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The grouping system and local distribution pattern analysis of Javan green peafowl (*Pavo muticus muticus,* Linnaeus 1758) population in Baluran and Alas Purwo National Parks, East Java, Indonesia

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Abstract. *Hernowo JB, Alikodra HS. 2018. The grouping system and local distribution pattern analysis of Javan green peafowl (Pavo muticus muticus, Linnaeus 1758) population in Baluran and Alas Purwo National Parks, East Java, Indonesia. Biodiversitas 19: 1690-1695.* The Javan green peafowl population lives in a group system. The population applies a small size group system. The distribution of the birds in Java Island is randomly fragmented and isolated in several types of habitat and each has a small number of individuals in every group. Baluran and Alas Purwo National Parks, East Java, Indonesia as part of Javan green peafowl (*Pavo muticus muticus,* Linnaeus 1758) distributions have been selected for the study on the grouping system and the analysis of local distribution. The research was aimed at obtaining data and information on the grouping system and local distribution of Javan green peafowl population in Baluran and Alas Purwo National Park. The number of individuals and groups was counted by applying a transect method and a concentration method on every type of habitat where peafowls are present. The distribution pattern data were analyzed by using a formula (Ludwig and Reynolds 1988). The results indicate that Javan green peafowl population is living in small groups (2-4 birds). There are 5 types of Javan green peafowl groups in Baluran National Park (BNP) and Alas Purwo National Park (APNP). The dominant group is adult female group consisting 3 individual members. The leader of the group is a female bird. Adult males live in solitary. The group system among Javan green peafowl populations is a strategy of the birds. Local distribution of Javan green peafowl populations in Baluran and Alas Purwo National Parks is mostly in the form of clumped dispersion.

Keywords: Alas Purwo, Baluran, group, Javan green peafowl, local distribution

INTRODUCTION

Javan green peafowls are distributed and scattered into fragmented habitats with small populations in several types of habitats (Balen et al. 1995; Hernowo 1995; Hernowo and Hernawan 2003; Hernowo and Wasono 2005). Green peafowls are present in protected areas such as sanctuary reserves, game reserves as well as national parks, and also in unprotected areas such as forest plantations or estate plantations. Alas Purwo and Baluran National Parks are two of the distribution sites of Javan green peafowls at the tip of the eastern part of Java Island. Baluran National Park has typical savanna and monsoon forest habitat, while Alas Purwo National Park has more diverse types of habitats compared to Baluran National Park (Hernowo 2017). The habitat in Alas Purwo includes low land tropical rainforests, grazing areas, and teak plantations with intercropping. Baluran has a typical monsoon climate with a long dry season. This climate is heavily influenced by the southeast wind during the period of April to October, with less precipitation. The average dry season is approximately 7-8 months each year. Meanwhile, Alas Purwo has type B rainfall according to Smith-Ferguson classifications and has annual precipitation of 1279-1554 mm per year (Hernowo 2011; Hernowo 2017). The dry season in BNP begins in May and ends in November, while in Alas Purwo it is from June to October.

Javan green peafowl populations have been experiencing high pressure posed by illegal hunting of the birds' (for their eggs, train feathers, individuals) lost habitat, as well as the conversion or destruction of their habitats. Illegal hunting has led to the extinction of local populations of Javan green peafowls in their local distribution. Balen et al. (1995) stated that during the last decade the most serious problem for Javan green peafowls is poaching, which has made the birds endangered. Habitat destruction and conversion have affected the quality and quantity of their habitats, such as the availability of food, shelter, and cover. However, the reality in the field shows that the birds still exist in their local distribution. This means that green peafowls have strategies on how to overcome the obstacles. One of their strategies is to apply the grouping system among Javan green peafowls.

Green peafowls live in a group system (Delacour 1977; Hernowo 1995). There is very limited information on the grouping system of Javan green peafowls. It is interesting to analyze the grouping system of Javan green peafowl populations namely how Javan green peafowls apply their strategies to overcome the high pressure and also their local distribution.

The paper aims at analyzing the grouping system among Javan green peafowl populations and their local distribution pattern in relation to the types of habitats.

