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Guild Composition and Niche Overlap of Insectivorous Birds in Evergreen Rainforest

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Abstract

A guild is a group of species that have similar requirements of resource and foraging behavior. The knowledge of insectivorous guild could explain foraging patterns, niche exploitation, and competition in a tropical forest. This information could help to monitor the forest by understanding the guild composition and their response to the habitat condition. In order to describe the guild composition and niche overlap of insectivorous birds, we observed all of the individual birds found foraging in the evergreen forest, Baluran National Park. Bray-Curtis similarity index and Pianka niche overlap index were used to analyze the data and grouping the birds into a guild. The cluster analysis consists of 27 bird species revealed 4 guilds: ground gleaner, foliage gleaner, aerial sallier, and bark prober. Based on species richness, foliage gleaner dominates the other groups while bark prober had the least species richness in the evergreen forest. The scarcities of feeding substrate affect guild existence and proved that the diversity of habitat substrate could affect the diversity of guild in an area. Ten congeneric species were found in this habitat and most of them are grouped into foliage gleaner. The junglefowl has the highest niche overlap than any other congeneric species. It seemed that the more specific the foraging substrate niche, the higher the competition among sympatric species. The level of congeneric/sympatric species competition could become the indicator to monitor a specific habitat or forest by understanding their niche partitioning, especially if the species is protected by the law.

Keywords: foraging behavior, foraging substrate, competition, niche partitioning, lowland rainforest

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Introduction

In bird community, and later on in other taxa as well, the classification based on niche (e.g. the major food sources such as insectivores, frugivores, granivores, piscivores, nectarivores) is not sufficient to explain the utilization of resources and competition (Root, 1967, Simberloff & Dayan, 1991). A finer classification as the subset of the niche could be more appropriate and the classification is called guild (Root, 1967, Simberloff & Dayan, 1991). The concept of the guild was originally created by Root (1967) to explain about “a group of individual birds that exploit the same class of environmental resources in a similar way”. When the concept of the guild was applied to different groups of species in different areas, many ecological interpretations of the guild have emerged (Simberloff & Dayan, 1991). The knowledge of guilds can explain the relationship between bird community and the habitat (Verner, 1984; Sekercioglu, 2012), as it can answer many questions such as the abundance of bird species, foraging patterns and preferences, or even the niche exploitation and competition (Adamik et al., 2003; Gray et al., 2007; Tscharntke et al., 2008; Mansor & Sah, 2012).

In this paper, a guild of insectivorous birds defined as a group of species that feed on insects with similar foraging behavior and substrate used. Thus, it is expected that species of the same guild will compete stronger for food resources than species of different guilds. The higher the membership number of a guild, the higher the level of competition amongst members (Huston, 1979).

The level of competition could become the factor of birds to form alternate foraging strategy to overcome the competition and exploit the resources successfully (Rabenold, 1978; Norazlimi & Ramli, 2015). Foraging strategy can be interpreted as an activity of using a foraging behavior on a substrate to forage the food resources (Remsen & Robinson, 1990; Adamik et al., 2003). However, some insectivorous species will have similar foraging strategy preferences while exploiting resources in an area (Holmes & Robinson, 1981; Kornan, 2000). Among them, congeneric species (i.e. species belong to the same genus) usually have the highest possibility of similar foraging strategy preferences and niche overlap because of similar morphology, behavior, resource use, and most importantly closely related life histories. Niche overlap is the

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overlapping use of resources and could be used to explain the level of competition and resource partitioning amongst coexisting species (Sinclair et al., 2006; Mansor & Sah, 2012).

However, research on insectivorous bird guild in the tropical rainforest is limited compared to those of temperate forests. Therefore, the objective of this paper is to analyze the guild grouping pattern and niche overlap of insectivorous birds in a lowland evergreen tropical rainforest, in order to understand why tropical rainforests area able to hold many insectivorous birds. The hypothesis of this study is that the more diverse a habitat substrate, the more diverse the guild composition and that would affect the level of competition (indicated by the niche overlap). We also hope this paper could help the forest management issue on tropical forests since the guild concept will provide good information to birds or habitat conservation. The reason is that the guild has a role in applied ecology and management as an indicator of a specific habitat or forest (Verner, 1984). Based on the information about guild composition on a habitat or forest and their niche partitioning and overlap, it could help to understand the capability of habitat or forest to support the species, especially if the species was protected by the law.

