The species diversity of avifauna in Bukit Cinta Klaten in supporting the development of birdwatching area of Gunung Gajah Village Klaten

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Abstract. The population of avifauna in the natural environment can be a potential attraction for bird watching tourism. The objective of this study were to identify avifauna that exist in each interpretation pathways in Bukit Cinta, to identify the interpretation pathways that potentially could be developed as birdwatching location, to describe the spatial and temporal distribution of avifauna species in each interpretation pathway of visitor characteristics at Bukit Cinta, especially with regard to tourist interest and making recommendations for birdwatching tourism programs at Bukit Cinta. This study used the method of Visual Encounter Survey (VES). Avifauna observation has been conducted in the tourist area of Bukit Cinta, Gunung Gajah Village, Bayat District Klaten Regency Central Java in July 2018. The avifauna diversity and distribution were analyzed descriptively into species level. The results showed that there were 12 species of avifauna found in the study sites i.e., sepah kecil (Pericrocotus cinnamomeus), elang ularbido (Spilornis cheela), avifauna madu sriganti (Cynnyris jugularis), kekeb babi (Artamus leucorynchus), walet linci (Collocalia linchi), cabe Jawa (Dicaeum trochileum), bondol Jawa (Lonchura punctulata), caladi tilik (Dendrocopos moluccensis), kutiang (Pycnonotus aurigaster), tekukur (Spilopelia chinensis), cinenen (Orthotomus sepium), dan caladi ulam (Dendrocopos macei). All species of avifauna were distributed evenly in the study site. In conclusion, the species diversity of avifauna in the study site was very high and can be a supporting biological resource in the development of avifauna ecotourism.

1. Introduction

Bukit Cinta is a tourist area located in Gunung Gajah Village, Bayat Subdistrict, Klaten Regency. This area is owned by Perhutani, which is managed by the Village and Local Youth Owned Enterprises, with the main function as tourist sites and educational activities. Administratively this area is located in Klaten Regency, Central Java Province with an area of 10 ha.

Bukit Cinta Desa Gunung Gajah has many potential objects to be developed and as the attraction for tourists, such as flora and fauna diversity, natural scenery, management systems, and agroforestry. The zero cutting policy established by Perhutani together with managing partners for forest stands in Bukit Cinta has implications for more intensive management of non-timber forest products (NTFPs) and natural tourism which are sources of income in realizing an independent management unit. Since 2013, the manager has begun to develop natural tourism activities including educational tourism.
Avifauna birdwatching as one of the tourism activities is a trip to the wild with an emphasis on human appreciation of the beauty of avifauna that lives freely in their habitat, both in the sound independence, beauty of body shape and color, and the uniqueness of its behavior [1, 2]. Several studies show that birdwatching activities can be a source of financial income for managers and communities around the area [3]. Birdwatching tourism is increasingly popular in the United States and is one of the economic activity opportunities that can be integrated with environmental conservation [4].

Bukit Cinta has many paths that can be used for interpretation channels. These lines are the main route used by visitors to reach the Bukit Cinta base camp, a tracking track made of concrete, a bicycle path, a footpath used by the Bukit Cinta management for inspecting plants and local patrols.

Data and information regarding the potential of Avifauna and the conditions of the existing interpretation pathways will be useful as a basis for the preparation of the birdwatching tour program at Bukit Cinta. Therefore, research is needed to obtain the data and information. The results of this study are expected to provide data on avifauna species and plan to develop a birdwatching program on the interpretation path in the Bukit Cinta Village of Gunung Gajah Village. The data will be useful for the Bukit Cinta management in preparing and developing birdwatching tour program.

2. Materials and methods
This research was carried out in July 2018 in the Bukit Cinta area of Gunung Gajah Village, Bayat District, Klaten Regency, Central Java. Avifauna observation was performed using a point count method in 3 points in each observation site [5]. The observations were done in the morning (06.00 WIB-08.00 WIB) and the afternoon (16.00 WIB -18.00 WIB). All observation stations were divided into three habitat types, namely bush-shrub vegetation, herbaceous-grass vegetation, and tree vegetation. The influence of vegetation type and habitat conditions on the existence and activity of Avifauna were carried out by rapid assessment method which is a modification of habitat assessment to obtain a general picture of vegetation type and habitat conditions found by avifauna. Community perceptions about the potential of avifauna observation tourism were collected through semi-structured interviews. The aim was to see the problems more openly. The interviewees were asked for their opinions and ideas [6]. Determination of respondents was performed using a snowball sampling technique. Snowball sampling is a sampling technique with the help of key informants who know the information about the avifauna in the research site.