MATERIALS AND METHODS

The observation

Research was conducted in Baluran National Park (BNP) of Situbondo and Banyuwangi districts, East Java, Indonesia from June to October 2006, in 2007, March 2009, March 2010, April 2012, April 2013 and in Alas Purwo National Park (APNP), Banyuwangi District, East Java, Indonesia, from August to December 2006, in 2007, March 2009, March 2010, April 2012, and April 2013. The study focused on the local distribution of Javan green peafowls in Baluran National Park in Bekol resorts (savanna, coastal forests, and monsoon forests) and in Alas Purwo National Park in Rowobendo resort (Sadengan grazing areas, lowland forests, mixed plantation forests with intercropping area and teak plantation forest with intercropping area and teak plantation forest) (Figure 1).

The number of Javan green peafowl groups in Baluran National Park was calculated by using the transect method and concentration count method following Hernowo (1997). The sample area covered an area of approximately 4 km x 3 km (1,200 ha). Four transects were observed at the sample area approximately 3 km length of each transect. Census was carried out in ten days for every observation time and it was conducted simultaneously every month. The census started every morning at 5.00 AM and ended at 8.00 AM. Four observers went through the transect routes. The walking speed was about one hour per km in each transect. The individual number was counted based on the number of Javan green peafowl in fixed area (1,200 ha) and direct visual contact with the birds during the census. After the census, the observers came together to make correction to avoid double counting. In addition to the census, additional observation with concentration count was conducted at water holes for the number of groupings of Javan green peafowls.

In Alas Purwo National Park (APNP), the census of Javan green peafowls was conducted by using the concentration count method. The sample area for the concentration of the birds focused on five places namely Sadengan grazing area, Rowobendo intercropping area, Gunting intercropping area, Sumber Gedang teak plantation forest, and Ngagelan teak plantation forest. Five observers recorded the number of green peafowls at the concentration area at each observation time. The census was carried out in ten days for every observation time and was conducted simultaneously every month. The census started every morning at 5 00 AM and ended at 8.00 AM.

