Analysis of The Javan Green Peafowl (*Pavo muticus muticus* Linnaeus 1758) Habitat in Baluran and Alas Purwo National Park, East Java

Jarwadi Budi Hernowo1,*, Cecep Kusmana2, Hadi Sukadi Alikodra1, Ani Mardiastuti1

1Wildlife Ecology and Management Laboratory, Department of Forest Resources Conservation and Ecotourism, Faculty of Forestry, Bogor Agricultural University, Bogor, Indonesia
2Forest Ecology laboratory, Department of Silviculture, Faculty of Forestry, Bogor Agricultural University, Bogor, Indonesia

ABSTRACT

Information of javan green peafowl habitat is commonly informate as general and only describing typical habitat used. Details information and data of the component habitat, availability and function such as (food resources, shelter, cover, drinking site, nesting site, etc), and characteristic function of habitat components at every habitat type are very important to be known how habitat component support to the javan green peafowl live Baluran and Alas Purwo national park is one of distribution javan green peafowl and it was chosen to study on the habitat analysis. The research was aimed to is to analysis and synthesis of availability, function and characteristic habitat of javan green peafowl and to describe ideal habitat for javan green peafowl. Vegetation analysis was used as method approach to obtain composition, structure of vegetation and potential food, shelter, cover and nesting site. Base on activities of the bird and combining with use of habitat component, analysis of habitat used was done. The result showed that javan green peafowl get food at open area and feed much on grasses and shrubs. Drinking site is an area where water available continuously. The characteristic of feeding site is open area which is growth by grasses and shrubs. The shelter sites were used by the birds such as trees or ground bellow trees where are closed to feeding site. Characteristic roosting site is tall trees (emergent trees), the leaves are not dense, rather open, the branches of the trees form a relatively upright angle to the stem, and not far from the trees present the open area. The green peafowl select nest places at open area which is grow by shrubs and put the eggs at the ground. The ideally habitat of the javan green peafowl composed by open area which is growing by grasses and shrubs as feeding site, places where water resources available as drinking site, tree or shaded places as sheltering and resting site, tree, forest or dense shrubs for covering/refuge site, dust places for dusting activities, open area for dancing and open area which is growing by shrubs for nested places were compound closed each other.

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1. Introduction

The javan green peafowl status is protected bird in Indonesia base on SK Mentan No 66/Kpts/Um/2/1973 dan Peraturan Pemerintah Republik Indonesia No 7 tahun 1999. According to ICBP (The International Council for Bird Preservation) has stated that the green peafowl as globally threatened bird in both population and their habitat (Collar and Andrew 1988). Meanwhile CITES has recorded in Appendix II and IUCN Red List 2016 has categorized as endangered bird.

The javan green peafowl (*Pavo muticus muticus*) has distributed at several habitat types such as; tropical low land forest, monsoon forest, savanna, and teak forest. The range of green peafowl has become patchily and locally restricted in every site of their local distribution. Nowadays, possible habitats to support these birds are forest reserves (national park, game reserve, nature reserve, and forest protected area) and teak plantation area (Hernowo 1995). The distribution of javan green peafowl only in java island and as macro landscape in Java is at fragmented, restricted and isolated habitat.

Baluran and Alas Purwo national park are as one site of javan green peafowl distribution at tip of the

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Eastern part of Java Island. Baluran national park have typically savanna and monsoon forest habitat, but Alas Purwo have habitat type more diverse like; low land tropical rain forest, grazing area, and teak plantation with intercropping (Hernowo et al. 2011). In relation with the habitat types, densities of the birds have differences. Hernowo (1999) give an example at Baluran national park that the green peafowl more abundant at habitat type of savanna-monsoon forest compared the other habitat type. Hernowo and Hernawan (2003) recorded that the green peafowl at teak forest plantation KPH Sumedang more abundant at bordered between intercropping areas with teak plantation age class IV.

Information of javan green peafowl habitat is commonly informate as general and only describing typical habitat used (Mulyana 1988; Setiawan 1994; Setiadi 1994; Hernowo 1995; van Balen et al. 1995; Brickle 2002; Rini 2005; Septania 2009; Takandjandji and Sawitri 2011). But the analyzing on detail of whole availability, characteristic and function of javan green peafowl habitat is not yet been done. Details information and data of the component habitat, availability and function such as (food resources, shelter, cover, drinking site, nesting site, etc), and characteristic function of habitat component at every habitat type are very important to be known how habitat component support to the javan green peafowl live. Focus observation on collecting data and information of availability, function and characteristic of javan green peafowl habitat component should be done exactly and analyzed properly. Result from analysis function and characteristic of habitat component will get composition and structure of ideal habitat of the javan green peafowl.

The aim of this paper is to analysis and synthesis of availability, function and characteristic habitat of javan green peafowl and to describe ideal habitat for javan green peafowl.

2. Materials and Methods

Research was conducted at Baluran and Alas Purwo national park, June 2006 until December 2007, March 2009, March 2010, April 2012, April 2013. The sample area was focused at savanna, beach forest and monsoon forest of Bekol resort in Baluran national park, and Sadengan grazing area, intercropping area and teak plantation of Rowobendo resort in Alas Purwo national park.

The sample area for analysis javan green peafowl habitat in BNP, cover an area of about 4 x 3 km (1,200 ha) which have four main type of habitat like; savanna, beach forest, evergreen forest and monsoon forest. In each type of javan green peafowl habitat was made continous transect to get composition and structure of vegetation (Figure 1). Besides that analyzed, additional observation was done at water holes, roosting site and feeding site to know function of habitat for supporting javan green peafowl live.

Analysis javan green peafowl habitat in APNP was focused at five places such as Sadengan grazing area, Rowobendo intercropping area, Guntingan intercropping area, Sumbergedang teak plantation forest, and Ngagelan teak plantation forest. That area has representative on javan green peafowl habitat in APNP (Figure 2). The sample area cover around (3 x 4 km).