Data were analyzed descriptively. Data from the inventory of the encounter of the number and species of avifauna were then tabulated and identified as endemic avifauna according to MacKinnon et al. [7]. Furthermore, the species of avifauna which is protected according to Government Regulation Number 7 of 1999 concerning the preservation of plant and animal species are identified as avifauna which has the potential to become a birdwatching attraction on Bukit Cinta, Gunung Gajah Village. Furthermore, the effect of vegetation type and habitat conditions in the study site on the population and activity of avifauna were determined at the three points of observation location. Data on community perceptions on the Bukit Cinta regarding birdwatching tourism were described descriptively to provide the database of avifauna species, the activities of the communities around the research location, and the support of community on birdwatching tours.

3. Result and discussion
3.1. Inventory of the existence of potential avifauna species
The results showed that avifauna species found in the Bukit Cinta area of Gunung Gajah Village, Bayat Klaten Subdistrict, were as many as 12 species. The avifauna species found in the Bukit Cinta Village of Gunung Gajah Village is presented in Table 1.

| No | Local name    | Scientific name         | Protection status | Ecological status |
|----|---------------|-------------------------|-------------------|-------------------|
| 1  | Madu sriganti | Cyniris jugularis       | Not protected     | Endemic           |
| 2  | Cabe jawa     | Dicaeum trochileum      | Not protected     | Endemic           |
Based on Table 1 it is known that all of this avifauna are endemic avifauna in Sumatra, Java, Kalimantan, and Bali [7]. Whereas according to Government Decree No. 7 Year 1999 concerning Preservation of Plant and Animal Species, only one species of avifauna included in the protected category, namely Elang ularbido (*Spilornis cheela*).

| No. | Common Name         | Scientific Name       | Status             | Endemic |
|-----|---------------------|-----------------------|--------------------|---------|
| 3   | Bondol Jawa         | *Lonchura leucogastroides* | Not protected    | Endemic |
| 4   | Sepah kecil         | *Pericrocotus cinnamomeus* | Not protected    | Endemic |
| 5   | Kekeb babi          | *Artamus leucorynchus* | Not protected    | Endemic |
| 6   | Cinenen/prenjak     | *Orthotomus sutorius* | Not protected    | Endemic |
| 7   | Tekukur             | *Streptopelia chinensis* | Not protected    | Endemic |
| 8   | Cucak kutilang      | *Pycnonotus aurigaster* | Not protected    | Endemic |
| 9   | Caladi tilik        | *Picoides moluccensis* | Not protected    | Endemic |
| 10  | Caladi ulam         | *Dendrocopus analis*  | Not protected    | Endemic |
| 11  | Walet linci         | *Collocalia linchi*   | Not protected    | Endemic |
| 12  | Elang ularbido      | *Spilornis cheela*    | Protected        | Endemic |

Avifauna madu sriganti (*Cyniris jugularis*)  
Cabe Jawa (*Dicaem trochileum*)  
Bondol Jawa (*Lonchura leucogastroides*)  
Sepah kecil (*Pericrocotus cinnamomeus*)  
Kekeb babi (*Artamus leucorynchus*)  
Cinenen (*Orthotomus sutorius*)  
Tekukur (*Streptopelia chinensis*)  
Cucak kutilang (*Pycnonotus aurigaster*)  
Caladi ulam (*Dendrocopus analis*)
Caladi tilik
(Picoides moluccensis)

Walet linci
(Collocalia linchi)

Elang ularbido
(Spilornis cheela)

**Figure 1.** Various species of avifauna found in the Bukit Cinta area of Gunung Gajah Village

There are 12 species of avifauna in the research location. The limited number of avifauna found in the research location may seem likely because of the lack of food and beverage due to the dry season. Food sources are the main thing for the existence of avifauna in their habitat [8]. During the dry season, many trees molt, the production of fruits and seeds or shrubs decreases. This condition causes some avifauna to migrate from the Bukit Cinta area to find foods to survive. Some tree vegetation, shrubs, and dried herbs found so the avifauna could not find a place to rest, shelter or breed. According to Elfidasari and Junardi [9], the abundance of avifauna in an area is caused by the ability of avifauna to create a particular niche for them to reduce competition in term of resources and various forms of adaptation to environmental conditions. The various species of avifauna that have been successfully documented in the research location can be seen in Figure 1.