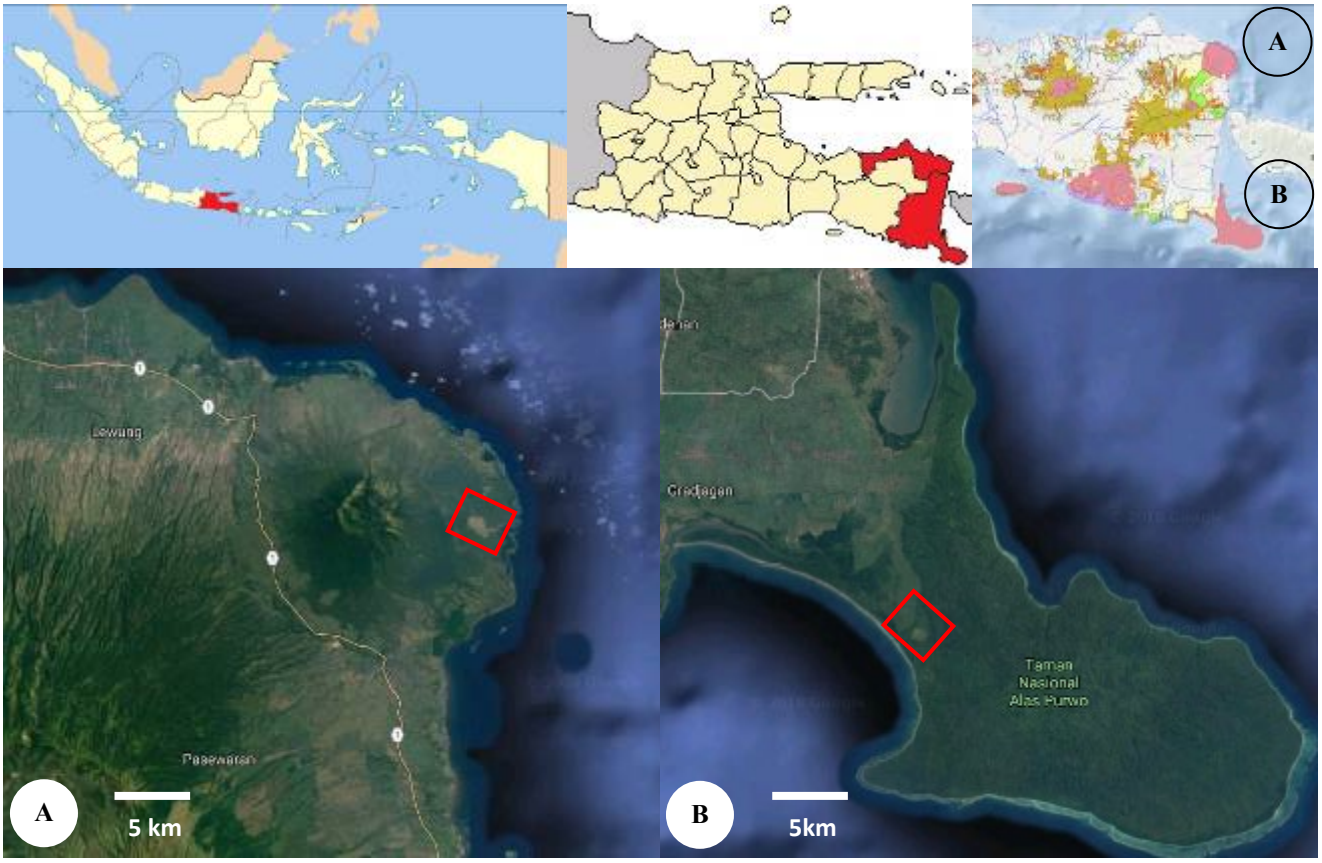

Figure 1. Study sites of Javan green peafowl (*Pavo muticus muticus,* Linnaeus 1758) population in East Java, Indonesia. A. Bekol resort of Baluran National Park, B. Rowobendo resort oft Alas Purwo National Park. Red squares indicate location of sampling plots.

Green peafowls are classified into adults, sub-adults, or young birds according to Delacour (1977) criteria. The local distribution pattern was analyzed by using the following formula (Ludwig and Reynolds 1988).

$\sigma^2 = \mu$ random distribution pattern,
$\sigma^2 > \mu$ clumped distribution pattern
$\sigma^2 < \mu$ systematic distribution pattern,

Where:
σ^2 predicted by S^2, and
μ predicted by x = average

The number of Javan green peafowls in groups in several types of habitats in BNP and APNP was tested by using *chi-square test* in order to know if the different numbers of the groups are caused by the types of habitats.

RESULTS AND DISCUSSION

Group system of the Javan green peafowl population

Based on field observation, the results show that Javan green peafowls in BNP and APNP live in groups, and the groups that were found at BNP and APNP have 5 types, not so much different from what Hernowo (1995) and Hernowo et al. (Hernowo 2011) found. The Javan green peafowl group types are as described below:

Group of Peahen and their chicks. The group consists of adult females and 1-4 chicks. Their relation is very close; they stay together when they are feeding, drinking, sheltering, roosting, and everywhere. They also come easily together with other adult females, with adult males, or with adult female groups or other groups. The leader of this group is peahen (mother). The group of Peahen and their chicks is only 3.33% of the total number of group Javan green peafowls in BNP, but in APNP it is 3.23%.

Group of adult females (Figure 2.A). The group consists of adult females of 2-5 individuals. This group can stay together with other female groups or sub adult female groups or groups of peahen and chicks or with a peacock and other groups. The leader of this group is a female. This group is 43.33% of the total number of Javan green peafowl group in BNP, but in APNP it is around 35.14%.

Group of sub-adult females (Figure 2.B). The group consists of sub-adult females of 2-4 individuals. This group could be formed from the same clutch. The group also easily relates with a peacock, or adult female groups, the group of peahen and chick or with other same groups. The leader of this group is a female. This group is 6.67% of the total number of Javan green peafowls group in BNP and APNP.

Group of sub-adult or young mixed (female and male) (Figure 2.C). The group consists of sub-adult females of 2-3 individuals and 1 sub adult male. This group might be from the same clutch. They can come together with another group, but are rather loose with adult males if a sub adult male has matured. The leader of this group is a female. Sub-adult mixed group is only 3.33% of the total number of Javan green peafowl groups in BNP, and in APNP it is 3.23%.