Methods

Located in East Java (Indonesia), Baluran National Park (BNP) has diverse ecosystems ranging from mangroves to montane rainforest of an altitude variation from 0 to 1,250 m asl. The monsoon climate in BNP is unique with a longer dry season than the wet season and affects the vegetation structure in the Park. The major ecosystems in the Park are savannah and tropical deciduous forest. Among other minor ecosystems in the Park, there is a lowland evergreen forest which is not affected by the monsoon and always green throughout the year .

The lowland evergreen forest (S7°50'; E114°25'; 118.86 ha; 150–250 m asl) as the study site is located next to savannah and monsoon forest (Figure 1). This type of forest is characterized by a warm climate with an average annual temperature of 31 °C and an average annual rainfall of 900–1,600 mm (MoF, 1997). The forest structure is quite heterogeneous with a dense canopy of broad-leaves tree. The tree species is dominated by *Corypha utan*, *Streblus asper*, and *Kleinhovia hospita* while the shrub layer is composed mostly by *Eragrostis amabilis* and *Derris elliptica* (Lathifah et al., 2015). In most part of the study site, the mixed tree species created a full 5 canopy layer, ranging from 1.30 to 10.50 m high (Sastranegara, 2018).

Bird foraging behavior was collected during the dry season (July to August in 2016) with a total effective observation of 105 hours, by walking systematically in the study area in the morning from 05:00 am to noon. The observer would walk along the imaginer transect about 1 km with 100 m width toward the west side. Insectivorous birds

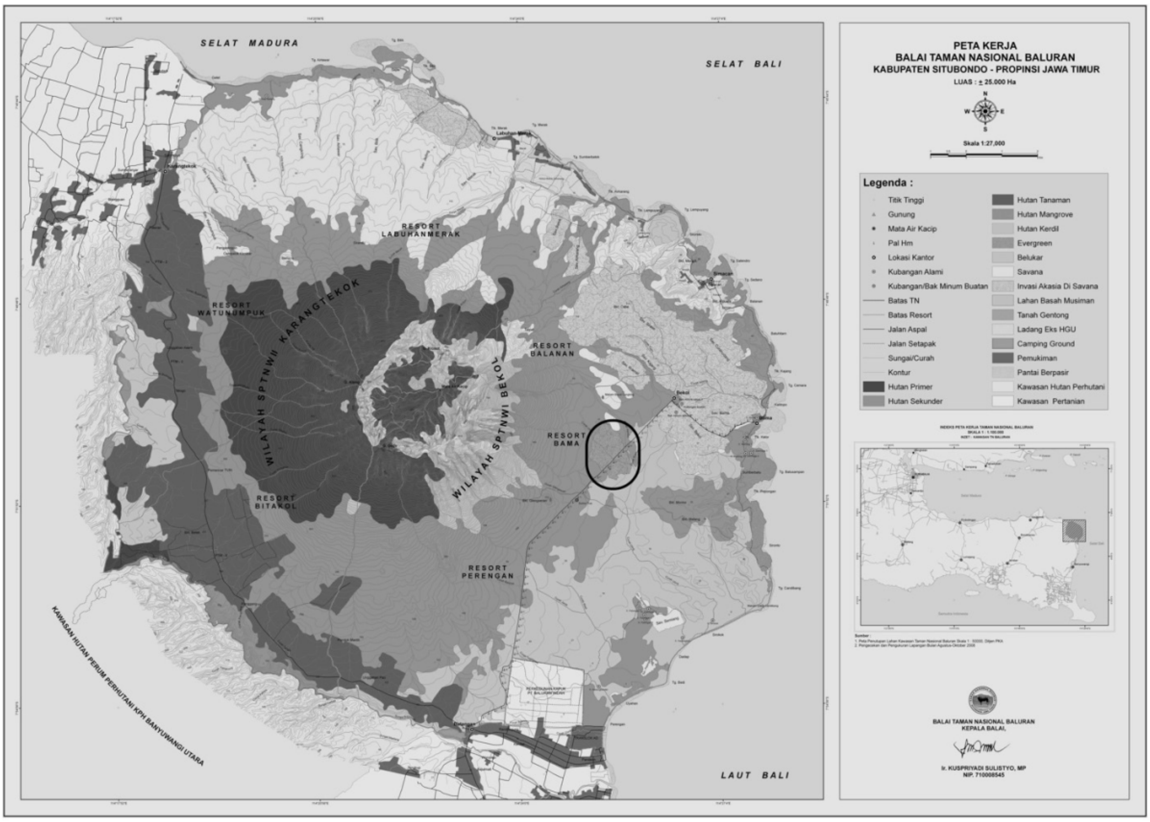


Figure 1 The location of study site (box) of lowland evergreen rainforest in Baluran National Park, West Java, Indonesia.

