

Habitat and Nest Characteristics of Javan Hawk-eagle (*Nisaetus bartelsi* Stresemann 1924) in Gunung Salak 1 Resort Area of Gunung Halimun Salak National Park

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Abstract

The Javan Hawk-eagle *Nisaetus bartelsi* is a protected bird of prey endemic to Java Island and is one of Indonesia's mascot fauna. The survival of this species in nature is threatened, among others due to habitat degradation, and land use change around its habitat. This study was conducted to analyze the presence and characteristics of nests and the habitat around Javan eagle nests in the Gunung Salak 1 Resort area within the Gunung Halimun Salak National Park. The research was conducted using the Direct Observation method, with parameters namely characteristics of nest trees, and nests, as well as biotic and abiotic environments around Javan eagle nests. The results found the presence of active Javan eagle nests in the Hameurang Valley block in the Sintok area, and the Curug Cibadak block in the Loji area. The nest in Sintok was found in a beunying tree (*Ficus fistulosa*) in a natural forest, at 1,097 m above sea level. Nests in Loji were found in rasamala (*Altingia excelsa*) trees in the natural forest, at 1,347 m asl. The nest is located at the height of 15-22 m from the ground, round in shape, the nest material is epiphytic plants, branches of puspa (*Schima wallichii*), rasamala (*Altingia excelsa*), and manii (*Maesopsis eminii*). The plant around the nest with the highest INP in Sintok is the manii tree (*Maesopsis emini*), while in Loji it is the seuhang tree (*Ficus grossularioides*).

Keywords: Javan eagle, habitat, *Nisaetus bartelsi*, nest.

INTRODUCTION

Birds of prey (raptors) are generally sensitive to changes that occur around their habitat, so they become key species as well as bioindicators of healthy ecosystems (Gunawan, 2020). The Javanese eagle *Nisaetus bartelsi* is endemic to the island of Java and protected by the Indonesian government, with endangered status (IUCN, 2023) and listed in Appendix II of CITES (Lutfi, 2020).

Despite its protection, the Javan eagle's survival in its natural habitat is still threatened by extinction, among others due to habitat degradation and poaching (Ridwan, et.al., 2014). One of the areas in West Java where Javan eagles can still be found is Mount Halimun Salak National Park (Ridwan, et.al., 2014). This area plays an important role as a natural habitat for Javan eagles, but scientific information is needed on the characteristics of nests, nest trees, and habitat around Javan eagle nests in this area. The availability of Javan eagle nesting sites in natural habitats plays a very important role in the continued protection of this endemic species. Nests serve as a place to rest, shelter, and breed, which will determine the sustainability of the species in nature (Gunawan, 2016).

This study aims to analyze the characteristics of nests, nest trees, and habitats around Javan eagle *Nisaetus bartelsi* nests in the Gunung Salak 1 Resort area, within the TNGHS. The information obtained from this study is useful for the management of the TNGHS area, especially as a natural habitat for the remaining *Nisaetus bartelsi* in Java.

METHODS

Place and time of research

The research was conducted in February 2023, in the Gunung Salak Resort I area of Gunung Halimun Salak National Park (TNGHS). The observation sites represent two different ecosystems, namely the Hameurang Valley block in the Sintok Sukamantri area which is rather close to the settlement, and the Curug Cibadak block in the Loji area which is far from the settlement.

Materials and tools

The equipment used in the study included a GPS device, roller meter, telephoto lens, still camera, thermohygrometer, binoculars, lux meter, altimeter, the book "Guide to Field Survey and Monitoring of Birds of Prey" (Prawiradilaga, et.al., 2003), and the book "Five Hundred Plant Species in Gunung Halimun Salak National Park, West Java" (Priyadi, et.al., 2014). The research materials were individual Javan eagles and Javan eagle nests found in the study sites.

The determination of the observation location was based on the results of the preliminary survey, with the criteria, namely the presence of emergent trees, a height of more than 30 m, and a wide field of view to the valley (Ridwan, et.al., 2014).

Methods

The research data consisted of primary and secondary data. Primary data are data from observations and direct measurements in the field. Secondary data included information/data related to Javan eagles in the TNGHS area in previous years.