Based on the field observations, Madu Sriganti (Cyniris jugularis) is more often found foraging and playing in the flower trees and shrubs. This species has small features, yellow lower body, small beak which tapered with one-time head length and olive green color in the back [10]. In the Bukit Cinta area, the female and male species were found. The male has unique characteristic; there is dark color in the throat and shiny purple when exposed to sunlight [7]. Madu Sriganti often comes to flowering plants. Based on the observations in the research location, this species often comes to brightly crowns flowers and not too small in size. The example of the plant that is visited by this avifauna is the Butterfly Flower (Bauhinia purpurea). Taufiqurrahman [11] states, the style of sucking nectar by this species is to absorb from behind the flower, through the base of the flower, and immerse the head in the center of the flower. This Avifauna also eats small insects. Avifauna Madu Sriganti is found in secondary forests and gardens in the Bukit Cinta area.

Cabe Jawa (Dicaeum trochileum) is an avifauna species found in the Bukit Cinta area. This species had very agile behavior and observed to be active with its partner. This species comes to flowering plants to get nectar and also trees that produce small fruits. This avifauna has characteristics of a small, black and bright red body. The observed male avifauna has characteristics in the head, back, stump and red or orange chest. The wings and the end of the tail are black. Female Avifauna has features, red stumps, dull brown in other parts of the body while the lower body is dull white [10]. This Avifauna is observed in locations in the vegetation of fruit shrubs and flowering trees.

In the Bukit Cinta region, there are many Bondol Jawa avifauna (Lonchura leucogastroides). This type of avifauna was observed with look for grain activity in the bush-shrub vegetation and trees. Bondol Jawa avifauna has thick triangular beak characteristics which are specific characteristics of Estrildidae family. The head, upper body until the tail is brown, but the throat until the chest is black. Clean white belly, tungging and dark stump. The tail has a rounded end and often moved up when called a partner [10]. In the Bukit Cinta area, it was found many shrubs and trees that produce grain.

Several small avifauna were observed in the Bukit Cinta area, one of them was Sepah Kecil (Pericrocotus cinnamomeus). Sepah Kecil is avifauna from the Campephagidae family of the Pericrocotus Genus. This Avifauna is a type of avifauna which eats caterpillars for butterflies, spiders, patches, other small-sized insects. Sepah Kecil has a small body about 15 cm long. The color of the
body is gray, red and black. The head and coat are gray. This type of Avifauna was observed having activities in small groups with their partners. The lower female body of avifauna is whitish, more opaque. The upper body is brownish gray, and it has a brown line, black beak, and legs. This type of avifauna found moving from high tree to another tall tree to find foods, especially in the secondary forests, gardens, and moor [12].

Kekeb Babi (*Artamus leucorynchus*) was one of the observed flying enthusiasts avifauna perched on a tall tree in the Bukit Cinta area. Kekeb Babi is a group of insectivorous avifauna in the air. This type of avifauna has characteristics. The body is rather small, the tail is short, and it has long triangular wings with a strong beak. The flight of this avifauna is very similar to kite avifauna [10]. This type of Avifauna was observed to have colony activity in the group which perched on high tree branches.

Bukit Cinta is a tourist site that is overgrown with vegetation in the form of trees and non-trees, shrubs which have flowers and produce grain. This area is an attractive habitat for avifauna Cinenen (*Orthotomus sutorius*). Cinenen with the local name Ciblek is monitored at the location, sing with a distinctive voice. At the site, this avifauna is observed to be active in pairs. Cinenen has the features of a small, gray body, rusty red head. Male Avifauna was found in locations with characteristics that have a red rusty crown, esophagus, and cheeks. White belly swept yellow. Female Avifauna has a pale red color, white chin, and throat, the back part is olive, and the side of the body is not too gray [10].

Avifauna is observed in locations that scattered randomly in places where there are large and shady trees, such as acacia, mahoni, and rarely found in shrubs and short limbs. Its presence at the Bukit Cinta area is known to have a friendly singing behavior with the partner for a long period.

