

## **Behavioral Study of Crested Serpent-eagle (*Spilornis cheela*) as Conservation Education in Pusat Suaka Satwa Elang Jawa**

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### **ABSTRACT**

One of the raptors commonly found in Indonesian forests is Crested Serpent-eagle (*Spilornis cheela*). However, its population in its natural habitat is hampered due to habitat loss, illegal trade, and hunted for pets. *Pusat Suaka Satwa Elang Jawa* (PSSEJ) is a rehabilitation center specialized for mountain eagles, focused on rehabilitation and releasing the eagles to their original habitat. Eagles taken care of in PSSEJ were handed over from the public, Nature Conservation Agency (BKSDA), or other conservation institutions. Other than as a rehabilitation center, PSSEJ became an education and conservation center for raptors as a continuous effort to manage natural resources and biodiversity. Crested Serpent-eagle that are not eligible to be released based on observation in the rehabilitation stage would be kept in a display cage. The display cage is purposed as a conservation education facility for PSSEJ visitors. This study aimed to find daily activity frequency of Crested Serpent-eagle in PSSEJ display cage as information that supports conservation education. The observation was conducted for five days from 08.00 am - 04.00 pm using ad libitum sampling and focal animal sampling methods. Based on the results, it could be concluded that the biggest percentage of Crested Serpent-eagle's daily activity in the display cage is perching at 71.6%. This percentage is similar to the percentage of eagle perching activity in nature. Although the percentage of its activity is similar, the Crested Serpent-eagle in this study has a very small possibility of being released into the wild because, after more than one year of rehabilitation, its dependency on humans has not disappeared.

Keywords: Crested Serpent-eagle, conservation Education, display cage, PSSEJ

### **INTRODUCTION**

Crested Serpent-eagle is one of the raptors commonly found in the Indonesian forests. The adult Crested Serpent-eagle has a dark gray-brown upper body and a brown lower body. On the abdomen, there are white spots, on the tail there is a wide gray stripe in the middle of the black line. Crested Serpent-eagle has a short crest and wide, black and white. When flying, the tail is visible broad white stripe and white stripe on the trailing edge of the wings. Own wide wings with a rounded shape and a short tail. Long adult bodies range from 50-74 cm, wingspan 109-169 cm, and height between 22-23 cm. Females are generally larger and heavier than males (Prawiradilaga et al. 2003). Raptors possess an important role in the ecosystem (Donázar et al., 2016). This is due to raptors' position in the food chain as the top predator, or the top of the food pyramid. If its existence in its natural habitat is disturbed, it

would also hamper the food chain and network in the said ecosystem, both directly and indirectly. Hence, its existence has a deep impact on ecosystem balance (Ridwan and Rusli 2014). However, its population in its natural habitat is hampered by habitat loss, illegal trading, and hunted for pets. Based on research conducted by Gunawan et al. (2017), about 2,461 raptors, including Crested Serpent-eagle, are illegally traded in the black market through social media.

One way to do restoring the state of resources in ecosystems is conservation. Conservation is one action that humans do to build, improve or maintain a good relationship with nature(Nurhikmah et al., 2021). As an effort of protection and conservation, aside from the utilization of written law, currently, the government has established several nature reserves areas such as a sanctuary, wildlife reserves, national parks, and other conservation areas as areas for wildlife to live and take shelter. Moreover, those areas could be used for research, education, tourism, as well as recreation for the sake of area utilization and animal conservation and its habitat (Fauzi et al., 2017). One of them is *Pusat Suaka Satwa Elang Jawa* (PSSEJ) which conducted rehabilitation and release specialized for mountain eagles to their natural habitat. *Pusat Suaka Satwa Elang Jawa* is managed by Balai Taman Nasional Gunung Halimun Salak, located in Resort PTNW Salak 1. Aside from a rehabilitation center, *Pusat Suaka Satwa Elang Jawa* became an education and conservation center for raptors as a continuous effort in managing natural resources and biodiversity (Erlan et al., 2016). Eagles rehabilitated in *Pusat Suaka Satwa Elang Jawa* are surrendered by the public, BKSDA, or other conservation institutions. Crested Serpent-eagle that are not possible to be released based on observation in rehabilitation stages would be kept in a display cage. The display cage is aimed as a conservation education facility for the visitors of *Pusat Suaka Satwa Elang Jawa* (Zufitrianto, 2021).