were recorded and observed during their attempt to capture insects by using a binocular (8×42). Each individual bird was followed to a maximum of 5 successive foraging attempts, or until it lost from sight. The individual followed was the first individual (if there were multiple birds at sight) and would be followed as long as still inside the transect. The information recorded was bird species, foraging behavior, and the substrate from which the food was taken or towards which the attack was directed.

Bird nomenclature and classification follows Sukmantoro et al. (2007) and MacKinnon et al. (2000). The foraging behavior was categorized based on Remsen and Robinson (1990) as follows: (1) glean - birds pick a stationary prey from the substrate by standing or hopping; (2) probe (peck) - a bird's bill penetrated the substrate to pick the subsurface prey; (3) sally (fly catch) - a bird makes a fluid lunge in the air or substrate to pursue a flying or stationary prey. The substrates were classified as: (4) ground, including litter and grass; (5) trunks - the main axes of trees; (6) branches-smaller secondary axes of trees; (7) twigs - small branches to which leaves attached; (8) leaves; (9) shrubs; (10) lianas; and (11) air, also followed Remsen and Robinson (1990). The principles used for grouping the birds into a guild was based on the combination of foraging behavior and habitat substrate used while the birds foraged (Holmes & Recher, 1986).

The collected data matrix consisted of bird species (rows), foraging behavior and substrates (columns) (Appendix 1). Species with less than 10 observations were excluded from further analysis to avoid bias. These excluded species were *Turnix suscitator* (n = 5), *Halcyon chloris* (n = 2), *Macronous flavicollis* (n = 5), and *Cyornis banyumas* (n = 4).

The matrix dataset was initially expressed as an actual number based on the foraging frequencies of individual species. However, due to the quite high discrepancy on the observation number (n minimum 18; n maximum 227), the data was transformed from actual number into a percentage before analyzed.

The data screening was analyzed by using a gradient analysis approach with the Non-metric Multi-Dimensional Scaling (NMDS) to produce an ordination based on a distance or dissimilarity matrix for both the actual number and percentage. Datasets which showed a better ordination was selected for the hierarchical cluster analyses. The Bray-Curtis (UPGMA) hierarchical cluster analysis was used to reveal the guild composition and similarity among species. All data analysis was carried out using PAST ver. 3.14 statistical program (Hammer et al., 2001).

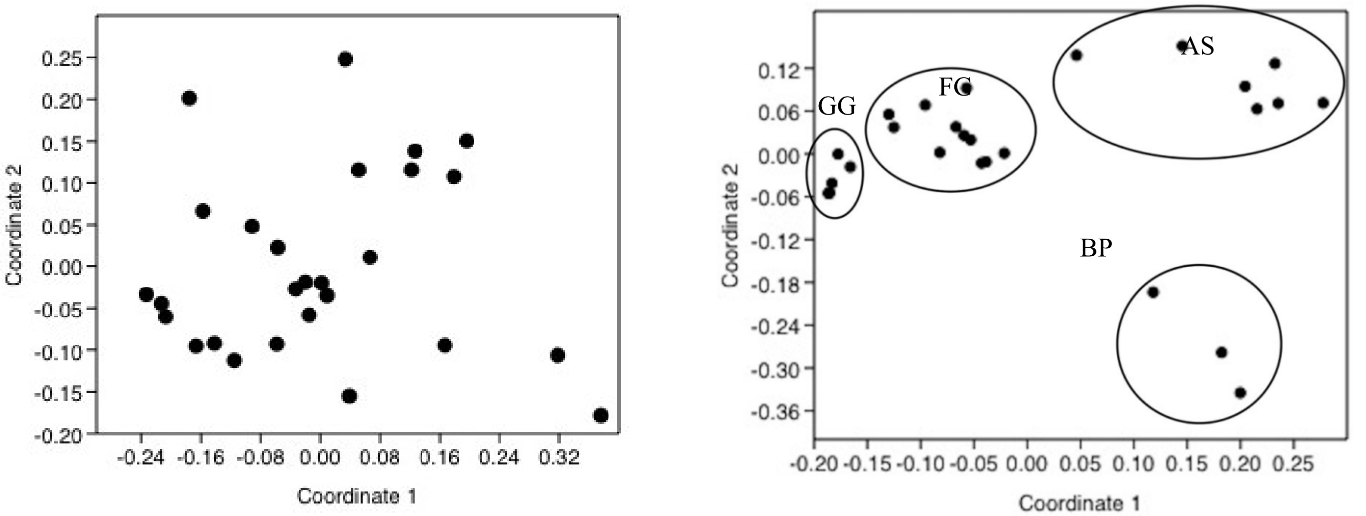
Niche overlap of sympatric congeneric species in the tropical evergreen forest was examined by using Pianka's niche overlap index (O_{jk}) as shown in Equation *[1]* (Pianka, 1973).