Figure 1. Map of Baluran National Park (sources google earth,12/24/2015)
The green peafowl habitat was described by vegetation analyzed approach. For data analysis, quantitative value of vegetation was used to describe composition and structure vegetation at each type of habitat. It was analyzed using the important index value (IVI) method after Mueller and Ellenberg (1974) as follows:

$$IVI = RF + RD + RDo$$

where:
- **RF** = Relative Frequency
- **RD** = Relative Density
- **RDo** = Relative Dominance

Data were collected from trees, poles and sapling is: species, number, dbh (diameter at breast height) and height. Meanwhile for seedling only described: number and species. The sample plot (Transsect with number of each plot 30, size plot 20 X 20 m for tree, 10 x 10 m for poles, 5 x 5 m for sapling). The species and number of herbs, shrubs and grasses were also recorded in sample plot with size 1 x 1 m, number of plot 30 in each habitat type.

To describe feeding site, roost sites and display area used by green peafowl direct observation was done and its recorded such as: species of vegetation, number and frequencies of used and some of habitat characteristics condition. To know vegetation function at green peafowl habitat (feeding sites, roosting sites, covering sites and sheltering sites) was analyzed by percentage of habitat used or duration using at each habitat types with the formula as follow:

$$Fh = \frac{F}{TF}$$

Where:
- **Fh** = Function of green peafowl habitat like for feeding area, roosting sites, covering sites and sheltering sites base on frequency or duration,
- **F** = Frequencies green peafowl using function of habitat,
- **TF** = Total Frequencies green peafowl using function of habitat,

**Hypothesis**
- **Ho** = The green peafowl does not prefer to certain habitat,
- **H1** = The green peafowl prefer to certain habitat

$$\chi^2 = \sum \left(\frac{|O - E| - 0.5}{E}\right)^2$$

Where:
- **O** = Individual number were observed
- **E** = Individual number were expected

**Test criteria**
- **$\chi^2$ calculation > $\chi^2$ table → reject Ho**
- **$\chi^2$ calculation < $\chi^2$ table → accept Ho**

To describe characteristic of habitat component function for the green peafowl used descriptive analysis. The main parameter is especially character of habitat component such as availability, unique of habitat condition, preferable, frequently, long time and number used.

To describe habitat ideal was analyzed of uniqueness (characteristic) of each habitat component which perform in one unit habitat base on availability,
frequently, duration, and preferable than synthesis of total characteristic of habitat component (food, water, shelter, cover, roosting site, nesting site). Criteria used in habitat ideal is synthesis of habitat component, (a) Availability, (b) Function, (c) Characteristic.

3. Result

3.1. Habitat Used by the Javan Green Peafowl
The javan green peafowl in BNP used several habitat types at Bekol Resort such as savanna, monsoon forest, evergreen forest, and beach forest. But the birds abundances at each habitat types were differ. The birds were more prefer used savanna habitat type compared with the other habitat types such as monsoon forest and beach forest. That condition has indicated by individual number of the javan green peafowl much higher at savanna than individual number for other habitat type (Figure 3).

The habitat type has been used by the javan green peafowl at Rowobendo Resort APNP were lowland tropical rain forest and grazing area, intercropping area with teak plantation forest, beach forest and teak plantation forest. The bird abundances at each habitat types were differ. That condition was related with preferences of the javan green peafowl to habitat type. The habitat types were preffered by the javan green peafowl in APNP was Grazing area Sadengan which surround by low land tropical rain forest and intercropping area in teak plantation of Gunting. That condition has indicated by individual number of the javan green peafowl much higher at those habitat types (Figure 4).

Base on field observation, that the javan green peafowl in BNP and APNP used several habitat types, but concentrated (central distribution) at open area, which the area not too large (<20 ha), not far from the open area present trees as roosting site. The trees were as clumped or individual, event forest. The open area was growed by grasses and

![Figure 3](image3.jpg)

**Figure 3.** The habitat type in relation to population abundance of the javan green peafowl in BNP

![Figure 4](image4.jpg)

**Figure 4.** The habitat type in relation to population abundance of the javan green peafowl in APNP
shrubs. The habitat types which have open area, roost tree and available water resources for drink the javan green peafowl in BNP was savanna habitat type, meanwhile in APNP the habitat which have like mentioned above were Sadengan grazing area which surround by lowland tropical rain forest and intercropping area in teak plantation of Gunting.

Gradient of the javan green peafowl habitat at BNP and APNP was expressed by used of habitat component by the javan green peafowl. The javan green peafowl used open area which is growed by grasses and shrubs as feeding site, open area which is growed by shrubs was used by nesting site, forest or dense shubs area were used by the birds as covering site and shading trees or egde of forest is used as shaltering site. Clean places are used as dancing area for the male bird. Certain trees which are closed to open area used as roosting site. Available of water resources at the habitat type influenced on presented of the javan green peafowl.

### 3.2. Feeding Site at APNP and BNP

The javan green peafowl select open area which dominated by grasses at several habitat types in both national park Alas Purwo and Baluran as feeding site. In APNP, the bird frequently feed in Sadengan grazing area. Sadengan grazing area is a man made, which the former was lowland tropical rain forest (TRF), it opened and planted several grasses and the large area was approximately 60 ha. Intercropping area at resort Rowobendo APNP is one habitat types which is used by the javan green peafowl as feeding site. In intercropping area was growed by grasses and shrubs. The grass and shrubs composition was recorded from sample area in Sadengan grazing area, intercropping area, and teak plantation at Table 1.