Beside the avifauna that has singing voices, we found avifauna which has a beautiful voice like Tekukur (*Streptopelia chinensis*). This type of avifauna is one type that easily adaptable. This type of avifauna has characteristics, medium-sized body, slightly pinkish brown, has a long tail with white outer tail feathers. The feathers on the wings are darker than the feathers on the body and have distinctive black lines on the side of the neck with white spots [10]. This Avifauna was observed at the Bukit Cinta area in the midst of searching for food in the tree vegetation that produced grain and while sunbathing to warm its body.

Cucak Kutilang (*Pycnonotus aurigaster*) is one type of avifauna that is monitored in the Bukit Cinta area. This type of avifauna is one type that easily adaptable and found in many locations with foraging activities, such as insects and small fruits. This Avifauna belongs to the Pycnonotidae family, with the characteristic of carrying out the colony and observed for foraging activities in 10 pairs of colonies. Cucak Kutilang is an avifauna which likes to sing, both while flying together and foraging. This Avifauna has characteristics, medium-sized body, black head with a whitish stump and yellow tungging. The collar, chest, and abdomen are white. Black wings and brown tails [10].

Avifauna type Caladi Ulam (*Dendrocopus analis*) was also observed in the Bukit Cinta area. This Avifauna is a type of avifauna which rarely found. Its presence is characterized by a distinctive voice in the form of short shouts while looking for food. This Avifauna is solitary when observed while searching for food. At the Bukit Cinta area, this avifauna is currently eating insects (termites) in teak trees by extracting bark covered in termite houses. Avifauna Caladi Ulam is also called woodpecker avifauna which has a rather small body characteristic, the male avifauna has a red crown, as for the female avifauna has black color. The side of the face, malar, and collar have black color. The upper body of the avifauna is black and white, while the lower body is dark yellow with black streaks. Avifauna is observed in locations moving from tree to another tree to find termite insect houses that grew a lot on tree bark [13].

The Caladi Tilik, known as the scientific name (*Picoides moluccensis*), was also found at Bukit Cinta area. This Avifauna is species from the Picidae family of the Dendrocopos Genus. This Avifauna is a type of avifauna that eats ants, beetle, termites, and other small-sized insects. It has a small body of approximately 13 cm, black and white. The dorsal part of the head is dark brown like a hat. The upper body of the avifauna is dark brown with white spots, while the lower body is dirty white with black marks. The side of the face is white, the spots on the cheeks are gray, the black malar strips are wide — male avifauna found with the characters, the thin red line behind the eye, red line,
black upper beak, gray bottom beak, and green leg [10]. This type of woodpecker Avifauna is observed at the location has solitary or own activities, flying from tree to tree, with high and rather high in voice while flying to find food. Avifauna is looking for food by pecking at the bark of trees or dead tree materials that are used as insect nests. At the site, this avifauna is observed in the habitats of secondary forests and gardens with teak and acacia vegetation that is profoundly attached to termite nests.

Walet Linci (Collocalia linchi) is a type of flying avifauna that is found on Bukit Cinta. This type of avifauna is from the Apodidae family, from the Collocalia Genus. This Avifauna is a type of small insectivorous avifauna that acts in a colony. The detailed characteristics are the little body with approximately 9 cm in diameter, shiny black blue. It has a slightly tailed gray chin, and a striking white belly. Avifauna is observed at the location while flying in hilly areas, secondary forests, and gardens in the Bukit Cinta area. This Avifauna swoops while drinking water and grabbing prey, rarely perches and does not use echolocation [14].

Besides the singing buffs, owners of melodious voices, and flying enthusiasts, they found raptor avifauna in the air of the Bukit Cinta area namely the Ularbido Eagle which is known by its scientific name (Spilornis cheela). Ularbido Eagles are avifauna with conservation status, including from the Accipitridae family and Spilornis Genus. This type of avifauna has characteristics, medium size body approximately 50 cm long and dark in color. The wings are very wide rounded with a short tail. The upper body is gray-brown, while the lower body is brown. The abdomen, side of the body and part of the stomach are white spots. There is a large gray line in the middle of the black lines on the tail. This Avifauna has a characteristic, yellow skin without feathers between the eyes and beak. Avifauna lives in pairs, struggling and hovering over the area while making a sound. There are broad white lines on the tail and white lines on the back edge of the wing which seen while flying. The iris is yellow, and it has a gray, brown beak and yellow feet. The habitat of this type of avifauna is in the mountainous area located around the Bukit Cinta, especially around the secondary forests where there are many high acacia trees. This avifauna habitat is forest, forest edge, plantation, and sub-urban spread to an altitude of 1900 asl. This type of avifauna preys on snakes and other reptiles, frogs and small mammals [15].

