

Bird community and it's conservation implications in Gunung Tunak

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1
Short Communication:
**Bird community and it's conservation implications in Gunung Tunak
Nature Park, Lombok, Indonesia**

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2
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6
Abstract. Hadiprayitno G, Al Idrus A, Mertha IG, Ilhamdi ML, Suana IW. 2019. Birds community and it's conservation implications in Gunung Tunak Nature Park, Lombok, Indonesia. Biodiversitas 20: 1753-1757. Bird community is an important indicator of ecosystem health. A study was conducted in Gunung Tunak Nature Park to analyze the composition of bird species and the abundance and diversity of bird species. Data were collected by survey method from May to August 2017 on three trails. The bird fauna of Gunung Tunak Nature Park consisted of 32 species belonging to 27 families and 10 orders. The order Passeriformes accounted for the dominant family and species, with an abundance of 61.6%. The species with the highest abundance is *Zosterops chloris* (13.9%), following by *Orthotomus sepium* (12.2%), and *Sreptopelia chinensis* (10.4%). While the diversity index was 3.03, indicating that the bird community in Gunung Tunak Nature Park is still well preserved. Five species are of high conservation priority based on protected by Indonesian Law, Endemicity of Wallacea, and the IUCN Red list i.e., *Megapodius reinwardt*, *Pitta elegans*, *Caloenas nicobarica*, *Lalage sueurii*, and *Dicrurus densus*.

Keywords: Abundance, bird, conservation, diversity, Gunung Tunak Nature Park

INTRODUCTION

Many ecosystems in the world – forests, waters, wetlands, mangroves, coastal, marine, and other important ecosystems – are experiencing pressure due to rapid population growth and economic development. Ecosystem changes have occurred on a very large scale in the last 10 years, due to a combination of causes such as climate change, natural resource exploitation, pollution, habitat destruction and the presence of invasive species (Leadley et al. 2014; Barnosky et al. 2012; Hughes et al. 2013). Ecosystem change also causes loss of biodiversity (Hooper et al. 2012).

Conservation efforts are needed to reduce damage and changes in ecosystems. Nature Park is an effort to protect and conserve an area that can provide a guarantee of its biodiversity of flora and fauna. Based on Law No. 5 of 1990 on the Conservation of Biological Resources and Ecosystems Republic of Indonesia, nature parks are included in nature conservation areas that require tourism activities to comply with the principles of conservation and protection of nature. Nature parks can also be used for the advancement of education and science. Biological resources that exist in these areas should be sustainably used (Ministry of Forestry Republic of Indonesia, 2013).

Gunung Tunak Nature Park has been inaugurated since 1996. It is one of the nature parks in Lombok, Indonesia that has an important role in protecting biodiversity in the area of Gunung Tunak. However, the legalization of this

area is not followed by inventory and monitoring of biodiversity, especially the bird community. Bird community is essential in monitoring both habitat and biodiversity changes (Andrén 1994; Palmer et al. 2008). Due to sensitivity to environmental changes, bird communities can be used to evaluate trends and environmental changes (Lindenmayer et al. 2000; Liu et al. 2004; Keis et al. 2012). In addition, bird diversity can be a very important estimator for ecological conditions (Larsen et al. 2011). In addition to very important ecological value, the aesthetic values of birds (the beauty of feather color, sound, and behavior) are important to support the activities of ecotourism in ecotourism area (Tripathi et al. 2015) likewise in Gunung Tunak Nature Park.

Currently, there is no scientific information about the bird community in Gunung Tunak Nature Park. Scientific information is an indicator of the effectiveness of long-term conservation efforts. The effectiveness of conservation is often measured by species diversity, with a current focus on changing aspects of diversity such as functional, genetic, and phylogenetic traits that have capacity to disclose processes that underlie patterns in a community composition (Luck et al. 2013; Lindenmayer et al. 2015; Dias et al. 2016). Thus, information on bird community in Gunung Tunak Nature Park is needed as one of the important efforts to conserve the bird community and its habitat.