Traditional community settlements surround nature reserves and communities that rely on livelihoods in national park forest areas make their position close to wildlife reserves often causing people to meet wild animals (Zulkarnain et al., 2022). Aside from a rehabilitation effort, conservation education is also very important, especially for this community. Through conservation education, hopefully, there would be changes in manner, celebration, and behaviors related to managing natural resources and ecosystems (Purmadi et al., 2020). Hence, this study aims to find out the daily activity frequency of the Crested Serpent-eagle kept in the display cage in *Pusat Suaka Satwa Elang Jawa*. The result of this research could be used in conservation education facilities to educate the public regarding the importance of preserving the ecosystem, especially the Crested Serpent-eagle.

## METHODS

An individual who is the object of this study named Aka kept in one of the display cages is a male Crested Serpent-eagle that originated from BKSDA Jakarta and submitted to *Pusat Suaka Satwa Elang Jawa* on 2 February 2020. This individual is kept in a display cage due to the lack of behavioral changes after being kept in a quarantine cage. From the first time it arrived, this individual has the character of dependency on humans, where when a human or raptor keeper approaches its cage, the individual would move closer. This behavior arises due to being reared by humans for too long. Indeed, this does not conform to wildlife's natural characteristic that is sensitive to human presence and would avoid human presence around them (Winarno and Harianto, 2018).

This research is qualitative descriptive, due to research performed with The researcher explaining the research object conditions according to data observed in the field (Marhento

and Zaenab, 2021). This study was conducted in *Pusat Suaka Satwa Elang Jawa* located in Loji, Cijeruk Subdistrict, Bogor Regency, West Java (Figure 1) in September 2021. Daily activity data retrieval in the display cage measuring 4 x 6 x 3.5 m was conducted in five days from 08.00 am - 04.00 pm. Raptor daily activity data were retrieved using ad libitum sampling method that observes and describes all observed animal behavior as well as focal animal sampling by observing all behavior of one individual animal in a certain special time unit and recording the behavior shown (Altmann, 1974). Environmental parameter data measured consisted of humidity and ambient temperature using a hygrometer and a thermometer. The material used in this study was tally sheets.

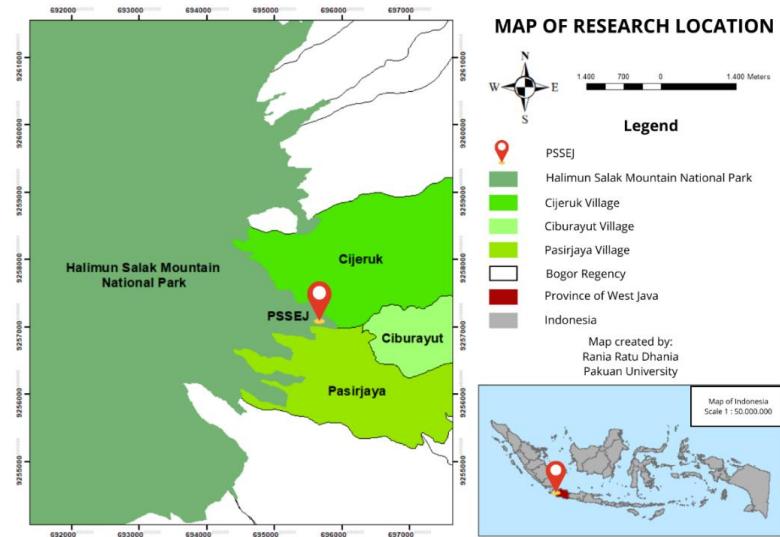


Figure 1. The location of *Pusat Suaka Satwa Elang Jawa*

Data retrieved from research results was processed to calculate its daily activity frequency. The frequency of each Crested Serpent-eagle's activity is analyzed using a formula created by Sudjana (2016) as follows:

$$\text{Relative Frequency} = \frac{\text{frequency of one activity}}{\text{frequency of all activities}} \times 100\%$$