$$O_{jk} = \sum_i^n P_{ij} \times P_{ik} \;/\; \sqrt{\sum_i^n {P_{ij}}^2 \times {P_{ik}}^2} \qquad [1]$$

note: p_i is the frequency of occurrence of substrate item i in the diet of species j and k. The value of Pianka's niche overlap index varies from 0 (total separation) to 1 (total overlap).

Results and Discussion

There were 285 individuals of 27 insectivorous species observed during the study, giving an average individual encounter rate of 2.8 individual hour^{-1}. Data screening using NMDS showed that the data set expressed as a percentage has lower stress value than the actual number (Figure 2), indicating that data transformation into percentage was more appropriate. Therefore, the percentage of data were used for further analysis to examine the guild grouping pattern of insectivorous birds in the evergreen forest.



(a) (b)

Figure 2 Schematic of a Non-metric Multi-Dimensional Scaling plot of insectivorous birds in evergreen forest: using the data matrix that expressed as (a) actual numbers (stress value: 0.17) and (b) percentages (stress value: 0.10), which showed more distinct clusters. Notes: GG: Ground Gleaner; FG: Foliage Gleaner; AS: Aerial Sallier; BP: Bark Prober.

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Following a statistical analysis, birds can be divided into guild categories as follows: (1) foliage gleaner - bird species mainly foraging on foliage of trees or shrub layers using mainly the gleaning behavior; (2) ground gleaner - bird species that glean prey from the ground; (3) bark prober - bird species that probe or peck on tree trunks and thick branches to catch the prey, mainly using vertical foraging movement; (4) aerial sallier - bird species which usually fly catch prey in the air or various substrates.

Within the insectivores, four main guilds can be distinguished with the similarity of 0.4 (Figure 3): ground gleaner, foliage gleaner, aerial sallier, and bark prober as suggested by Holmes and Recher (1986). The similarity between guilds was quite low and indicating that there was less competition among guilds. The difference in foraging behavior and substrate used affect the similarity between guilds.

Of all species, 62.9% was ground (22.2%) and foliage gleaners (40.7%), while the others (37.0%) consisted of the aerial salliers (25.9%) and the bark probers (11.1%). The dense forest seemed to be more suited to the gleaners and made the birds safer to glean from a substrate to others. This result indirectly supported the theory that habitat structures affect the composition of a community and could become an important factor in species diversity (Ramachandran & Ganesh, 2012; Casas et al., 2016). The species who can exploit the resources successfully in a habitat will have a better opportunity to maximize the reproductive success and become more dominant than other birds that cannot exploit the resource successfully (Adamik et al., 2003).

The first guild, the ground gleaner, was mostly foraging on the ground, except for babblers (*Pellorneum capistratum* and *Malacocincla sepiarium*) who also forage on the higher substrate. These species were also found used shrubs and lianas as their feeding ground. However, this foraging pattern is not surprising since babblers usually found in places with dense understory vegetation (Imanuddin, 2009).

Phasianidae (*Pavo muticus, Gallus varius*, and *G. gallus*) had the most similar niches (1.00) among ground gleaners and even among insectivorous birds in lowland evergreen forest (Figure 3). These three birds are exclusively foraged on the ground substrate (100%) by gleaning the insect around litters and grasses. Although Phasianidae is more often called granivorous birds, the scientist also found it prey at the insect in forest ground to fulfill their protein necessity (Wong, 1986; Arshad et al., 2000; Yong et al., 2011).