MATERIALS AND METHODS

Study area

Gunung Tunak Nature Park is located on Mertak Village at 8.533°S 116.240°E, Central Lombok District, West Nusa Tenggara, Indonesia (Figure 1). The park has dry deciduous lowland monsoon forest with the altitude ranged from 0 to 105 m. According to the Schmidt-Ferguson classification, Gunung Tunak Nature Park has a C, D and E climate type. The rainy season is generally from September to April (Wahyuni and Mildranaya 2010).

Sampling procedure

Data were collected by survey methods (Howes et al. 2003), on three trails. All of the trails started from the guesthouse: trail 1 to the Bile Sayak Beach (3 km), trail 2 to Ujung Beach (2.26 km), and trail 3 to the entrance of Gunung Tunak Nature Park (1.9 km). Survey was carried out twice a month from May to October 2017 by walking down the trails in the morning (06:00 to 10:00) and in the afternoon (16:00 – 18:00) to identify and count the number of individuals of each species. Bird species were identified using the field guide by Coates and Bishop (2000).

Data analysis

Community analysis was done through relative abundance analysis and diversity analysis. Relative abundance analysis was according to the equation (Krebs, 2009):

$$RAD = (ni/N) \times 100 \%$$

Where,

- AD**: relative species abundance
- ni** : number of individual species-i
- N** : total number of individuals.

Diversity analysis was performed using Shannon-Wiener Diversity Index, with formula:

$$H' = -\sum_{i=1}^s p_i \ln p_i$$

Where,

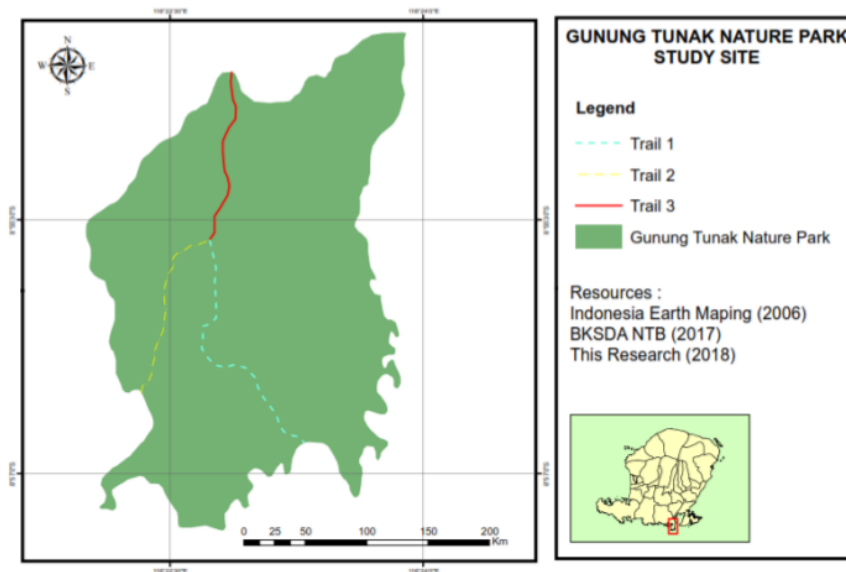
- H'**: diversity index
- pi**: proportional abundance

RESULTS AND DISCUSSION

Bird species composition

A total of 32 species of birds belonging to 27 families and 10 orders were recorded in Gunung Tunak Nature Park (Fig. 2). The order Passeriformes accounted for the largest number of families and species, with 15 species or 46%. Passeriformes has also been found to be dominant in a conservation area adjacent to the oceans (Manica et al. 2010; Zakaria and Rajpar 2015; Li et al. 2016; Roy et al. 2016). Higgins et al. (2001) explained that Passeriformes is the largest order and most diverse, with 5,712 species and 45 families.