Species grass which is dominant in Sadengan grazing area were lamuran/java grass (*Polytrias amaura*), tekirawa/coco grass (*Cyperus rotundus*) and paitan/buffalo grass (*Paspalum conjugatum*). But

| Vegetation species | Sadengan grazing area | Rowobendo intercropping area | Gunting intercropping area | Sumber gedang teak plantation | Ngagelan teak plantation |
|--------------------|-----------------------|-----------------------------|-----------------------------|-------------------------------|----------------------------|
|                    | DR  | FR  | DR  | FR  | DR  | FR  | DR  | FR  | DR  | FR  |
| *Paspalum conjugatum* | 32  | 0.63 | 12  | 0.3 | 20  | 0.5 | 8   | 0.2 | 8   | 0.2 |
| *Cyperus rotundus*   | 38  | 0.73 | 16  | 0.2 | 24  | 0.6 | 10  | 0.3 | 8   | 0.2 |
| *Ischaemum timorense*| 28  | 0.33 |     |     |     |     |     |     |     |     |
| *Axonopus compressus*| 22  | 0.46 | 8   | 0.2 | 16  | 0.2 | 9   | 0.2 | 7   | 0.2 |
| *Polytis amaura*     | 30  | 0.46 | 10  | 0.2 | 16  | 0.7 | 6   | 0.1 |     |     |
| *Brachiaria mutica*  | 22  | 0.33 | 8   | 0.2 | 14  | 0.3 | 6   | 0.1 |     |     |
| *Euleusine indica*   | 20  | 0.33 |     |     |     |     | 10  | 0.3 | 6   | 0.2 |
| *Dactyloctenium aegyptium* | 18  | 0.43 |     |     |     |     | 7   | 0.2 | 5   | 0.2 |
| *Cyonon dactylon*    | 20  | 0.36 | 10  | 0.2 | 12  | 0.3 |     |     |     |     |
| *Andropogon aciculatus* | 30  | 0.33 |     |     |     |     |     |     |     |     |
| *Echinocloa colona*  | 16  | 0.26 |     |     |     |     |     |     |     |     |
| *Panicum stagnitum*  | 8   | 0.16 |     |     |     |     |     |     |     |     |
| *Panicum crusgalli*  | 8   | 0.16 |     |     |     |     |     |     |     |     |
| *Optimenus broimaniai*| 12  | 0.23 |     |     |     |     |     |     |     |     |
| *Centrella asiatica* | 10  | 0.16 |     |     |     |     |     |     |     |     |
| *Sida acuta*         | 8   | 0.63 | 6   | 0.2 | 8   | 0.2 | 4   | 0.1 |     |     |
| *Mikania micrantha*  | 4   | 0.16 |     |     | 2   | 0.2 |     |     |     |     |
| *Ageratum conyzoide* | 18  | 0.26 | 8   | 0.3 | 10  | 0.3 | 6   | 0.1 | 4   | 0.1 |
| *Amaranthus spinosus*| 10  | 0.23 |     |     | 4   | 0.2 |     |     |     |     |
| *Phyllanthus niruri* | 18  | 0.43 | 10  | 0.3 | 12  | 0.3 |     |     |     |     |
| *Euphorbia hirta*    | 6   | 0.16 |     |     |     |     |     |     |     |     |
| *Eupathorium odoratum*| 20  | 0.36 |     |     |     |     |     |     |     |     |
| *Cassia tora*        | 30  | 0.5  |     |     |     |     |     |     |     |     |
| *Fassiflora foetida* | 12  | 0.3  |     |     |     |     |     |     |     |     |
| *Glycine max*        | 30  | 0.3  |     |     |     |     |     |     |     |     |
| *Zea mays*           | 4   | 0.3  |     |     |     |     |     |     |     |     |
| *Capsium frutescens* | 9   | 0.3  |     |     |     |     |     |     |     |     |
| *Arachis hypogea*    | 25  | 0.3  |     |     |     |     |     |     |     |     |
| *Vigna sinensis*     | 9   | 0.3  |     |     |     |     |     |     |     |     |
| *Phaseolus radiatus* | 9   | 0.3  |     |     |     |     |     |     |     |     |

Remark: DR = density relative (%), FR= frequency relative (%)

Table 1. Vegetation analysis result of food resources of the javan green peafowl at several habitat types in APNP.
shrubs species which are dominant such as enceng-enceng/ring worm plant (*Cassia tora*) and kirinyuh/siam weed (*Eupatorium odoratum*). The Grasses and Shrubs species are prefer such as lamuran/java grass (*Polytrias amaura*), paitan/buffalo grass (*Paspalum conjugatum*), sidaguri/common wireweed (*Sida acuta*), and bayeman/spiny amaranth (*Amaranthus spinosus*).

The javan green peafowl feed more concentrated in savanna Bekol BNP, most of the area composed by open area which growed by grasses and shrubs. The bird feed on grasses and shrubs, that food more available during dry season compared other habitat types. The grasses and shrubs species which are recorded at sample plot in savanna, beach forest, monsoon forest and evergreen forest habitat types (Table 2).

The javan green peafowl is Omnivorous bird, but main of the javan green peafowl food was grasses and shrubs. The birds feed on seed, fruit, flower, and the leaf of grasses and shrubs. The javan green peafowl is opportunistic bird. The bird used chance (opportunate) on abundances available of food. The availability of food in BNP and APNP were influenced by the season. In general, the food more available at rainy season compared with dry season. The kind of food which is eaten by peafowl was recorded both in APNP and BNP at Table 3.