## RESULTS AND DISCUSSION

Display cage in *Pusat Suaka Satwa Elang Jawa* is purposed for eagles that have small to zero possibilities to be released to their natural habitat. Those eagles usually have physical disabilities due to aggressive or dependent behavior towards humans that are difficult to recover. Those eagles usually have gone through the quarantine stage to be rehabilitated. However, as there is no improvement in behavioral changes through the said stage, the eagles could not carry on the rehabilitation process into the training stage. Those eagles are moved to display cages as a conservation education facilities for the visitors of *Pusat Suaka Satwa Elang Jawa* (Zufitrianto, 2021). Hence, the display cage is the only cage in *Pusat Suaka Satwa Elang Jawa* that can be visited by common visitors.

Other cages such as quarantine cages, training cages, and flight training cages cannot be entered by just anyone because the eagles in these cages are eagles that are undergoing a rehabilitation stage, so contact with humans must be strictly limited. The location of cage is

also placed far from residential areas and close to natural forest ecosystems because rehabilitated eagles must minimize contact or see humans so that their wild behavior quickly recovers. The cage must be in a location far from humans other than the raptor keeper (Wildlife Rehabilitators Network of New Zealand, 2019). The *Pusat Suaka Satwa Elang Jawa* area is indeed a tourist area, but due to the pandemic and construction, *Pusat Suaka Satwa Elang Jawa* is still closed for general tourist visits.

Based on research conducted by Gunawan et al. (2017) in Indonesia, generally rehabilitated eagles were human pets that have lost their natural abilities and traits with the result that they need a lot of time to be rehabilitated, not to mention the still weak law enforcement regarding the hunting, illegal possession and illegal trade of these animals that should be protected. It shows the lack of the public's understanding of keeping wildlife as pets, specially protected animals such as raptors or eagles.

The eagles rehabilitated in *Pusat Suaka Satwa Elang Jawa*, which are handed over by the public are generally found by people in the neighborhood where they live with conditions usually divided into two, injured due to fights between eagles, sick, or exposed to snares, and eagles in a weak condition or stray into residential areas that have signs that the eagle is a loose pet eagle. Freed pet eagles or eagles that are deliberately released by their owners usually have markings such as ropes/chains still attached to the legs or tail feathers/wings that have been cut off. The eagle from the BKSDA usually comes from confiscation activities (Zufitrianto, 2021).

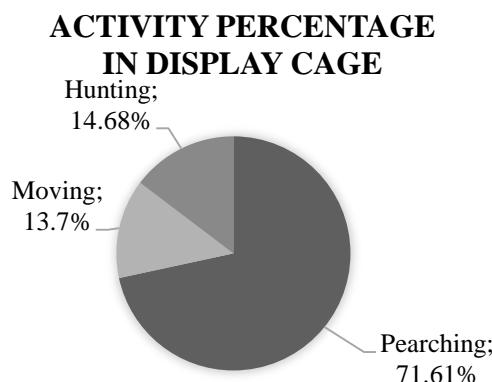


Figure 2. Activity percentage in display cage

Based on the results of the study, the percentage of Crested Serpent-eagle activity in the display cage is 71.6% perching, 13.7% moving, and 14.7% hunting (Figure 2). Perching activity has the biggest percentage compared to other activities, which is almost similar to the percentage of raptors' silent activity in their natural habitat, around 76.1% - 86.2% (Setiadi et al., 2000).

