BIODIVERSITAS
Volume 25, Number 5, May 2024
Pages: 1920-1928

ISSN: 1412-033X
E-ISSN: 2085-4722
DOI: 10.13057/biodiv/d250508

Nest characteristics, distribution, and preferences of *Megapodius reinwardt* as the basis for its conservation on Lombok Island, West Nusa Tenggara, Indonesia

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Manuscript received: 9 October 2023. Revision accepted: 4 February 2024.

Abstract. *Yamin M, Jufri AW, Hakim A, Gunawan, Rahmat J, Sukarso AA. 2024. Nest characteristics, distribution, and preferences of* Megapodius reinwardt *as the basis for its conservation on Lombok Island, West Nusa Tenggara, Indonesia. Biodiversitas 25: 1920-1928. Megapodius reinwardt* Dumont, 1823 is a unique bird that has an important ecological role as an insect controller, food security, and economy. This study aims to accurately determine the distribution, characteristics of nests and nesting preferences of *M. reinwardt* in natural habitats. Data collection was carried out by field observation methods at three locations from March to August 2023, i.e.: TWA Gunung Tunak (Gunung Tunak Nature Park), TWA Kerandangan (Kerandangan Nature Park), and Gili Trawangan, but when data were collected on Gili Trawangan no active nests were found. We found that there are seven active nests in the western part of the TWA Gunung Tunak; each nest was built by five to twelve pairs of parents, while in TWA Kerandangan, three active nests were built by three pairs of parents. The population of *M. reinwardt* on Lombok Island is only found in TWA Gunung Tunak (96 heads) and TWA Kerandangan (12 heads). The presence of the nest is simultaneously significantly influenced by 14 factors (R^2 value=87%). Six factors are highly preferred, i.e., distance to river streams, light intensity, canopy cover, vegetation density, humidity, and plant litter composition. The vegetation diversity in TWA Gunung Tunak was 21 species with a density of 58 - 344 individuals/hectare compared to TWA Kerandangan, which was 40 species with a density of 185-410 individuals/hectare. The diversity index (H) of *M. reinwardt* is between 2.14-2.26. The evenness index (E) is between 0.95-0.96. The high ecological index indicates that conservation strategies for *M. reinwardt* should be implemented by providing ecosystem services through the development of ecotourism and by increasing economic and community awareness.

Keywords: Bird, field observation, habitat, nest area, unique

INTRODUCTION

Megapodius reinwardt Dumont, 1823 (scrubfowl) is a type of terrestrial bird protected based on the Regulation of the Minister of Environment and Forestry of the Republic of Indonesia Number P.92/2018 concerning protected types of plants and animals. This bird is protected because it is unique, has the habit of building a nest in the form of mounds, and is shared use by several pairs of parent birds. Its population has shrunk drastically, and its distribution is limited to the islands of Lombok, Sumbawa, Komodo, Sumba, Flores, Pantar, Alor, and Wetar (Harris et al. 2014). Yamin and Khairuddin (2018) reported that the population of *M. reinwardt* on Moyo Island was 29 individuals, while on Gili Trawangan, it is estimated that there are only 2 - 3 individuals, and hence their status threatened with extinction (Aminy et al. 2013). *Megapodius reinwardt*, which was once common in Greater Sunda on Kangean Island, East Java, according to MacKinnon and Karen (2000), is now extremely rare. This globally endangered bird family is vulnerable to climate change which provides an important indicator of the effectiveness of wildlife conservation (Wang 2023). *Megapodius reinwardt* has an important ecological role as an insect controller. Moreover, biological information is still lacking, it has difficulty reproducing in captivity, and the population is drastically reduced. The ecosystem affected by the remaining excavations is relatively poorly studied (Khairuddin and Yamin 2019; Hall et al. 2023).