### Table 2. Vegetation analysis result of food resources of the javan green peafowl at several habitat types in BNP

| Vegetation species | Habitat type | Savana | Beach forest | Monsoon forest | Evergreen forest |
|--------------------|--------------|--------|--------------|----------------|------------------|
|                    | D  | F    | D  | F    | D  | F    | D  | F    |
| *Abutilon cripum*  | 30 | 0.76 | 14 | 0.3  | 22 | 0.3  | 12 | 0.2  |
| *Ocmum amaricanum* | 25 | 0.46 | 12 | 0.2  | 18 | 0.3  | 9  | 0.2  |
| *Vernonia cinerea*  | 25 | 0.43 | 8  | 0.2  | 3  | 0.2  | 0  | 0.3  |
| *Barleria prionitis* | 8  | 0.2  | 10 | 0.5  | 14 | 0.4  | 8  | 0.2  |
| *Stachyrapteta jamaiicensis* | 20 | 0.76 | 10 | 0.5  | 14 | 0.4  | 8  | 0.2  |
| *Thespesia lampas*  | 18 | 0.43 | 12 | 0.3  | 10 | 0.2  | 8  | 0.2  |
| *Amaranthus spinosus* | 8  | 0.33 | 6  | 0.2  | 2  | 0.2  | 2  | 0.2  |
| *Calotropis gigantea* | 5  | 0.16 | 4  | 0.16 | 2  | 0.2  | 4  | 0.3  |
| *Capparis separia*  | 4  | 0.13 | 12 | 0.36 | 4  | 0.3  | 4  | 0.3  |
| *Ipomoea obtusia*   | 12 | 0.16 | 10 | 0.2  | 8  | 0.3  | 8  | 0.2  |
| *Phyllanthus niruri* | 17 | 0.56 | 10 | 0.2  | 8  | 0.3  | 8  | 0.3  |
| *Bauhinia angulata* | 2  | 0.2  | 2  | 0.3  | 2  | 0.4  | 2  | 0.4  |
| *Cassia mimosoides* | 3  | 0.16 | 4  | 0.2  | 4  | 0.2  | 4  | 0.2  |
| *Cassia obtusifolia* | 7  | 0.16 | 5  | 0.3  | 5  | 0.3  | 5  | 0.3  |
| *Clitoria ternatea* | 9  | 0.2  | 10 | 0.3  | 10 | 0.3  | 10 | 0.3  |
| *Flemingia lineata* | 16 | 0.36 | 14 | 0.5  | 14 | 0.5  | 14 | 0.5  |
| *Indigofera sumatrana* | 3  | 0.16 | 6  | 0.4  | 8  | 0.4  | 4  | 0.3  |
| *Sida acuta* | 14 | 0.5  | 10 | 0.3  | 10 | 0.3  | 10 | 0.3  |
| *Wisadula acidaula* | 4  | 0.16 | 4  | 0.16 | 4  | 0.16 | 4  | 0.16 |
| *Streblus asper* | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 |
| *Corypha utan* | 0.2  | 0.2  | 0.2  | 0.2  | 0.2  | 0.2  | 0.2  | 0.2  |
| *Passiflora foetida* | 6  | 0.3  | 4  | 0.3  | 4  | 0.3  | 4  | 0.3  |
| *Plumbago zeylanica* | 2  | 0.13 | 3  | 0.3  | 3  | 0.3  | 3  | 0.3  |
| *Glucosmis cochinchinensis* | 4  | 0.36 | 4  | 0.3  | 4  | 0.3  | 4  | 0.3  |
| *Zyzyphus rotundifolia* | 2  | 0.2  | 2  | 0.2  | 2  | 0.2  | 2  | 0.2  |
| *Morinda tinctoria* | 0.33 | 0.33 | 0.33 | 0.33 | 0.33 | 0.33 | 0.33 | 0.33 |
| *Azima sarmentosa* | 4  | 0.3  | 2  | 0.2  | 2  | 0.2  | 2  | 0.2  |
| *Mimosa pudica* | 11 | 0.2  | 12 | 0.3  | 12 | 0.3  | 12 | 0.3  |
| *Eleucine indica* | 15 | 0.4  | 12 | 0.3  | 12 | 0.3  | 12 | 0.3  |
| *Cynodon dactylon* | 22 | 0.4  | 12 | 0.3  | 12 | 0.3  | 12 | 0.3  |
| *Cyperus rotundus* | 32 | 0.36 | 12 | 0.2  | 12 | 0.2  | 12 | 0.2  |
| *Paspalum conjugatum* | 30 | 0.33 | 12 | 0.2  | 12 | 0.2  | 12 | 0.2  |
| *Polytrias amaura* | 42 | 0.4  | 12 | 0.2  | 12 | 0.2  | 12 | 0.2  |
| *Brachiaria mutica* | 28 | 0.3  | 12 | 0.2  | 12 | 0.2  | 12 | 0.2  |
| *Andropogon aciculatus* | 13 | 0.2  | 16 | 0.2  | 16 | 0.2  | 16 | 0.2  |
| *Optimenus bromani* | 16 | 0.16 | 16 | 0.16 | 16 | 0.16 | 16 | 0.16 |
| *Dactylolcenium aegyptium* | 14 | 0.2  | 14 | 0.2  | 14 | 0.2  | 14 | 0.2  |

**Note:** D = density (ind/m²), F = Frequency (%)
Many kind of grasses and shrubs species (36 species), Trees and palm (6 species), and horticulute plant (6 species) which are eaten by the javan green peafowl. The food variation of the javan green peafowl in BNP was quite higher than APNP (Figure 5). The most of their diets were got from open area at each habitat types in the both national park (Table 4).

Chi-square test for abundancies of food resources at several types of habitat of BNP and APNP showed that densities of grass species and shrubs which are eaten by javan green peafowl significant different, BNP ($\chi^2 = 1619.149$, $P < 0.01$) and APNP ($\chi^2 = 1744.099$, $P < 0.01$).

### 3.3. Drinking Site

Water is important factor of habitat component of the javan green peafowl living. The green peafowl come to drinking site in Sadengan APNP is man made water reservoir, or a puddle where filed up by water which distributed in the grazing area or Sadengan river. Sprinkler water as tool to distributed water for grasses, but saturated water filed up the puddle. The puddle as drinking site for the peafowl was formed from foot track of big mammal like Banteng (*Bos javanicus*) and Rusa Deer (*Cervus timorensis*). The javan green peafowl which is present at intercropping area get water from drainage and mangrove area. During the dry season water in Sadengan grazing area only available at sprinkler area and man made water reservoir, but Sadengan river was not available.