Solitary groups (Figure 2.D). The adult male bird (peacock) does not have a group and also a sub-adult male is frequently not living in groups. A male bird, if it has matured, will live in solitary. Solitary group is only 3.33% of the total number of Javan green peafowl groups in BNP, and in APNP it is 3.23%.

According to Hernowo (1995), Javan green peafowls in BNP live in a group system with a small number of members (2-4 individuals), except adult male birds which live in solitary (1 individual). The Javan green peafowl groups found in BNP and APNP are classified into 5 types of group systems (GAF, GSAF, GPC, MG, and SG). The dominant group found in BNP and APNP is adult female group (GAF) comprising 3 individuals. The small number of individuals in each group is supposedly related to effective and efficient managing of their group system. In relation to the management of the group system, the size of the birds' body has influenced the members of the group. Javan green peafowls belong to big size birds (Hernowo 1995). If big size birds work with a large number of individuals in a group system, they will face obstacles or difficulties in managing or controlling individuals in the group.

The abundance of the group number (%) in Javan green peafowl population is influenced by the process within the group. The female will separate from the adult female group (GAF) if individually a member of the group is ready for the mating process. The field observation shows that the Group of Peahen and Chick (GPC) will perform when an adult female has a chick. This condition is related to post-breeding process (rearing). The chick will appear at the beginning of the rainy season. Usually, GPCs in Baluran are active after November, but in Alas Purwo they are active after October. Those conditions are influenced by the rainy season. In Alas Purwo the rainy season comes earlier than in Baluran.

If GPC has enough process for developing the chick, the chick will separate from the peahen. The developing process of a chick takes a period of approximately 3-4 months. The chick will form a new group, and the group is the sub adult female group (GSAF) or the young mixed group. The group types will depend on individual members of sex found there (male or female). If all members are females, the type of the group system will be a group of sub-adult females (GSAF), but if the members of the group consisting of females and males, the group system will be young mixed (female and male) group (MG).

The leader of the group in BNP and APNP is a female bird. Hernowo (1995) found that the leader of the group in BNP is a female bird. The role of a female bird as a leader indicates that all Javan green peafowl groups are mostly dominated by female birds. The members of the group may be from the same clutch size. The female bird can easily move its group, especially when the group meets another group. If the group leader is a male bird, it will be difficult for another group. Hernowo (1995) states that the territories of Javan green peafowls are marked by a fight or expulsion. The females seem to have no territories. It is not

clear whether the males occupy territories or not, but adult males keep quite a clear distance from each other. Hernowo et al. (Hernowo 2011) explain that male Javan green peafowls may be close to each other, but the distance is around 25-75 m from each other during the mating season. Keeping a distance between adult male Javan green peafowls does not only happen during the mating season but also out of the mating season (almost a year long). Even though adult males feed together in open areas, they always keep a distance among them. When they are drinking in drinking sites, they cannot be close to one and another (not less than 3 m). It has never been found two or more adult peafowls staying together on one roosting tree. This explains why male peafowls have never become leaders in their group system.

The number of groups observed in Baluran National Park is listed in Table 1. Javan green peafowl groups recorded in several habitat types are dominated by adult female groups. The highest number of birds in BNP is in Bekol savanna habitat. The number of Javan green peafowl groups observed in APNP is also indicated in Table 1. Adult birds dominate in habitat types. However, the birds are more distributed in Sadengan grazing area and Gunting intercropping teak plantation area habitats.

The chi-square test indicates that the abundance of Javan green peafowl groups differs by habitat type (χ^2 = 29.05, $p< 0.01$) in BNP and (χ^2 = 38.92, $p< 0.01$) in APNP. This means that the number of groups is influenced by habitat types in both national parks (BNP and APNP). Chi-square test does not only indicate a significant difference by habitat type, but also by seasons (indirectly). In addition to the significant difference by habitat, the number of groups is also affected by seasons in both national parks (BNP and APNP). Such a difference in the number of groups is caused by the availability of supporting factors, especially food resources in each habitat type. There are more supporting factors in Bekol savanna in BNP and Sadengan grazing area in APNP compared to other habitat types (Hernowo 1999; Hernowo and Wasono 2006; Hernowo et al. 2011a,b). Seasons are also related to the availability of food resources. It is not directly affecting the number of groups, but directly affecting the individual number of the birds.