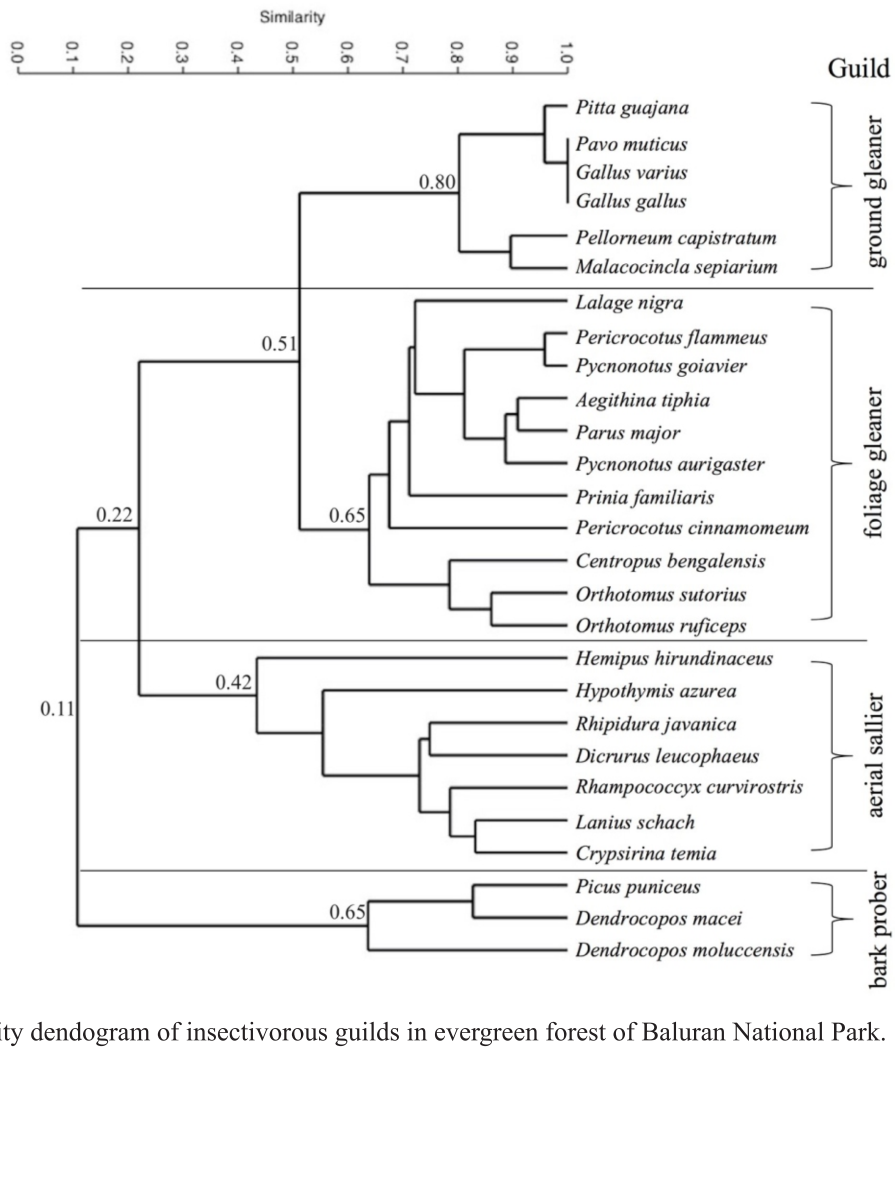

Figure 3 Community dendogram of insectivorous guilds in evergreen forest of Baluran National Park.