During the dry season in BNP the condition became very harsh. The rainfall is quite low nearly 7 – 8 months are dry. The water is limited and only available in certain places. At sample area, water is available in Bekol, Bama, Kelor and Manting, but in the rainy season water is available everywhere.

The frequency of the bird drink has been recorded base on observation time in APNP and BNP as recorded at Table 5.

### 3.4. Sheltering Site and Resting Area

After the temperature was approximately 28-29°C, the day became hot, the javan green peafowl used shelter site under trees, at trees or in shrubs and bushes. The trees are used by the peafowl at middle of sadengan grazing area APNP, like walikukun (*Schoutenia ovata*), laban (*Vitex sp.*), and sonokeling (*Dalbergia latifolia*). The green peafowl sheltering while take rest. Besides those trees, the bird used other trees for sheltering and resting such as apak (*Ficus infectoria*), serut (*Streptplus asper*), and Bamboo (*Bambusa sp.*) where they present at edge of sadengan grazing area. Meanwhile in BNP, the birds sheltered and rest under widoro bukol (*Zyzyphus rotundifolia*), mimba (*Azadirachta indica*), asem (*Tamarindus indica*), pilang (*Acacia leucophloea*), kesambi (*Schleicheria oleosa*), herbs and shrubs. The frequency of sheltering and resting of javan green peafowl APNP and BNP as shown at Table 6.

The green peafowl will sheltered under luxuriant trees or climbed up and stay at middle crown of trees or at shrubs and bushes. For sheltering and resting the birds will select on certain criteria such as luxuriant trees, dense shrubs and bushes also save from any disturbance during they are sheltering and resting. The peafowls will shelters during hot days (09.00 am – 14.00 pm). Chi-square test for frequently the javan green peafowl used sheltering trees at several types of habitat of BNP and APNP showed that frequencies of using sheltering trees has significant different in BNP ($\chi^2 = 681.7967$, $P < 0.01$) but for APNP do not significant ($\chi^2 = 28.86$, $P > 0.01$).

### 3.5. Covering Site (Refuge)

The javan green peafowl used forest or shrubs as covering site (refuge). Covering site have function as protected places from several disturbances which threat to the bird. Choosing places for covering (refuge) depend on kind of disturbance and availability of covering site.

Chi-square test for frequently the javan green peafowl used covering (refuge) at several types of habitat of BNP and APNP showed that frequencies of covering has significant different in both BNP and APNP, BNP ($\chi^2 = 185.4376$, $P < 0.01$), and APNP ($\chi^2 = 404.3685$, $P < 0.01$). The javan green peafowl frequency of covering in APNP and BNP as recorded at Table 7.

### 3.6. Roosting Site

Not every tree is used by the green peafowl as roosting site, and they will select on certain trees. Several trees were used by the birds as roosting site in Sadengan APNP such as Randu alas (*Bombax valetoni*), Bendo (*Artocarpus elastica*), Apak (*Ficus infectoria*), Jambu hutan (*Syzigium samaranense*), Laban (*Vitex pubescens*), and Gempol (*Nauclea siamea*). The javan green peafowl frequency using tree as roosting site in APNP as shown at Table 8.

The number of birds using a roost tree varies over the year. In one roost tree never used by 2 adult male. Between adult males have distance mechanism each other (*Hernowo et al.* 2011a). Number of female bird roost together with male also varies over the year.

Base on the trees were chosen as roosting site by the green peafowl in savanna BNP, it were recorded at table 9. Preferred trees as roosting site in BNP are Pilang and Gebang trees. The tree was selected by the bird the emergent tree with crown not so dense the leave.

The characteristic of roosting trees has similar to (*Hernowo 1995; Hernowo 1999; Hernowo et al. 2011a*) such as, (a) The trees are tall or emergent trees; (b) Close to the roosting tree present open area; (c) The branches of the trees relatively upright angle to the
Table 3. Vegetation species which are eaten by the javan green peafowl in Sadengan grazing area and intercropping of teak plantation of APNP and savanna also monsoon forest of BNP