Observations used the Direct Observation method (Ridwan, et.al., 2014), by four observers simultaneously on the same object. Data collection lasted for two weeks, conducted in the morning (08.00-09.00 WIB), afternoon (11.00-12.00 WIB), and evening (14.00-15.00 WIB).

The parameters observed, and the way they were measured (Prasetyo, 2002), were as follows:

- a. Nest tree characteristics: identifying tree architecture, and nest tree species, and measuring tree height;
- b. Nest characteristics: identifying the materials, shape, and position of the nest, and measuring the height of the nest in the tree.
- c. Biotic environment around the nest: identify and analyze the vegetation around the nest.
- d. Abiotic environment around the nest: measuring light intensity, temperature, humidity, and height of the nest tree location.

Data Analysis

Data on nests and nest trees were analyzed descriptively, to provide an overview of the characteristics of Javan eagle nests and nest trees in the study area (Iskandar, et.al., 2021). Vegetation data around the nest trees were analyzed as follows (Kartawinata, 2016):

$$\text{Density (K)} = \frac{\text{number of individuals of each species}}{\text{area of the entire plot}}$$

$$\text{Relative Density (KR)} = \frac{\text{density of a species}}{\text{density of all species}}$$

$$\text{Frequency (F)} = \frac{\text{number of plots in which a species occurs}}{\text{total number of plots}}$$

$$\text{Relative Frequency (FR)} = \frac{\text{frequency of a species}}{\text{frequency of all species}}$$

$$\text{Dominance (D)} = \frac{\text{flat area}}{\text{sample plot area}}$$

$$\text{Relative Dominance (DR)} = \frac{\text{dominance of a species}}{\text{dominance of all species}}$$

$$\text{Index of Importance (INP)} = \text{FR} + \text{KR} + \text{DR}$$

RESULTS AND DISCUSSION

Characteristics of Javan eagle nest trees

This study found two active Javan eagle nests in the Gunung Salak I Resort area of TNGHS, namely in the Hameurang Valley block in the Sintok area, and in the Curug Cibadak block in the Loji area, which were placed on two different tree species (Table 1).

Table 1. Javan eagle nest trees in the study site

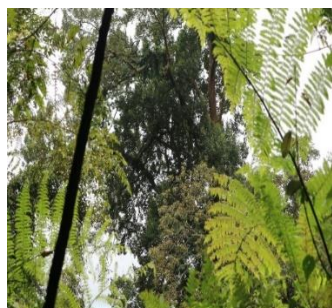
Tree Indetity	Sintok Area	Loji Area
Species	<i>Ficus fistulosa</i> (beunying)	<i>Altingia excelsa</i> (rasamala)
Number	One tree	One tree
Function	Nest-laying	Nest-laying
Position	facing an open area, on a mountain ridge with, a land slope of 65°. close to river	facing an open area, on a mountain ridge, close to the river

The beunying tree of the Javan eagle nest in the Sintok area (Figure 1) is about 20 m tall, with a trunk diameter of 50 cm, located in a valley with a slope of 65° towards open areas, and close to the river. The tree has a scarrone-type architecture with monopodial branching, terminal flowers in the crown, sympodial-type branches like a modular construction, the trunk grows tall rhythmically (Ekowati, *et.al.*, 2017).

Javan eagle nests in the Loji area were found in rasamala trees (Figure 2), which are 40 meters high, 50 cm in diameter, located in a valley with a slope of 60°, leading to an open area, and close to the river. The tree architecture is rauh type, with branches that grow rhythmically, monopodial type, and orthotropic (Ekowati, *et.al.*, 2017).



A B
Figure 1. Beunying Tree *Ficus fistulosa*: A. Tree morphology; B. architecture of *scarrone* type
(Source: Ekowati, 2017)



A B
Figure 2. Rasamala tree (*Altingia excelsa*): A. Tree morphology; B. architecture of *rauh* type
(Source: Ekowati, 2017)

Javan eagles choose the tallest of the emergent trees in a habitat as nest trees. In the Sintok area, Javan eagle nest trees are located relatively close to settlements, and where people tap rubber tree sap. The relative proximity of nest trees to settlements may be influenced by the presence of potential food sources, such as rats, chickens, pigeons, snakes, lizards, and chameleons. Despite being able to hunt prey near settlements, Javan eagle nests are placed in trees about 1.6 km from settlements, in valleys with a slope of 650 which makes the nest trees difficult to reach by humans.