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Table 1 Niche overlap (O_{jk}) of insectivorous sympatric congeneric species in evergreen forest

Congeneric species	Niche overlap	Substrate [O_{jk}]
Gallus gallus *Gallus varius*	1.00	Ground (1.00)
Pericrocotus cinnamomeus *Pericrocotus flammeus*	0.58	Twig (0.31), leaf (0.02)
Pycnonotus aurigaster *Pycnonotus goiavier*	0.63	Twig (0.31), branch (0.06), leaf (0.04)
Orthotomus sutorius *Orthotomus ruficeps*	0.88	Shrub (0.36), liana (0.02), twig (0.01)
Dendrocopos macei *Dendrocopos moluccensis*	0.88	Trunk (0.28), branch (0.10)

The niche of junglefowls (*G. varius* and *G. gallus*) was totally overlapped and indicating a high competition to feed insects between these sympatric congeneric species (Table 1). This condition induces these species to create another foraging strategy to reduce the competition and exploit the resources successfully such as spatial space partition. Red junglefowl (*G. gallus*) usually forages in denser vegetation than green junglefowl (*G. varius*) in lowland evergreen forest (MacKinnon et al., 2000).

The foliage gleaners were the second guild found in lowland evergreen forest and had the highest species richness (11 species). The highest species richness than other guilds indicating that tree foliage could supply better food resources as reported by Adamik et al. (2003) on Bondi State Forest in New South Wales, Australia. *Pycnonotus goiavier* (55.2% on branches, 27.6% on twigs, and 17.2% on leaves) and *Pericrocotus flammeus* (52.0% on branches, 36.0% on twigs, and 12.0% on leaves) had the most similar niches (B = 0.96) among foliage gleaners. The high similarity between these two species indicating high competition and it proved by looking at the niche overlap that almost overlaps (O_{jk} = 0.99) especially on branch substrate (O_{jk} = 0.29).

Among foliage gleaners, six congeneric species were found sympatric in this forest which is *P. cinnamomeus* and *P. flammeus*, *P. aurigaster* and *P. goaivier*, *Orthotomus sutorius*, and *O. ruficeps* (Table 1). The two latter species were grouped into one cluster indicating higher competition than other congeneric species that not grouped into one cluster. It could be seen from *O. sutorius* and *O. ruficeps* (0.88) niche overlap value that was higher than *P. cinnamomeus* and *P. flammeus* (0.58) and *P. aurigaster* and *P. goiavier* (0.63). Moreover, the ecological similarity of congeneric species usually makes them grouped into one cluster on clustering analysis since it used similar characteristics data point (foraging pattern) for grouping the species (Shirkhorshidi et al., 2006). It means that the Orthotomus congeneric birds were more similar in foraging patterns than the Pericrocotus and Pycnonotus congeneric birds because they were not grouped into one cluster.

The third cluster was the aerial salliers and consisted of seven species namely *Hemipus hirundinaceus*, *Hypothymis azurea*, *Rhipidura javanica*, *Dicrurus leucophaeus*, *Rhampococcyx curvirostris*, *Lanius schach*, and *Crypsirina temia*. Most of the aerial salliers had specific habitat preferences, which preferably foraged in open space using mostly sally behavior (MacKinnon et al., 2000; Adamik et al., 2003). *L. schach* (21.21% on branches, 24.24% on twigs, and 21.21% on leaves) and *C. temia* (42.86% on branches, 23.81% on twigs, and 14.29% on leaves) had the most similar niche (B = 0.83) among aerial salliers and foraged mainly in foliage of trees by sallying (90.91% and 80.95%, respectively). The open space is an important area for these aerial salliers to forage and the loss of these areas would greatly affect their existence and abundance if they could not adapt to the habitat changes (MacKinnon et al., 2000; Cueto & de Casenave, 2002).

Fantail (*R. javanica*), on the other hand, could adapt to sally between branches (3.3%), twigs (15.7%), and leaves (22.3%) in lower tree foliage to catch insects (McLean, 1984). High vegetation density made limited air space for fantail to forage in the air so the fantail needs to switch the strategy and used other substrates to take the food. Therefore, fantail could exploit the resources more successfully than most aerial salliers and more generalist in terms of substrate used because no other aerial salliers were found foraging under tree foliage.

H. hirundinaceus and *H. azurea* had fallen into a different cluster with other aerial salliers where the application of foraging behavior between gleaning and sallying quite balanced (*H. hirundinaceus* 54.84% and 45.16% while *H. azurea* 30.23% and 69.77%, respectively). Both species were the most generalist in terms of foraging behavior used among aerial salliers. This situation could let these two species easily adapt to habitat resources conditions and competition by changing foraging behavior. The theory of optimal foraging also stated that when the resources were limited, the species would concentrate on their best feeding strategy to fulfill their necessity (Sinclair et al., 2006).