| Species vegetation | Local name | Common name | Lifeform | Part of vegetation are eaten | Location |
|-------------------|------------|-------------|----------|-----------------------------|----------|
| Claome rutidosperma | Bohohban   | Consumption weed | Grasses  | Leaf, Flower, Seed          | APNP     |
| Paspalum conjugatum** | Pahitan    | Buffalo grass  | Grasses  | Leaf, Flower, Seed          | APNP, BNP|
| Cyperus rotundus** | Teki       | Coco grass    | Grasses  | Leaf, Flower, Seed          | APNP, BNP|
| Iscaemum timorense | Bangbangban | Lucnutu grass | Grasses  | Leaf, Flower, Seed          | APNP, BNP|
| Anxongopus compressus | Puthian    | Carpet grass  | Grasses  | Leaf, Flower, Seed          | APNP, BNP|
| Polytrias amaora | Lamuran     | Java grass    | Grasses  | Leaf, Flower, Seed          | APNP, BNP|
| Brachiatra mutica | Kolonjono   | Para grass    | Grasses  | Leaf, Flower, Seed          | APNP, BNP|
| Eucleus indicia | Lulangan    | Wire grass    | Grasses  | Leaf, Flower, Seed          | APNP, BNP|
| Dactylotlenium egyptium | Katelan   | Bahama grass  | Grasses  | Leaf, Flower, Seed          | APNP, BNP|
| Cydonon dactylon | Kerawatan   | Bermuda grass | Grasses  | Leaf, Flower, Seed          | APNP, BNP|
| Andropogon acicularis | Domdoman   | Love grass    | Grasses  | Leaf, Flower, Seed          | APNP, BNP|
| Echinochoa colona | Tuton       | Jungle rice grass | Grasses  | Leaf, Flower, Seed          | APNP, BNP|
| Panicum stagninum | Jawen       | Barnyard grass | Grasses  | Leaf, Flower, Seed          | APNP, BNP|
| Panicum crusgalli | Kremah      | Aigator weed  | Grasses  | Leaf, Flower, Seed          | APNP, BNP|
| Optinems broinani | Rayapan     | Francais grass | Grasses  | Leaf, Flower, Seed          | APNP, BNP|
| Althernanthera phyloeroxides | Pegagan   | Asian penywort | Grasses  | Leaf, Flower, Seed          | APNP, BNP|
| Centroa asiatica | Saktiet     | Kasi kambing  | Grasses  | Leaf, Flower, Seed          | APNP, BNP|
| Pseudoranthenum diversifolium | Sida acuta** | Sidaguri     | Shrubs   | Leaf, Seed                 | APNP, BNP|
| Mikania micrantha | Uwii-uwian  | Miale-a-minute weed | Shrubs   | Leaf, Flower               | APNP, BNP|
| Ageratum conyzoides | Wedusan     | Bily goat weed | Shrubs   | Flower, Seed               | APNP, BNP|
| Amarathus spinosus | Bayam duri  | Spiny amaranth | Shrubs   | Leaf, Flower, Seed          | APNP, BNP|
| Phyllanthus niruri** | Meniran     | Gale of wind  | Shrubs   | Leaf, Flower, Seed          | APNP, BNP|
| Euphorbia hirta | Patikan Kebo | Pill-bearing spurge | Shrubs   | Leaf, Flower, Seed          | APNP, BNP|
| Fassiflora foetida | Santiet     | Stinking      | Shrubs   | Leaf, Flower, Seed          | APNP, BNP|
| Euphorbium odoratum | Kirinyuh    | Passionflower | Shrubs   | Leaf, Flower               | APNP, BNP|
| Stachytateta jamicensis* | Jarong      | Blue porterweed | Shrubs   | Leaf, Flower, Seed          | APNP, BNP|
| Cassia toar | Orok-orok    | Sickle senna  | Shrubs   | Leaf, Flower, Seed          | APNP, BNP|
| Glycine max | Kedelai     | Soybean       | Horticulture | Leaf, Fruit               | APNP     |
| Zea may | Jagung      | Maize         | Horticulture | Leaf, Fruit               | APNP     |
| Capsium frutescens | Calab rawit | Red pepper    | Horticulture | Leaf, Fruit               | APNP     |
| Arachis hypogea | Kacang tanah | Pupnut       | Horticulture | Leaf, Fruit               | APNP     |
| Vigna sinensis | Kacang panjang | Black-eyed pea | Horticulture | Leaf, Fruit               | APNP     |
| Phaseolus radiatus | Kacang hijau | Green gram    | Horticulture | Leaf, Fruit               | APNP     |
| Abutilon crispum | Cemplak     | Egyptian abultion | Shrubs   | Leaf                       | BNP      |
| Ocimum amaranuum | Selasih     | American basil | Shrubs   | Leaf                       | BNP      |
| Vernonina cinerea | Nyawonan   | Purple fleabane | Shrubs   | Leaf                       | BNP      |
| Thespesia lamaps | Kapasan     | Common mallow | Shrubs   | Leaf                       | BNP      |
| Acalyphe indica | Sangkep     | Cat tail plant | Shrubs   | Leaf, Flower, Seed          | BNP      |
| Azima sarmentosa | Sokdoy     |              | Shrubs   | Leaf, Flower, Seed          | BNP      |
| Flemingia lineare** | Othok-othok | Large leaf eminia | Shrubs   | Leaf, Flower, Seed          | BNP      |
| Wisadula acidaula | Rayutan   |              | Shrubs   | Leaf, Flower, Seed          | BNP      |
| Indigofera smithantra | Tarum    | Common indigo | Shrubs   | Leaf, Flower, Seed          | BNP      |
| Barliera prionitis | Berduri banyak | Porcupine flower | Shrubs   | Leaf, Flower, Seed          | BNP      |
| Callotropis gigantea | Widuri    | Crown flower  | Shrubs   | Leaf, Flower, Seed          | BNP      |
| Jasminum junale | Melati hutan | Jasmine      | Shrubs   | Leaf, Flower, Seed          | BNP      |
| Morinda tinctoria | Mengkuduan | Indian mulberry | Tree     | Fruit                      | BNP      |
| Zzyphys rotundifolia | Bukol      | Wild jujube   | Tree     | Fruit                      | BNP      |
| Glycosmis cochinjinensis | Jerukan   | Citrus wild   | Tree     | Fruit                      | BNP      |
| Corypha utan | Gebang      | Talipot palm  | Palm     | Fruit                      | BNP      |
| Streius asper | Serut       | Tootbrush tree | Tree     | Fruit                      | BNP      |
| Ficus spp. | Beringin    | Fig           | Tree     | Fruit                      | BNP      |

**Noted * food species are prefered, ** food species most are prefered
3.7. Sunning Site

If the javan green peafowl get wet, they are sunning at place where the sun light direct to the bird. Usually the javan green peafowl is sunning at morning. The bird in BNP and APNP sunning at at tree, stamp pole or places direct with sun light. Besides sunning, the bird while is preening to make order the feathers. The duration of sunning of the javan green peafowl around 0.5–3 hour, depend on stage of wet and occurred the sun light. In general, the duration and frequency of sunning more frequent and longer done at rainy season compared dry season.

3.8. Dusting Site

The green peafowl select certain places for dusting on cram soil. Usually the places for dusting at open area which direct get sun. Usually dusting was done in morning 05.00–8.00 AM. Dusting activities held for manage the feathers and their skin from parasite. Dusting activities will be done only at dry season. The frequency of javan green peafowl dusting in APNP and BNP were recorded at Table 11.

