants also need safe and comfortable atmosphere so that breeding behavior is not disturbed and the reproductive process can run well. It is essential to support the conservation of Sumatran elephants. Sumatran elephants have low reproductive capacity due to long gestation period ranging from 18–23 months, with an average pregnancy of 21 months and female elephant's gestation distance of about four years (Sukumar, 2003).

#### 4. Conclusion

Upon examination of the level of animal welfare and the care conditions of the Sumatran elephant (*Elephas maximus sumatranus*) in SETC, it can be concluded that the welfare level is classified as good with the implementation achievement reaching a value of 76.78%. It shows that the management reasonably considers the control of the elephant welfare level. Several aspects, such as being free from environmental discomfort, need to be improved by providing quarantine cages that meet the criteria and providing reproductive cells to support natural behavior. Due to this study's limitations, we suggest behavioral research on the Sumatran elephant at SETC; because the level of welfare is in the excellent category, it would be better to complement it by research on its behavior.

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