The last cluster consisted of bark probers, representing three species: *Picus puniceus*, *Dendrocopos macei*, and *D. moluccensis*. This guild had low species diversity at the study sites since it only consists of three species on this dense healthy tree forest. The availability of specific habitat features such as dead or decayed trees could become the factor of bark prober's low species diversity (Adamik et al., 2003). The level of interspecific competition among bark probers could also affect their diversity since the woodpeckers are quite sensitive to the habitat condition (Mikusinski, 2006).

P. puniceus and *D. macei* had the most similar niches (0.83) among bark probers. *P. puniceus* foraged only on the trunk of the trees (100%) by probing the tree bark (100%), while *D. macei* was not only foraged on trunks (65.52%) but also foraged on branches (34.48%). Meanwhile, *D. moluccensis* was found foraged on trunks (42.42%), branches (30.30%), and twigs (27.27%). The last species (the smallest of three bark probers found in this forest) was the most generalist in terms of foraging substrate used. It also seems that the smaller of woodpecker's body, the better it could exploit the resources in the dense forest since it observed foraging on the trunk that had 5 cm height from the ground and on 0.5 cm thick-branch (Mikusinski, 2006).

Bark probers also had congeneric species, *D. macei* and *D. moluccensis*, but they did not merge in the same cluster (see Figure 3). Instead, *D. macei* was in the same cluster with *P. puniceus* and had a niche overlap value higher than the bark prober congeneric species (O_{jk} = 0.885 > 0.878). Although, those niche overlap values did not differ significantly (p = 0.867) and prove that there is high competition (Pianka's index value close to 1) among bark prober species.

The results of the study showed that the availability of habitat substrate could affect the guild existence (Adamik et al., 2003). It also showed that the tree foliage could accommodate most of the birds (11 species) food necessity in evergreen forest and it proved with the highest guild members than other guilds. Therefore, this could prove the hypothesis that the more available a habitat substrate, the more diverse the species in a guild that uses the habitat substrate (Sastranegara et al., 2018). The abundance of a habitat substrate could also affect the food availability for birds, hence, affect the guild members as well (Mikusinski, 2006; Casas et al., 2016).

The response of guild members to habitat changes could be used as an indicator to monitor the forest (Verner, 1984). Moreover, the species that uses specific habitat substrate such as bark prober species has the sensitivity when the foraging substrate (tree trunk) is less available so it would be good as an indicator for forest condition (Mikusinski, 2006). The knowledge on habitat selection of such specific-species has a great impact on forest conservation planning (Verner, 1984; Mikusinski, 2006; Sinclair et al., 2006). However, using guild response on habitat condition are rarely used on forest management especially in Indonesia. Therefore, it would be great if the gaps in the knowledge about the guild in Indonesia are filled so it could help to contribute to maintaining the forest management.

Conclusion

Lowland evergreen forest under study had 27 insectivorous species and could be distinguished into four guilds consisted of ground gleaners (6 species), foliage gleaners (11 species), aerial salliers (7 species), and bark probers (3 species). Each guild had sympatric congeneric species except aerial sallier. Ground gleaner had two sympatric congeneric species (*G. varius* and *G. gallus*) with a total niche overlap (O_{jk} = 1.00). Foliage gleaner had six congeneric species which were *P. cinnamomeum* and *P. flammeus* (O_{jk} = 0.58), *P. aurigaster* and *P. goiavier* (O_{jk} = 0.63), *O. sutorius* and *O. ruficeps* (O_{jk} = 0.88). Bark prober had two congeneric species that not clustered into one group (*D. macei* and *D. moluccensis*; O_{jk} = 0.88). The guild study could be used as an indicator for forest management by understanding their niche partitioning and response to habitat changes. For example, bark prober has a specific habitat substrate to forage. These guild members usually need specific tree species or conditions to fulfill their necessity. Therefore, it could become a good indicator to help to monitor the forest.