In general, the bird community in Gunung Tunak Nature Park can be grouped into terrestrial birds and waterbirds. Most of them, 29 species or 91%, were terrestrial birds. Waterbirds only consisted of three species, *Egretta garzetta*, *E. sacra*, and *Phaethon lepturus* (Fig. 2). The dominance of terrestrial birds is due to hills and forests, making up large parts of Gunung Tunak Nature Park (Wahyuni and Mildranaya 2010) which are ideal habitats for terrestrial birds.



6
Figure 1. Study sites at Gunung Tunak Nature Park, Lombok, Indonesia

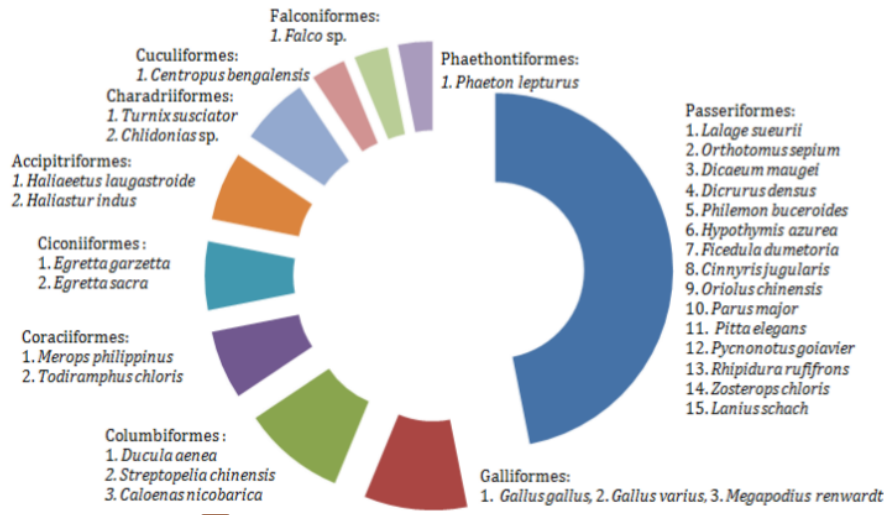


Figure 2. Orders and species of birds in Gunung Tunak Nature Park, Lombok, Indonesia

Table 1. Abundance and conservation status of bird in Gunung Tunak Nature Park, Lombok, Indonesia