### Table 5. The javan green peafowl were encountered drink (frequencies) in Sadengan grazing area APNP and Bekol water reservoir BNP

| Activities         | Observation time | Frequency (times) | Remark               |
|--------------------|------------------|-------------------|----------------------|
| Drinking in APNP   | Morning          | 140               | at puddle            |
|                    | Afternoon        | 40                | Man made water reservoir |
| Drinking in BNP    | Morning          | 200               | Bekol water reservoir |
|                    | Afternoon        | 180               | Bekol water reservoir |

### Table 6. The javan green peafowl were encountered sheltering and resting (frequencies) in sadengan grazing area and intercropping of teak plantation of APNP and savanna, monsoon forest of BNP

| Activities         | Observation time | Frequency (times) | Remark                        |
|--------------------|------------------|-------------------|--------------------------------|
| Sheltering and resting in APNP | 09.30-13.00 | 86               | widorobukol, mimba, pilang, asem, kesambi, herb and shrub |
| Sheltering and resting at BNP   | 09.30-14.00 | 125              | walikukun, sonokeling laban, apak, bambu, jati, mahoni, herb and shrub |
3.9. Display Area
Open areas which are relatively clean are preferred by peacocks during the mating season for dancing. Those activities for attracted the female bird. At Sadengan grazing area the peacock dance in middle of site or bellow shelter trees such as bungur (Lagerstroemia speciosa), walikukun (Schoutenia ovata) and laban (Vitex pubescens).
The frequency of javan green peafowl display in APNP and BNP were recorded at Table 12.
Besides, open areas at savanna and monsoon forest are chosen by the birds for dancing, but road Batangan – Bekol mainly at Hm 70 to HM 117 and Bekol – Bama HM 2-4, 12–21 BNP, also are preferred places for dancing. The dancing area where the adult male can gathering for dance was called Lek. The lek was found only Batangan – Bekol road of BNP. The male of the bird display in open area in APNP and BNP were shown at Figure 6.

3.10. Nesting Site
The green peafowl select area for the nest at open area which is growth by shrubs. Sunshine was direct to the eggs. The form of the nest is simple; form oval and the eggs are putted direct on the ground. The nest built with simple materials or did not contained materials. The green peafowl laid eggs varies 2–6 per nest, but mostly is 3–4 eggs. has similar to (Hernowo 1995; Hernowo 1999; Hernowo et al. 2011b).

3.11. Habitat Ideal of the Javan Green Peafowl
Ideally the javan green peafowl habitat is habitats which meets with living need of the javan green peafowl is comfort and save. Base on field observation in BNP and APNP, main diet of the javan green peafowl is kind species of grasses and shrubs. The grasses and shrubs species grow at open area which is not to large approximately 10–20 ha. If the day became hot, the javan green peafowl will sheltere under luxuriant tree or at tree or at dense shrubs which is closed to the feeding site. The javan green peafowl select certain tree for roosting site and near the tree present open area. The birds used shrubs area which sunshine get that place as nesting site. Forested area or dense shrubs used by the bird for covering site from many disturbances. The male of javan green peafowl select open area for dancing. Dusting activities done by the birds at open area which is the have dust soil. The javan green peafowl need continuously water

Table 8. The javan green peafowl roost in select trees (frequencies) in Sadengan and Intercropping area of APNP

| Trees for roost | Local name | Frequency (times) | Remark |
|----------------|------------|-------------------|--------|
| Bombax valetoni | Randu alas  | 30                | 16-19 female, 1 male |
| Vitex pubescens | Laban      | 60                | 1 male |
| Ficus elastica | Bendo      | 60                | 2-6 female |
| Nauclea siamea | Gempol     | 8                 | 2 female |
| Ficus insctoria | Apak       | 120               | 4 female |
| Syzigium samarangense | Jambu hutan | 15 | 2 Female |
| Swietenia macrophylla | Mahoni | 30 | 2 – 4 female/ tree |
| Tectona grandis | Jati       | 90                | 1 male |

Table 9. The javan green peafowl roost in select trees (frequencies) in Savanna of BNP

| Trees for roost | Local name | Frequency (times) | Remark |
|----------------|------------|-------------------|--------|
| Acacia leucophloea | Pilang     | 180               | 1 male, 4 female |
| Azedirachta indica | Mimba      | 90                | 1 male, 3 female |
| Tamarindus indica | Asem       | 40                | 1 male |
| Albizia lebekkoides | Tekik     | 25                | 1 male |
| Corypha utan | Gebang     | 120               | 1 male, 4 – 6 female |

Table 7. The javan green peafowl covering (frequencies) in APNP and BNP

| Activities          | Observation (times) | Frequency (times) | Sources of disturbance | Remark |
|---------------------|---------------------|-------------------|------------------------|--------|
| Covering in APNP    | Morning             | 60                | Peoples, bird of prey peoples | walking, running to bush or fly to perch on trees in sadengan and intercropping area |
|                     | Afternoon            | 30                |                        |        |
| Covering in BNP     | Morning             | 90                | peoples                | walking, running to bush or fly to perch on trees in savanna, monsoon forest and side road Bekol - Batangan |
|                     | Afternoon            | 60                | peoples                |        |
Table 10. Important Value Index (IVI) of trees at surround roosting site of the javan green peafowl in Sadengan APNP

| Trees species          | Local name | DR (%) | FR (%) | DoR (%) | IVI (%) |
|------------------------|------------|--------|--------|---------|---------|
| Artocarpus elastica    | Bendo      | 6.67   | 9.09   | 33.88   | 49.64   |
| Strebulus asper        | Serut      | 26.67  | 18.18  | 3.38    | 48.23   |
| Ficus infectoria       | Apak       | 26.67  | 27.27  | 10.40   | 64.34   |
| Lagerstroemia speciosa | Ketangi    | 13.33  | 18.18  | 1.91    | 33.42   |
| Dalbergia latifolia    | Sonokeling | 6.67   | 9.09   | 0.34    | 10.10   |
| Bombax valetoni        | Randu alas | 13.33  | 9.09   | 49.51   | 71.93   |
| Kleinhovia hospita     | Timongo    | 6.67   | 9.09   | 0.59    | 16.34   |