Figure 2.A. Adult female group, and B. Sub adult female group at Bekol water hole, Baluran National Park, East Java, Indonesia. C**.** Sub adult mixed group at Bekol waterhole, Baluran National Park, East Java, Indonesia. D. Adult male (peacock) solitary group in Sadengan, Alas Purwo National Park, East Java, Indonesia

Javan green peafowls in BNP and APNP live in small groups of individuals (2-4 birds). The dominant group is the adult female group comprising 3 individual birds. The leader of an adult female group is a female Javan green peafowl. Female birds are also leaders of sub-adult female groups, sub-adult mixed groups, peahen, and chicks or young groups of Javan green peafowls. Male Javan green peafowls are not leaders in the bird group system. The advantages of applying the group system among Javan green peafowls are (i) easy to find resources (food, shelters, covers, nest sites, rost sites, and rest sites), and (ii) easy to detect disturbances (predators and any other disturbances).

The results indicate that the number of group systems of Javan green peafowls is significantly different by habitat types in both national parks (BNP and APNP). This means that habitat type affects the number of groups present in each type of habitat. It is caused by habitat condition which supports the availability of food, shelter, cover, nesting site, and water (Hernowo 1999; Hernowo and Hernawan 2003; Hernowo and Wasono 2006).

Table 1. The number of Javan green peafowl groups observed in Baluran and Alas Purwo National Parks, East Java, Indonesia

Type of habitat	Number of Javan green peafowl groups	
	Observation I	Observation II
Baluran		
Bekol Savanna	20 (4AM1, 2GAF2, 2GAF4, 6GAF3, 1MG3, 2SAM1, 2GSAF3, 1GPC4)	17 (4AM1, 2GAF2, 2GAF4, 4GAF3, 1MG3, 2SAM1, 1GSAF2, 1GPC4)
Bama-Manting Beach Forest	3 (1AM1, 1GAF3, 1MG3)	4 (1AM1, 1GAF3, 1GAF2, 1MG3)
Bekol Monsoon Forest	3 (1AM1, 1GAF2, 1GAF3)	5 (1AM1, 2GAF3, 2GAF2)
Bekol Evergreen forest	3 (1AM1, 1GAF4, 1GAF2)	4 (1AM1, 2GAF3, 1GAF2)
Alas Purwo		
Sadengan grazing area	13 (5AM1, 1GAF4, 1GAF3, 1MG3, 2SAM1, 1SAM4, 1GPC4)	14 (5AM1, 1GAF4, 3GAF3, 1MG3, 2SAM1, 1GSAF3, 1GPC4)
Rowobendo mixed plantation and intercropping	4 (1AM1, 1GAF2, 1GAF3, 1SAM1)	6 (1AM1, 2GAF3, 2GAF2, 1SAM1)
Gunting intercropping teak plantation	16 (1AM1, 3SAM1, 2GAF4, 5GAF3, 1GAF2, 2GSAF4, 1GPC4, 1MG3)	12 (1AM1, 3SAM1, 1GAF4, 4GAF3, 1GSAF3, 1GPC4, 1MG3)
Sumber Gedang teak plantation	2 (1AM1, 1GAF2)	2 (1AM1, 1GAF2)
Ngagelan teak plantation	2 (1AM1, 1GAF2)	2 (1AM1, 1GAF2)

Note: Observation I (June-October 2006 and 2007). Observation II (March 2009, March 2010, April 2012, April 2013). AM (Adult Male) = (SG Solitary Group), GAF (Group of Adult Female), MG (Mix Group), SAM (Sub Adult Male), GSAF (Group of Sub Adult female), GPC (Group of Peahen and Chick). 1,2,3,4 values behind of group is an individual number at group. The number at front of group is the number of groups; the number behind of the group is the member's number of the group, value (21, 18, 5, 4, and 3) front of bracket is the number of groups

Table 2. The local distribution pattern of Javan green peafowls in Baluran National Park, East Java, Indonesia