Crested Serpent-eagle hourly activity frequency in the display cage has an up and down pattern. In 08.00-09.00 am they have a stationary activity frequency patterns, then their activity frequency would increase until 11.00 am, and after that the activity frequency would decline until 12.00 am. Furthermore, the activity frequency would slowly increase and stationary until 03.00 pm. After that, the activity would decrease until the end of the observation time. Based on Figure 3, it is shown that the highest activity frequency happened between 09.00-11.00 am. The highest activity frequency of the Crested Serpent-eagle in the display cage is similar to raptors in their natural habitat which has the highest activity frequency in 09.00-11.30 am (Rahmadiana et al., 2021). High activity frequency could be observed in clear weather. However, if the weather is cloudy, the activity frequency is

reduced and tends to be more stationary. It is due to the raptor's habit of utilizing airflow and high temperatures for their activities, especially for flights (Harianto et al., 2015). As the weather changes through the observation, the activity frequency has up and down pattern.

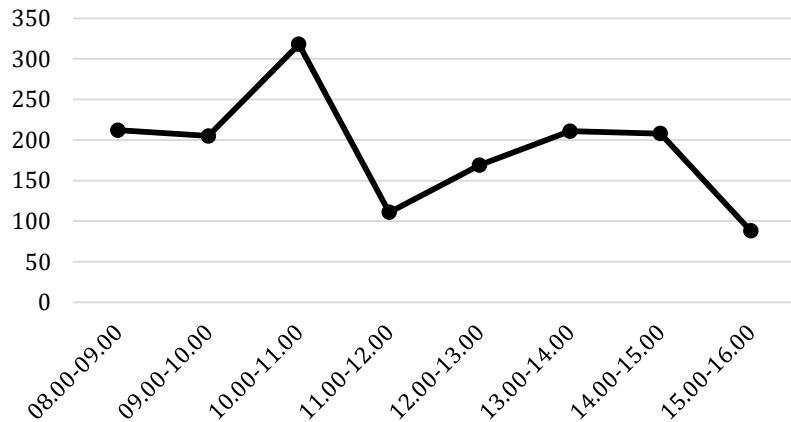


Figure 3. Activity frequency in display cage

The environmental parameters in the display cage had an average daily temperature of 22-24°C and an average humidity of 78-86%. According to Zufitrianto (2021), the humidity of the cage should not be too high because it can cause mold growth. The daily temperature and humidity in the cage adjust to the environmental temperature because the cage is built around a forest ecosystem.

### Perching Activities

Perching activities are the activity of a bird standing with one of two legs, with its eyes open (Putra et al., 2014). Based on the observation, there are fourteen activities done when they are perching. Dominating perching activities are sonant activity with a percentage of 31.41%, turning head 24.88%, grooming 11.79%, and watching around 9.51%. Other activities include lifting one leg 2.83%, relaxing 8.41%, moving tail 1.15%, stretching wings 1.46%, turning around 2.40%, shaking body 1.09%, scratching head 0.73%, flapping wings 3.04%, stationary on ground 1.18% and sunbathing 0.12% (Figure 4).

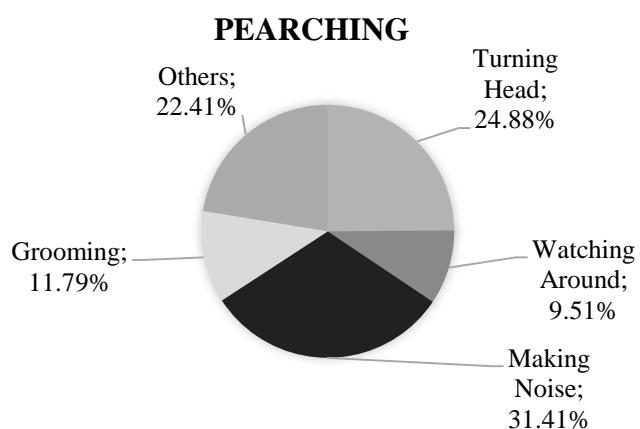


Figure 4. Percentage of perching activity inside display cage

Crested Serpent-eagle's relaxing activities include perching, leg covered by bodily feathers, a relaxed body, and occasionally standing with one leg consecutively while resting the other leg. Though the resting frequency is lesser than the observation activity, it takes a longer time. Relaxing activity on perch is used to regulate the body's metabolic rate as a mechanism to stabilize body's temperature so that the physiologic process functions optimally (Pasito et al., 2014). In cleaning itself, Crested Serpent-eagle would occasionally vibrate its body, and grooms to clean its feather and body from ticks. The percentage of Crested Serpent-eagle's cleaning activity in quarantine cages is corresponding to raptors' cleaning activities in their natural habitat, around 11.8-12.37% (Wiwoho et al., 2007). Crested Serpent-eagle would scrape its beak to the perch several times after feeding.