Species	English Name	Family	Individual number	RAD (%)	Conservation Status		
					Permenlhk 106/2018	IUCN	Wallacea endemicy
<i>Haliaeetus leucogaster</i>	White-bellied Sea Eagle	Accipitridae	36	0.9	P	LC	NE
<i>Haliastur indus</i>	Brahminy Kite	Accipitridae	16	0.4	P	LC	NE
<i>Todiramphus chloris</i>	Collared Kingfisher	Alcedinidae	192	4.8	NP	LC	NE
<i>Egretta garzetta</i>	Little Egret	Ardeidae	16	0.4	NP	LC	NE
<i>Egretta sacra</i>	Pacific Reef-egret	Ardeidae	36	0.9	NP	LC	NE
<i>Lalage sueurii</i>	White-shouldered Triller	Campephagidae	104	2.6	NP	LC	E
<i>Orthotomus sepium</i>	Olive-backed Tailorbird	Cisticolidae	488	12.2	NP	LC	NE
<i>Caloenas nicobarica</i>	Nicobar Pigeon	Columbidae	68	1.7	P	NT	NE
<i>Ducula aenea</i>	Green Imperial-pigeon	Columbidae	68	1.7	NP	LC	NE
<i>Streptopelia chinensis</i>	Spotted dove	Columbidae	416	10.4	NP	LC	NE
<i>Centropus bengalensis</i>	Lesser Coucal	Cuculidae	52	1.3	NP	LC	NE
<i>Dicaeum maugeli</i>	Red-chested Flowerpecker	Dicaeidae	68	1.7	NP	LC	NE
<i>Dicrurus densus</i>	Wallacean Drongo	Dicruridae	140	3.5	NP	LC	E
<i>Falco</i> sp.	Falcon	Falconidae	36	0.9	P	LC	NE
<i>Lanius schach</i>	Long-tailed Shrike	Laniidae	104	2.6	NP	LC	NE
<i>Megapodius reinwardt</i>	Orange-footed Scrubfowl	Megapodiidae	88	2.2	P	LC	NE
<i>Philemon buceroides</i>	Helmeted Friarbird	Meliphagidae	36	0.9	NP	LC	NE
<i>Merops philippinus</i>	Blue-tailed Bee-eater	Meropidae	172	4.3	NP	LC	NE
<i>Hypothymis azurea</i>	Black-naped Monarch	Monarchidae	16	0.4	NP	LC	14
<i>Ficedula dumetoria</i>	Rufous-chested Flycatcher	Muscicapidae	16	0.4	NP	LC	NE
<i>Cinnyris jugularis</i>	Olive-backed Sunbird	Nectariniidae	192	4.8	NP	LC	NE
<i>Oriolus chinensis</i>	Oriolus chinensis	Oriolidae	104	2.6	NP	LC	NE
<i>Parus major</i>	Great Tit	Paridae	172	4.3	NP	LC	NE
<i>Phaethon lepturus</i>	White-tailed Tropicbird	Phaethontidae	16	0.4	P	LC	NE
<i>Gallus gallus</i>	Red Junglefowl	Phasianidae	36	0.9	NP	LC	NE
<i>Gallus varius</i>	Green Junglefowl	Phasianidae	120	3.0	NP	LC	NE
<i>Pitta elegans</i>	Elegant Pitta	Pittidae	120	3.0	P	LC	NE
<i>Pycnonotus goiavier</i>	Yellow-vented Bulbul	Pycnonotidae	244	6.1	NP	LC	NE
<i>Chlidonias</i> sp.	Marsh tern	Sternidae	88	2.2	P	LC	NE
<i>Rhipidura rufifrons</i>	Rufous Fantail	Rhipiduridae	104	2.6	NP	LC	NE
<i>Turnix susciator</i>	Barred Buttonquail	Turnicidae	68	1.7	NP	LC	NE
<i>Zosterops chloris</i>	Lemon-bellied White-eye	Zosteropidae	556	13.9	NP	LC	NE
Total			3988	100			

Note: P: Protected; NP: Not Protected; LC: Least Concern; NT: Near Threatened; E: Endemic; NE: Non-Endemic

Abundance, diversity and conservation status of bird species

The survey found that *Zosterops chloris*, *Orthotomus sepium*, and *Streptopelia chinensis* has RAD >10%. Other species such as *Lalage sueurii*, *Dicrurus densus*, *Pitta elegans*, *Megapodius reinwardt*, *Caloenas nicobarica*, *Haliaeetus leucogastroides*, *Haliastur indus*, *Chlidonias* sp., *Caloenas nicobarica*, and *Falco* sp. are included on three categories of conservation status, Permenlhk 106 Tahun 2018, IUCN Red list status, and endemicty.

Discussion

Based on Table 1, the species with the highest abundance is *Zosterops chloris*. It is caused by *Zosterops* has a diverse diet, in which feeding more on fruits and nectar, but may also feed on insects (Fry et al. 2000). In addition, species of *Zosterops* generally have similar habitat and food and can continue to grow in spite of the dense population (Catterall 1985; Scott et al. 2003). The colonization pattern of *Zosterops* also influences its high abundance in Gunung Tunak Nature Park. *Zosterops* are often found in small groups and have remarkable abilities in forming colony formations in an area and have the ability to form an endemic formation on an island (Hockey et al. 2005; Warren et al. 2006; Moyle et al. 2009; Melo et al. 2011).