Habitat type	Variance square (S2)		Average number (X)		Distribution pattern
	Observation I	Observation II	Observation I	Observation II	
Baluran					
Savanna Bekol	64.84	45.60	43.40	50.80	Clumped
Beach Forest Bama-Manting	12.84	8.72	6.80	8.50	Clumped
Monsoon Forest Bekol	6.01	10.68	5.30	10.30	Clumped
Evergreen Forest Bekol	6.40	8.46	6.20	8.30	Clumped
Alas Purwo					
Sadengan Grazing Area	25.88	31.17	30.50	25.10	Clumped
Mix Plantation Intercropping Rowobendo	6.62	12.10	6.20	11.90	Clumped
Teak Plantation Intercropping Gunting	44.77	30.01	44.10	29.70	Clumped
Teak Plantation-Back Mangrove Sumber Gedang	2.49	2.71	2.40	2.60	Clumped
Teak Plantation Ngagelan	3.21	1.96	2.90	1.80	Clumped

Note: Observation I (August-December 2006 and 2007); Observation II (March 2009, March 2010, April 2012, and April 2013)

Local distribution pattern of the Javan green peafowl populations

The local distribution pattern of Javan green peafowls, which is estimated based on the results of the census (the number of individuals) in BNP and APNP, is listed in Tables 2. The local distribution pattern of Javan green peafowls in BNP is of clumped type. The local distribution pattern of the birds in this National Park is closely related to the availability of resources in every habitat type. The birds are distributed in various habitat types in BNP, such as savanna, monsoon forests, coastal forests, and evergreen forests. In general, the local distribution of Javan green peafowls in APNP was of clumped type. Such local distribution pattern of Javan green peafowls in this National Park is closely related to the availability of resources in every habitat type. The birds are distributed in various habitat types in APNP, such as lowland tropical rainforests with grazing areas, intercropping areas, and teak plantations.

The local distribution of the Javan green peafowl population in various habitat types in BNP and APNP is of clumped type. Such clumped local distribution is probably related to the availability of food resources, water, covers, shelters, roost sites, and nesting sites. Several observers of the Javan green peafowl population in BNP stated that the distribution of the birds is concentrated in savanna and monsoon forest in BNP (Pattaratuma 1977; Hernowo 1995; Hernowo 1999; Yuniar 2007; Risnawati 2008). The local distribution of Javan green peafowls in APNP is concentrated in Sadengan grazing area and teak plantation with intercropping area (Supratman 1998; Hernowo and Wasono 2006). Meanwhile, Hernowo and Palita (2004) reported that the Javan green peafowl population has clumped the local distribution in open areas surrounded by forests or coffee and rubber plantations in Meru Betiri National Park. Hernowo and Hernawan (2003) recorded that the distribution of Javan green peafowls is concentrated in teak plantation with intercropping area in BKPH Buah Dua and Songgom KPH Sumedang. Sumbara (2006) reported that the distribution of Javan green peafowls is concentrated in open areas surrounded by pine forests, sub-mountain forests, and horticultural areas in Cikuray pine forests of BKPH Boyongbong KPH Garut.

In conclusion, the populations of Javan green peafowls live in a group system with a small number of individual members (2-4 birds). The Javan green peafowl populations in BNP and APNP have 5 group types. The dominant group is adult female birds (GAF) comprising 3 individuals. The Javan green peafowl populations are found in abundance in savanna habitat at BNP and are distributed in Sadengan grazing area and intercropping teak plantation in APNP. The local distribution of Javan green peafowls in BNP and APNP is of clumped type.

REFERENCES

Delacour J. 1977. The Pheasant of the World. 2nd ed. Spurr Publication, England.

Hernowo JB, Hernawan E. 2003. Population and Habitat Study of Javan green Peafowl (*Pavo muticus muticus* Linnaeus 1958) in Ciawitali Teak Forest Plantation of BKPH Buahdua and BKPH Songgom, KPH Sumedang. Media Konservasi 8 (3): 117-126.

Hernowo JB, Palita Y. 2004. Study on local distribution and behaviour of Javan green Peafowl (*Pavo muticus muticus* Linnaeus 1758) in Meru Betiri National Park. Media Konservasi 9 (2): 69-76.

Hernowo JB, Wasono WT. 2006. Population and Habitat of Javan green Peafowl (*Pavo muticus muticus* Linnaeus 1958) in Alas Purwo National Park. Media Konservasi 11 (3): 83-88.