In the Loji area, Javan eagle nest trees are located far from settlements. It is suspected that this is a strategy to avoid hunting, and a result of land fragmentation. The Javan eagle nesting rasamala tree in Loji has a *rauh*-type architecture, while the eagle nesting beunying tree in Sintok is *scarrone*-type (Ekowati, et.al., 2017). Both tree architectures are somewhat similar, with horizontal branching that makes it easier for eagles to place prey on the branches while clutching. Beunying and rasamala trees have shady crowns that provide shade and protection when Javan eagles feed on their prey.

Characteristics of Javan eagle nests

The nests found in Sintok and Loji are active nests still used by Javan eagles. The nests were round, located at a height of 15-22 m from the ground, and placed on the third branch of the tree (Table 2).

Table 2. Characteristics of Javan eagle nests in the study sites

Nest Characteristic	Sintok Area	Loji Area
	Hamerang Valley	Curug Cibadak
Nest status	Active	Active
Nest Shape	Circular	Circular
Nest Position	The third branch, supported by three branches	The third branch, supported by two branches
Nest Building Material	Squirrel head leaves (<i>Drynaria quercifolia</i>), rasamala (<i>Altingia excelsa</i>), puspa (<i>Schima wallichii</i>), manii (<i>Maesopsis eminii</i>)	Rabbit's foot fern leaves (<i>Davallia solida</i>), twigs, dan leaves
Height of nest from the ground	15 m	22 m

Nest Tree	<i>Ficus fistulosa</i> (beunying)	<i>Altingia excelsa</i> (rasamala)
Distance from tree to river	10 m	15 m

The Javan eagle nest in the Haeurang Valley block of the Sintok area was placed in a B stratum tree, on the third branching, supported by three branches, and at a height of 15 m from the ground. Nest building materials included epiphytic squirrel head (*Drynaria quercifolia*), branches of rasamala (*Altingia excelsa*), puspa (*Schima wallichii*), and manii (*Maesopsis eminii*) (Figure 3).



Figure 3. Javan Eagle Nest in Hameurang Valley, Sintok: A. nest position; B. nest shape (Source: TNGHS and Author's documentation, 2023)

Javan eagle nests have also previously been found in the Hameurang Valley block on the eastern slope at a slope of 650. The nest was placed in a mountain suren tree, at a height of 30 m from the ground. The nest is round, composed of the leaves of kadaka, seuseurehan, and kahejoan trees, and branches of puspa, rasamala, and manii trees. The nest is located in a stratum A tree, on the fourth branching, and supported by three branches (Wijayanti & Sukandar, 2014).

Javan eagle nests in the Curug Cibadak block in the Loji area were found in stratum A trees, on the third branching, supported by two branches, at a height of 22 m from the ground. The nest was composed of rabbit's foot fern leaves (*Davallia solida*), twigs, and leaves that could not be identified, as the nest could not be observed using binoculars (Figure 4).



Figure 4. Javan eagle nest in Loji: A. nest position; B. nest shape (Source: Author's documentation, 2023)

The two Javan eagle nests found were placed on the third branch, supported by 2-3 branches. This position is preferred by Javan eagles, presumably because the branching structure of the tree provides the strongest support for the materials that make up the nest (Gunawan, 2016). Both nests

found in the study site are still actively used by Javan eagles, as evidenced by the presence of chicks and juvenile Javan eagles around the nests. In this study, three Javan eagles were found: one adult in the Sintok area, and one adult and one juvenile in the Loji area (Figure 5). All three individuals were seen perching and flying around the nest tree.



A.



B.

Figure 5. Presence of Javan eagles at the site: A. juvenile on the nest; B. adult flying around the nest.

(source: TNGHS and author's documentation, 2023)

Javan eagles choose nest trees in relatively open areas so that they can utilize the sun's thermal energy to glide and fly. The body size of the Javanese eagle is quite large, so it needs a lot of energy to flap its wings and fly. The presence of thermal energy in the environment will help streamline the energy expended. Javanese eagles like slope areas that lead to valleys, because it makes it easier to find and hunt prey (Wijayanti, et.al., 2014).