Remark: DR = Density relative, FR = Frequency relative, DoR = Dominant relative, IVI = Important value index

Table 11. The frequency of javan green peafowl dusting in APNP and BNP

| Activities          | Observation time | Frequency (times) | Remark                                      |
|---------------------|------------------|-------------------|---------------------------------------------|
| Dusting at APNP     | Morning          | 24                | Open area at sadengan and intercropping area|
| Dusting at BNP      | Morning          | 30                | Open area at savanna Bekol, side road HM 100–110 Bekol - Batangan |

Table 12. The frequency of javan green peafowl were encountered display in APNP and BNP

| Activities          | Observation time | Frequency (times) | Remark                                      |
|---------------------|------------------|-------------------|---------------------------------------------|
| Display at APNP     | Morning          | 86                | Open area, under shelter tree, at sadengan and intercropping area |
| Display at BNP      | Morning          | 116               | Open area, under shelter tree, road Batangan-Bekol Hm 70-117, Bekol-Bama Hm 2-4, Hm 12-21 |
|                     | Afternoon        | 42                | Open area, under shelter tree, at savanna, monsoon forest, road Batangan-Bekol Hm 70-117, Bekol-Bama Hm 2-4, Hm 12-21 |
|                     | Afternoon        | 54                | Open area, under shelter tree, road Batangan-Bekol Hm 70-117, Bekol-Bama Hm 2-4, Hm 12-21 |

Table 13. Ideally habitat component of the javan green peafowl

| Habitat function | Characteristic of habitat component, availability and enough |
|------------------|-------------------------------------------------------------|
| Feeding          | Kind species of grasses and shrubs in open area as gaps with minimum not less than 1 ha water (continuously) |
| Drinking         | Tree with luxuriant leave in open area or closed to open area |
| Sheltering and resting | Group of tree or forested area, or dense shrubs |
| Roosting         | Emergent tree, rare leave, or shaded leave |
| Dancing          | Open area and clean, gaps or road |
| Nesting          | Open area where the sun direct to the place, shrubs area |
| Sunning          | Open area, at the tree get direct sun |
| Dusting          | Dusting area |

resources. The habitat component for ideally habitat of the javan green peafowl as shown at Table 13.

Over all habitat gradient such as open area which is growed by grasses and shrubs for searching food (feeding site), places where water resources available (drinking site), tree or shaded places for sheltering and resting (sheltering and resting site), tree, forest or dense shrubs for covering tempat (covering site), tree for sunning (sunning site), dust places (dusting site), open area for dancing (dancing area) and open area which is growed by shrubs as nested places (nesting site) were compound (synthesis) became one site with lay out as Figure 7 with quantity and quality of habitat component are adequate become ideally habitat for javan green peafowl.

4. Discussion

4.1. Feeding Site

Characteristic of javan green peafowl feeding site is open area, which are growth by grasses and few of shrubs and be surrounded by tree. The open area is performing such as grazing area, intercropping area, savanna and forest gaps minimum large area approximately 1 ha. The javan peafowl search food on open area (Ponsena 1988; Hernowo 1995; Hernowo 1999; Hernowo and Hernawan 2003; Hernowo and
Figure 6. Male display at open area (a) Sadengan APNP (b) Bekol BNP

Sketch of the javan green peafowl ideal habitat

Figure 7. The sketch of ideally habitat of the javan green peafowl
The green peafowl slept on tree (Ponsena 1988; Hernowo 1999). According to Hernowo 1999, the green peafowl select certain tree for roosting site. The characteristic of roosting tree is tall tree (emergent tree), not dense leaft, branching system up right angle to the stem and present open area closing to roosting tree. Most preferred roosting trees at BNP were pilang and dead of gebang (Hernowo 1995; Yuniar 2006; Risnawati 2008), meanwhile at APNP preffered trees as roosting site was Apak (Hernowo and Wasono 2006; Yuniar 2006; Risnawati 2008; Hernowo 2011). Subramanian and John (2001) reported that the Indian blue peafowl (Pavo cristatus) at Reserve forest of Deer Park, Tirunelvelvi Tamil Nadu preffered roosted on tamarind (Tamarindus indicus), vagai (Albizia lebbeck), neem (Azadirachta indica), usilai (Albizia amara), and palmyra (Borrassus flabellifer) also less frequently on manjanathi (Morinda tenctoria) and velvelam (Acacia leucophloea). At Vivekananda Kendra, the bird prefer roost at coconut palm (Cocos nucifera) primarily used for roost, while tamarind, neem, mango (Mangifera indica) and umbrella thorn (Acacia planifrons) to be second choise. Even telecommunication pylons are used as roost site.
4.8. Ideally Javan Green Peafowl Habitat

The characteristic habitat of javan green peafowl is open area which is surrounded by forest. The green peafowl are searching food more at open area as feeding site. The green peafowl as omnivorous bird and ground animal feed much on leaf, seed of grasses and leaf and fruit of shrubs. They are choosing luxuriant tree or shady place for sheltering during the hot days. The birds select certain tree as tall tree or emergent tree for roosting and not for the tree there any open area. Nesting site of the bird is open area where shrubs are growing. The javan green peafowl prefer habitat such as savanna, grazing area surrounded by forest and intercropping teak forest plantation. The ideally habitat of the javan green peafowl is open area not so large which is growth by grasses and shrubs and it’s surrounded by forest and closed to water resources (continuously of the availability), occurred shelter site (luxuriant tree), cover site (forest or dense shrubs), roost site (tall trees, not so dense leaf and have up right branch system) closed to open area, present dusting places, have nest site (open area which is growth shrubs). Those habitat component combined became one.

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