Hernowo JB, Alikodra HS, Mardiastuti A, Kusmana C. 2011a. Population analysis of the Javan green peafowl (*Pavo muticus muticus Linnaeus* 1758) in Baluran and Alas Purwo National Parks, East Java. Biodiversitas 12: 99-106.

Hernowo JB, Mardiastuti A, Alikodra HS, Kusmana C. 2011b. Behavior ecology of Javan green peafowl (*Pavo muticus muticus* Linnaeus 1758) in Baluran and Alas Purwo National Parks, East Java. Hayati J Biosci 18 (4): 164-176.

Hernowo JB. 1995. Ecology and Behavior of the Green Peafowl (*Pavo muticus* Linnaeus 1766) In Baluran National Park East Java, Indonesia. [Thesis]. Faculty of Forestry Science, Georg-August-Universitat, Gottingen, Germany.

Hernowo JB. 1997. Population study of Javan green Peafowl (*Pavo muticus muticus* Linnaeus 1758) with three different methods in Baluran National Park. Media Konservasi 5 (2): 81-66.

Hernowo JB. 1999. Habitat and local distribution of Javan green Peafowl (*Pavo muticus muticus* Linnaeus 758) in Baluran National Park, East Java. Media Konservasi 6 (1): 15-22.

Hernowo JB. 2011. Ecology of Javan green Peafowl (*Pavo muticus muticus* Linnaeus 1758) in Several Habitat Types in Eastern Tip of Their Distribution in East Java, Indonesia. [Dissertation]. Forestry Science Study Program. Post Graduate School, Bogor Agricultural University. Bogor, Indonesia [Indonesian].

Hernowo JB. 2017. Determinant factors of the Javan green peafowl (*Pavo muticus muticus*) Linnaeus 1758 habitat in Baluran and Alas Purwo National Parks, East Java, Indonesia. Trop Drylands 1: 50-56.

Ludwig JA, Reynolds JF. 1988. Statistical Ecology a Primary Methods and Computing. John Wiley & Sons, Canada.

Pattaratuma A. 1977. An Ecological Study on the Green Peafowl, "Burung Merak" (*Pavo muticus* Linn.) in the Game Reserve Baluran Banyuwangi, East Java, Indonesia. Technical Paper No 2. Department of Forest Biology, Faculty of Forestry, Kasetsart University, Bangkok.

Ponsena P. 1988. Biological Characteristics and Breeding Behaviors of Green Peafowl (*Pavo muticus* Linnaeus) in Huai Kha Khaeng Wildlife Sanctuary. Thai J For 7: 303-313.

Risnawati R. 2008. Population and Habitat Analysis of Green Peafowl (*Pavo muticus* Linnaeus, 1766) at Alas Purwo and Baluran National Park, East Java. [Hon. Thesis]. Department of Forest Resources Conservation and Ecotourism, Faculty of Forestry, Bogor Agricultural University, Bogor [Indonesian].

Sumbara B. 2006. The Green Peafowl (*Pavo muticus* Linnaeus, 1766) Ecological Study in Cikuray Pinus Forest in BKPH Bayongbong, KPH Garut. West Java. [Hon. Thesis]. Department of Forest Resources Conservation and Ecotourism, Faculty of Forestry, Bogor Agricultural University, Bogor [Indonesian].

Supratman A. 1998. Study of the Distribution and Habitat Characteristic of Green Peafowls (*Pavo muticus* Linnaeus 1766) in Non Mating Season in Rowobendo Resort Alas Purwo National Park, East Java. Honor Thesis. Department of Forest Resources Conservation, Faculty of Forestry, Bogor Agricultural University, Bogor. [Indonesian]

van Balen S, Prawiradilaga DM, Indrawan M. 1995. The distribution and status of green peafowl in Java. Biol Conserv J 71: 289-297.

Yuniar A. 2007. Study on the Population and Habitat of Green Peafowl (*Pavo muticus* Linnaeus 1766), in Alas Purwo and Baluran National Parks, East Java. [Hon. Thesis]. Department of Forest Resources Conservation and Ecotourism, Faculty of Forestry, Bogor Agricultural University, Bogor [Indonesian].