Occasionally, the Crested Serpent-eagle would flap its wing several times on the perch or when they are perching on a net. Crested Serpent-eagle in the display cage rarely moves their tail when they perch after they finished flying or turning body. Crested Serpent-eagle would stretch their wings once in a while when they perch or when they are about to fly to another perch, while also sometimes turning body when they are on a perch. Its observing position is similar to its resting position, but with straight legs and a firmer body. Crested Serpent-eagle would turn their head right and left when they are in an observing or relaxing positions. The Eagle likes to monitor its surroundings, it aims to see if there are disturbances around it, so it can be prepared to protect itself (Sawitri and Takandjandji, 2010). Crested Serpent-eagle would scratch its head using its legs when grooming. Crested Serpent-eagle would also occasionally stay on the ground for a relatively long time. Crested Serpent-eagle would actively make noises when human approaches the cage or when there is any noise disturbance. The sound produced is shrilling, loud, and squeaky (MacKinnon et al., 2010).

The Crested Serpent-eagle was observed occasionally basking in the morning to midday by spreading its wings for some time on the perch. All cages in *Pusat Suaka Satwa Elang Jawa* are built facing east by considering the intensity of sunlight entering the cage area (Zufitrianto, 2021). Raptors is one of the animals that are susceptible to diseases caused by fungi (Ulumiyah et al., 2018). So sunlight in the cage area is needed to kill germs and fungi (Sawitri and Takandjandji, 2010).

## Moving Activities

Moving activities could be described as the activity of moving from one spot to another (Putra et al., 2014). Based on observation, there are four types of moving activities done by the eagle; those are flying between perches with a percentage of 61.59%, flying from or to the ground 22.54%, walking through the perch 6.83%, and walking on the ground 9.05% (Figure 5).

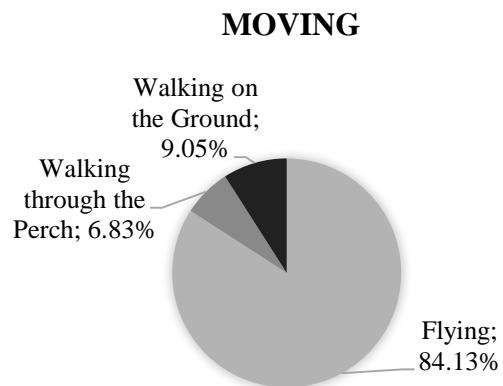


Figure 5. Percentage of moving activities in display cage

Moving activities are triggered by both internal and external stimulation such as thirst and hunger or disturbance in the surrounding environment (Takandjandji and Mite, 2008). Crested Serpent-eagle in display cages often flies from one perch to another in their active hour or when any human approaches the cage. It could be caused by its dependency on humans. Crested Serpent-eagle would come closer when humans approaches the cage, or whenever raptor keepers feed them. Eagles that have a docile nature or are dependent on humans will not avoid the presence of humans and tend to approach (Ulumiyah et al., 2018). Crested Serpent-eagle would fly from the perch to the ground when it is about to snatch the prey, when human approaches the cage, and would occasionally stay still and walk around on the ground part of the cage. Crested Serpent-eagle could not fly around inside the display cage due to its limited space. They would also jump through the perch to move from one end to another, as well as walk through the perch.