Habitat characteristics around the nest

The Javan eagle nest in the Sintok area is located at coordinates 106°45'15.333 "E and 6°41'2.036" S, at an altitude of 1,097 m above sea level. The nest in the Loji area is located at coordinates 106°45'24.553 "E and 6°42'48.223 "S at an altitude of 1,347 m above sea level (Figure 6).

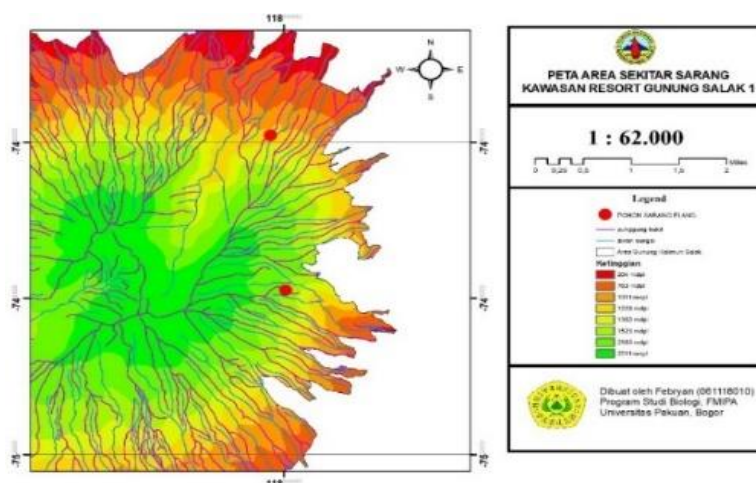


Figure 6. Location of Javan eagle nest findings in Gunung Salak Resort 1 (Source: ArcGis, 2023)

Abiotic variables measured in the vicinity of Javan eagle nests showed that air temperature and humidity in the Haurang Valley block of Sintok and the Curug Cibadak block of Loji were similar, except for light intensity. Light intensity in Sintok ranged from 460.3-905 Lux, while in Loji

it ranged from 922-1,213 Lux (Table 3). The higher light intensity in the Curug Cibadak block was influenced by differences in cover and the density of vegetation around the nest trees.

Table 3. Abiotic environmental conditions of habitats around Javan eagle nests

Time	Mean abiotic variables at the observation site					
	Temperature (°C)		Humidity (%)		Light Intensity (Lux)	
	Sintok	Loji	Sintok	Loji	Sintok	Loji
Morning	22,67	22,33	79	81	460,3	922
Day	27,33	28,33	89	88	905	1213
Afternoon	24,67	24,33	83	83	647,3	1126

Vegetation analysis around the Javan eagle nest was carried out through the calculation of the Index of Important Value (INP), to determine whether or not certain plants are dominant in a location (Wijayanti, et.al., 2014). Plants that have an INP of more than 300% mean that they are dominant around the Javan eagle nest. The results of the INP analysis show that the highest INP value in the Haeurang Sintok Valley block is owned by mani trees (*Maesopsis eminii*) (Figure 7), and seuhang trees (*Ficus grossularioides*) in the Curug Cibadak Loji block (Figure 8). Both INP values are still below 300, so they are still not categorized as dominating the habitat around the Javan eagle nest tree.