3.2. Effect of vegetation type and habitat condition on avifauna's existence and activity at research sites

The influence of vegetation type and habitat conditions on the presence and activity of avifauna in the study location can be seen through the presence and activity of avifauna at the three research points, that each represents three types of vegetation and habitat conditions.

The condition of observing bush-shrub vegetation is far from human activity. This observation point has avifauna food source. Vegetation types at this observation point are shrubs and shrubs that produce small amounts of seeds and fruit.

On the other hand, the conditions at the tree observation point are some trees as shelter, rest and food sources, such as teak, acacia, mahogany, and eucalyptus. The source of food for Caladi avifauna both Caladi Tilik and Caladi Ulam is quite abundant because during the dry or wet season many teak and mahogany trees are used as a place for termite nests. Waterways found in some observation points are almost dry so that the presence of avifauna at this point is least, especially at the point of herbaceous grass. A type of avifauna usually requires specific environmental conditions and types of food [17]. Habitats that are in good condition and far from human disturbances and contain a variety of food sources, allowing for many species of avifauna [17]. At the Bukit Cinta area, the habitat that consist of tree vegetation and shrubs is the most common type of avifauna.

Observations are made by recording bird encounters and activities at each observation point. At the point of observation, the trees and shrubs type, birds more often found while foraging on the edge of the waterways, perching and playing in the vegetation, taking refuge, moving from tree to tree from shrubs to other shrubs, and flying to find food sources. According to Shahadat et al. [18], birds tend to choose a good and protected vegetation structure so that birds feel safer to move. Habitat conditions and vegetation types affect the presence and activity of birds, if the habitat conditions are damaged, the presence of birds in the study location will be reduced so that it will affect the sustainability of birdwatching tourism. According to Rohiyan [19], birds will choose habitats that have abundant
resources for their survival. Otherwise, they rarely or could not find in environments that are less profitable for them.

3.3. Perceptions of the community of gunung gajah village, bayat subdistrict, concerning birdwatching tourism at bukit cinta tourist attractions

The perception of the community of Gunung Gajah Village in Bayat Subdistrict regarding birdwatching tourism includes explaining the existence of bird species known to the community, the activities of the community around the research location, and community support for bird watching tours. Based on interviews with the Village Chief, Village Secretary, Bukit Cinta Tourism Area Manager and Visitors, information was obtained that the bird species known to the public were only common bird species, such as Madu Sriganti avifauna, Sepah Kecil, Caladi Tilik, Caladi Ulam, Linci Swallow, and Ularbido Eagle. Some of these bird species are found in many research locations as for some birds species found in the Bukit Cinta area and not yet widely known to the public, such as Madu Sriganti, Sepah Kecil, Caladi Tilik, Caladi Ulam, Walet Linci, and Ularbido Eagles. The existence of several species of birds can add new information about the survival of bird species in the Bukit Cinta research location, so it has the potential to be used as a birdwatching tour. Community activities affect bird activities at the site of the study but not too threatening the existence of birds. The manager routinely conducts education about avifauna conservation and prohibits bird hunting in the area and around the Bukit Cinta area. All samples of the community support if there is a development of birdwatching tourism in the Bukit Cinta area. The community stated that they were ready to play an active role in tourist assistance, the provision of accommodation and food under the community’s ability to succeed in birdwatching.

4. Conclusions

Bukit Cinta Tourism Area Gunung Gajah Village has six potential avifauna species as a birdwatching attraction, i.e., Sepah Kecil (Pericrocotus cinnamomeus), Ularbido Eagle (Spilornis cheela), Madu Sriganti (Cynnyris jugularis), Walet Linci (Collocalia linchi), Caladi Tilik (Dendrocopos moluccensis), and Caladi Ulam (Dendrocopos macei). The environment condition and vegetation of the Bukit Cinta Tourism Area most likely affected the survival and activity of birds but did not cause disturbances and threats yet. Tree and shrub vegetation were preferred habitat for birds in finding their foods. Hence, both plants were ideal for birdwatching location. The owner, the local government, and the community of Gunung Gajah fully support the development of birdwatching in the Bukit Cinta Tourism Area, and they are committed to the wildlife protection in those areas.

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