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Appendix 1 Observation percentages of insectivorous birds of evergreen forest in Baluran National Park, East Java, Indonesia

Family	Common name	Scientific name	Foraging behavior			Substrate							
			Glean	Probe	Sally	Ground	Shrub	Liana	Trunk	Branch	Twig	Leaf	Air
Phasianidae	Red junglefowl	*Gallus gallus*	100.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Phasianidae	Green junglefowl	*Gallus varius*	100.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Phasianidae	Green peafowl	*Pavo muticus*	100.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cuculidae	Chestnut-breasted malkoha	*Rhampococcyx curvirostris*	0.0	0.0	100.0	0.0	0.0	0.0	0.0	30.3	36.4	33.3	0.0
Cuculidae	Lesser coucal	*Centropus bengalensis*	100.0	0.0	0.0	0.0	33.3	0.0	0.0	19.0	14.3	33.3	0.0
Picidae	Crimson-winged woodpecker	*Picus puniceus*	0.0	100.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
Picidae	Fulvous-breasted woodpecker	*Dendrocopos macei*	0.0	100.0	0.0	0.0	0.0	0.0	65.5	34.5	0.0	0.0	0.0
Picidae	Sunda pygmy woodpecker	*Dendrocopos moluccensis*	30.3	69.7	0.0	0.0	0.0	0.0	42.4	30.3	27.3	0.0	0.0
Pittidae	Banded pitta	*Pitta guajana*	100.0	0.0	0.0	91.5	8.5	0.0	0.0	0.0	0.0	0.0	0.0
Campephagidae	Pied triller	*Lalage nigra*	88.9	0.0	11.1	0.0	0.0	27.8	0.0	50.0	22.2	0.0	0.0
Campephagidae	Small minivet	*Pericrocotus cinnamomeus*	84.6	0.0	15.4	0.0	0.0	0.0	0.0	0.0	84.6	15.4	0.0
Campephagidae	Scarlet minivet	*Pericrocotus flammeus*	100.0	0.0	0.0	0.0	0.0	0.0	0.0	52.0	36.0	12.0	0.0
Campephagidae	Black-winged flycatcher-shrike	*Hemipus hirundinaceus*	54.8	0.0	45.2	0.0	0.0	54.8	0.0	0.0	29.0	0.0	16.1
Aegithinidae	Common iora	*Aegithina tiphia*	100.0	0.0	0.0	0.0	0.0	1.8	0.0	14.1	37.4	46.7	0.0
Pycnonotidae	Sooty-headed bulbul	*Pycnonotus aurigaster*	100.0	0.0	0.0	0.0	0.0	17.2	0.0	10.3	48.3	24.1	0.0
Pycnonotidae	Yellow-vented bulbul	*Pycnonotus goiavier*	100.0	0.0	0.0	0.0	0.0	0.0	0.0	55.2	27.6	17.2	0.0
Laniidae	Long-tailed shrike	*Lanius schach*	9.1	0.0	90.9	0.0	15.2	0.0	0.0	21.2	24.2	21.2	18.2
Timaliidae	Black-capped babbler	*Pellorneum capistratum*	100.0	0.0	0.0	65.4	19.2	15.4	0.0	0.0	0.0	0.0	0.0
Timaliidae	Horsfield's babbler	*Malacocincla sepiarium*	100.0	0.0	0.0	51.4	40.0	8.6	0.0	0.0	0.0	0.0	0.0
Sylviidae	Bar-winged pinia	*Prinia familiaris*	100.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0	50.0	0.0	0.0
Sylviidae	Common tailorbird	*Orthotomus sutorius*	100.0	0.0	0.0	0.0	64.3	17.9	0.0	0.0	17.9	0.0	0.0
Sylviidae	Ashy tailorbird	*Orthotomus ruficeps*	100.0	0.0	0.0	0.0	55.7	11.4	0.0	0.0	5.1	27.8	0.0
Monarchidae	Black-naped monarch	*Hypothymis azurea*	30.2	0.0	69.8	0.0	9.3	11.6	0.0	0.0	9.3	60.5	9.3
Rhipiduridae	Pied fantail	*Rhipidura javanica*	7.4	0.0	92.6	0.0	0.0	0.0	0.0	3.3	15.7	22.3	58.7
Paridae	Great tit	*Parus major*	100.0	0.0	0.0	0.0	0.0	0.0	0.0	23.3	46.5	30.2	0.0
Dicruridae	Ashy drongo	*Dicrurus leucophaeus*	0.0	0.0	100.0	0.0	0.0	0.0	0.0	46.2	11.5	0.0	42.3
Corvidae	Racket-tailed treepie	*Crypsirina temia*	0.0	0.0	81.0	0.0	0.0	0.0	0.0	42.9	23.8	14.3	19.0