### Hunting Activities

Raptors would do hunting activities to fulfill their energy requirement. Prey activities are also very important to maintain ecosystem balance, specifically to control the population of prey animals (Rahmadiana et al., 2021). The eagles at PSSEJ are fed once a day at different times every day. Feeding at different times aims to train the eagles to get used to being in nature because there is no certainty at what time they will eat. Although eagles in display cages cannot or have very little chance of being released, this feeding treatment is the same as eagles in other rehabilitation cages. The eagle's feed requirement is 20-30% of its body weight (Utami, 2002). The feed given to an eagle is approximately 300 grams. This weight is assumed for one guinea pig, one white rat, or two mice. This type of clothing was chosen based on the characteristics of being agile so that it can help the eagle to hone its hunting skills (Zufitrianto, 2021). Giving variations is done so that the eagles do not get bored with the type of feed (Sawitri and Takandjandji, 2010).

Based on observation, there are 6 types of hunting activities done by Crested Serpent Eagle, with two dominating activities that include feeding with a percentage of 67.26% as well as tearing their prey with the percentage of 29.78%. Other observed activities include observing prey (0.15%), snatching prey (0.44%), taking prey (1.19%), and defecating (1.19%); as shown in Figure 5. Defecation is the activity of disposing of digestive waste in solid form (Sawitri and Takandjandji, 2010).

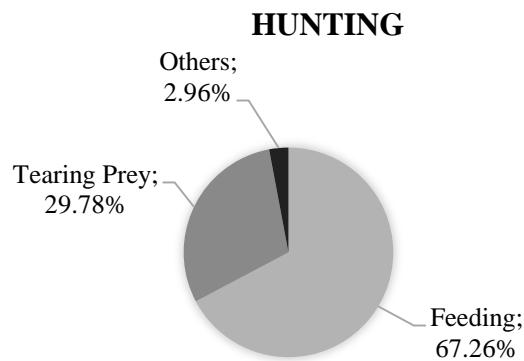


Figure 6. Percentage of hunting activities in display cage

Eagle hunting behavior consists of perching, flying to carry prey, gripping prey while perched, tearing the prey, then flying to carry prey to another location (Sitorus and Hernowo, 2017). When a raptor keeper approaches the cage, Crested Serpent-eagle would go down to the floor of the cage and approaches the hole where the feed would come in. When the keeper put the feed through the hole, Crested Serpent-eagle would immediately snatch, grip, and take the prey to a relatively safer spot on the floor. It would observe the surrounding area while making noises. When the eagle considers the area is safe, it would start to tear apart the prey and then consume it. The habit is different to eagles in their natural habitat, the crested serpent-eagle in the display cage eats its prey on the ground while the eagle in nature would always bring the prey to a perch where they would tear and consume it (Sawitri and Takandjandji, 2010). The behavior of eating prey on the ground occurs because the eagle no longer has the instinct to eat prey on the perch due to being reared by humans for too long and accustomed to being given food directly by human hands as an intermediary. According to Ayuni (2014), when eating its prey, the eagle will tear off the head of the prey to kill it and then tear the body apart. Birds of prey cannot chew their food because they do not have teeth so they will tear their prey using their beaks and claws (Sawitri and Takandjandji, 2010).

Crested Serpent-eagle would dispose of their digestive waste in the form of feces in unsettled time. Raptors commonly have short and simple intestines that would cause their digestion process to progress quickly, within a span fewer than four hours (Putry, 2011). The feeding behavior of this individual is by directly snatching its prey, but during observation time it is found one time that if the prey in the next cage is yet to be consumed and seen by this individual, the individual would observe and make a prey-snatching movement, of course, the prey will not be grabbed by the individual because it is blocked by the net.

## CONCLUSIONS

Based on the observation result, it could be concluded that the biggest percentage of the Crested Serpent-eagle's daily activity in the display cage is perching 71.6%. This percentage is similar to the percentage of eagle perching activity in nature. Crested Serpent-eagle in the display cage spent most of its time perching and its most active time is monitored at 09.00-11.00 am. The percentage of the Crested Serpent-eagle's daily activities are affected by the size of its cage and environmental conditions. Although the percentage of its activity is similar to the Crested Serpent-eagle in nature, the Crested Serpent-eagle in this research has a

very small possibility of being released into the wild because after more than one year of rehabilitation, its dependency on humans has not disappeared.

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