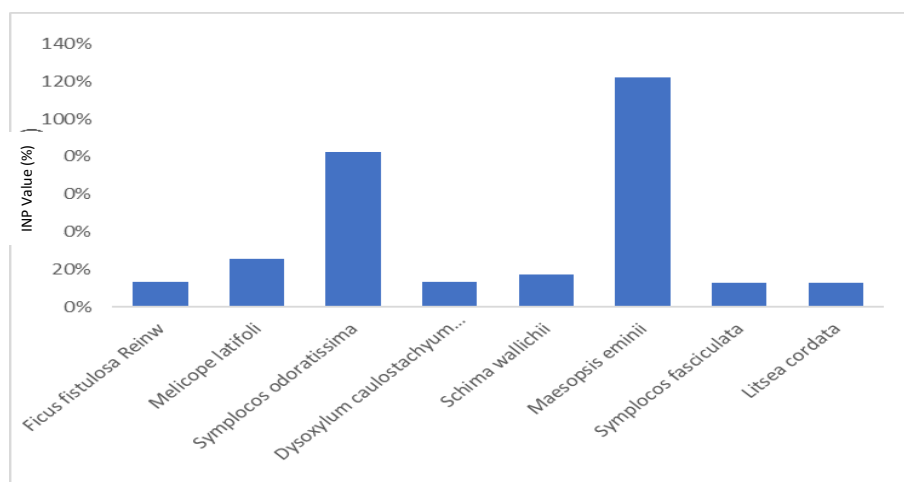


Figure 7. Results of INP of vegetation in Hameurangarea Valley, Sintok

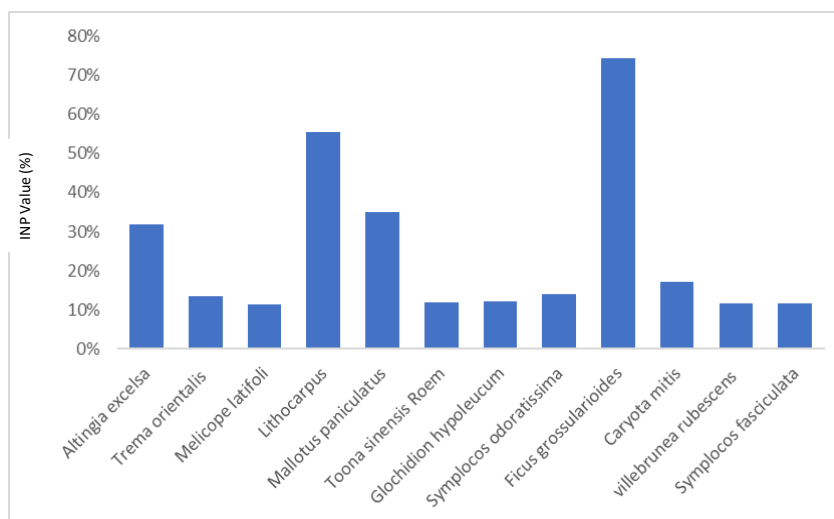


Figure 8. Results of INP of vegetation in Curug Cibadak, Loji

The diversity of vegetation around nest trees ensures the availability of potential prey for Javan eagles. The diversity of vegetation in the two research locations can support the survival of Javan eagles. This is evident from the discovery of two nests that are still actively used, as well as the presence of juvenile and adult Javan eagles in the study sites.

The provision of potential habitat for Javan eagles requires specific land types, namely located at an altitude of 1,000-1,500 m above sea level, temperatures ranging from 20-25°C, with tall emergent trees that are shady, not too densely crowned, with large horizontal branching, and near water sources. This habitat type is an ideal habitat that can fulfill the needs of Javan eagles for nesting, obtaining prey, and breeding (Aryanti, et.al., 2021). The habitat type as described is found in this research location, namely in the Hameurang Valley block in the Sintok area and the Curug Cibadak Loji block, within the TNGHS area.

CONCLUSIONS

The Gunung Salak I Resort area of TNGHS is suitable as a natural habitat for Javan eagles *Nisaetus bartelsi*, especially the Hameurang Valley block in the Sintok area, and the Curug Cibadak block in the Loji area. Both sites are located near natural forests at an altitude of 1,097-1,347 m above sea level, on slopes with a slope of 65° leading to open valleys, and with rivers. Based on these findings, it is necessary to increase efforts to protect the area, so that the availability of natural habitat for Javan eagles in this location can be sustained.

Javan eagle nests in the Sintok area were found in beunying trees (*Ficus fistulosa*), while in the Loji area nests were found in rasamala trees (*Altingia excelsa*). The nest is round, at an altitude of 15-22 m from the ground, and is composed of epiphytic plant leaves, branches of rasamala (*Altingia excelsa*), puspa (*Schima wallichii*), and manii (*Maesopsis eminii*). The vegetation around the nest consists of a variety of plants, and no particular species dominates.

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