Passeriformes dominate bird abundance in Gunung Tunak Nature Park with a relative abundance of 61.6%. The dominance of Passeriformes is due to variations in life ability and diverse food sources. Passeriformes can live arboreally or terrestrially, even though there are families that specifically live in arboreal habitats such as Hirundinidae or in terrestrial habitats such as Menuridae and Pittidae (Higgins et al. 2001). Furthermore, they can feed on almost all types of food, from plants to vertebrates (Higgins et al. 2001). However, most of them tend to specialize in foods, such as families that feed on nectar (Nectariniidae), seeds (Passeridae), fruits (Zosteropidae), small vertebrates (Artamidae), and insects (Maluridae, Paridae, Petroicidae, and others).

The Shannon-Wiener Diversity Index of the bird community in Gunung Tunak Nature Park was 3.03. The value of the Shannon-Wiener Diversity Index usually ranges from 1.5 to 3.5 and very rarely reaches 4.5. Communities whose species abundance is assumed to be normally distributed as in birds, copepods, planktons, coral reefs, and plants, or communities with abundant models of Broken Sticks, will have the value of Shannon-Wiener Diversity Index ranging from 1 to 3 (May 1975). Thus, the value of 3.03 obtained in the bird community in Gunung Tunak Nature Park was the maximum value of a bird community; it is certain that the bird community in Gunung Tunak Nature Park is still well preserved.

Gunung Tunak Nature Park is an excellent habitat for bird communities. This is evident in the habitat's ability to support the presence of 32 bird species. As bird community can be used as an indicator of ecosystem health and biodiversity (Gregory et al. 2003), conservation of bird communities in Gunung Tunak Nature Park is increasingly important, especially the presence of 14 species with high

conservation value, namely *Lalage sueurii*, *Dicrurus densus*, *Pitta elegans*, *Megapodius reinwardt*, *Caloenas nicobarica*, *Haliaeetus leucogastroides*, *Haliastur indus*, *Chlidonias* sp., *Caloenas nicobarica*, and *Falco* sp.

Caloenas nicobarica is a species with Near Threatened status (Birdlife International, 2012). Previous studies did not report it in Lombok (Myers and Bishop 2005; Suana et al. 2016; Hadiprayitno et al. 2016), so it is a new record for Lombok. The existence of *C. nicobarica* in some places of Indonesia has been reported by several researchers (Rahayuningsih et al. 2007; Mittermeier et al. 2013; Tamalene 2014; Kelly et al. 2017). The population of *C. nicobarica* continues to decline because of habitat degradation and hunting to be used as pets or for the sale of gals (Birdlife International 2012; Kelly et al. 2017). Two other species, *L. sueurii* and *D. densus* have been categorized as endemic to Wallacea (Coathes and Bishop 2000).

In addition to these three species, there are several other species protected by Indonesian Law, unique and much in demand by birdwatchers. *P. elegans*, for example, is an icon in Kerandangan Nature Park; attract both local and overseas birdwatchers (Suana et al. 2016). *M. reinwardt* is a unique bird; it does not incubate its eggs but builds a nest of mounds on the ground that are useful for generating heat for incubation and prevention of egg damage from fungi (Dekker et al. 2000). Although internationally the *M. reinwardt* population is relatively stable (Birdlife International 2013), locally (in Lombok) its existence is under threat due to habitat degradation and hunting (Aminy et al. 2013).

Legalization of Gunung Tunak since 2014 with the status of Nature Park was one of the important conservation steps in protecting flora and fauna in Gunung Tunak, especially the bird community. However, conservation efforts are not only limited to establishing legalization. Conservation efforts must continue to ensure the sustainability of the flora and fauna. One of the important conservation efforts is periodical monitoring. The 2014-2016 report of the Nature Resource Conservation Center of West Nusa Tenggara (BKSDA NTB 2014, 2015, 2016), on the condition of nature parks in NTB province, did not explain in detail the condition of the bird community. This indicates the shortcoming of conservation efforts, especially the bird community. The availability of regular monitoring data is indispensable for the design of conservation plans (Gregory et al. 2003). In addition, monitoring and evaluating the abundance and distribution of bird community in regional units can help determine the best regional units to maintain bird populations and their habitats and be able to ascertain the conservation priority objects in an area (NABCI 2011).

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