Megapodius reinwardt has another important role, namely for food security and the economy. Furthermore, their nesting behavior can be used for education, research, and ecotourism. Ecotourism is a new instrument for managing forest resources at the research location, and local people still exploit it for their family's economic needs. Unsurprisingly, hunting on *M. reinwardt* has increased, triggering a decline in its population. *Megapodius reinwardt* is a bird that is challenging to reproduce in captivity; hence its extinction risk is increasing; therefore, conservation and management must involve local communities. Ecotourism can be used as a conservation strategy for *M. reinwardt* and other species.

The number of bird species in Indonesia is approximately 812, with 179 species threatened with extinction and 31 in the critical category (Priyambodo 2021). Of these, six species threatened are found in the Nusa Tenggara region (IUCN 2019; Priyambodo 2021). The Wallacea region has the richest endemic birds, accounting for 70.1% (366 out of 510) of Indonesia's total endemic bird species, while many species in the region are threatened. There are two types of

major threats: direct and indirect threats. Direct threats can be caused by the species' biological character, such as low reproductive rate, long-term parental care, and high utilization. The indirect threats included hunting (egg, nestling, adult, consumption, trade, pet, and hobby (Prawiradilaga 2020). As for the Ciletuh-Pelabuhanratu Geopark, there were 121 bird species. Among them, 12 species have high conservation status under the International Union for Conservation of Nature (IUCN), and 17 are listed in Appendix II (Iskandar 2020). On the islands of Lombok and Sumbawa, the populations of several economically valuable bird species are thought to be nearly extinct due to hunting (BKSDA NTB 1995), even though these birds have the potential to become ecotourism objects.

The resource utilization value through ecotourism aligns with conservation objectives, namely to improve the community's economy and education (Apps et al. 2019). In this regard, ecotourism principles are clearly promoted, including environmental conservation and education, cultural preservation and experience, and economic benefits (Cobbinah 2015). The implementation level of ecotourism is considered necessary as part of integrated development planning carried out in an area. Therefore, several parties from the community level, society, government, business world, and non-governmental organizations are expected to build networks and carry out good partnerships according to their respective roles and expertise.

MATERIALS AND METHOD

Research methods

This research was originally planned for three areas on Lombok Island, West Nusa Tenggara, Indonesia, i.e., TWA Gunung Tunak (Gunung Tunak Nature Park) in Central Lombok District, TWA Kerandangan (Kerandangan Nature Park) in West Lombok District, and Gili Trawangan in North Lombok District. The location was chosen because the natural population of *Megapodiu reinwardt* on Lombok Island can only be found in this area, but when data were collected on Gili Trawangan, no active nests were found. Bird population data were collected through surveys on the study area and observations on their mounds. The biological aspects studied include population distribution coordinates, active nests, the biotic and nests abiotic characteristics, and the surrounding environment. Survey and direct observation methods are used to collect data from six am to ten am and four pm to six pm. GPS (Global Positioning System) is the nest's location, and the South Latitude (SL) and East Longitude (EL) are the GPS coordinates for each place (Romimohtarto and Juwana 1999).

Data on nest characteristics were taken for active nest mound areas using the field observation method from March to June 2023. The data collected includes 14 factors: altitude (masl), litter composition, distance to river channels, distance to roads, slope, soil acidity, canopy cover, light intensity, temperature, humidity, soil texture, number of predators, and disturbing bird population and plant species. Regarding vegetation, its role has been considered a place to play, rest, shelter, breed, and feed source. Vegetation sampling at each observation station was carried out using a quadratic method measuring 50×50 m. Each plot was divided into five sample plots measuring 10×50 m, and the total number of sample plots in the four observation plots was 20. All plants in each sample plot were recorded for species, number of individuals, canopy height, and stem diameter. The height of the crown of each tree is found using the tangent α formula multiplied by the tree's distance to the standing place, while the trunk diameter is found using the formula for the size of the tree trunk circle divided by π. Furthermore, to identify plant species, we used Hamlyn (2020). If there is an unknown plant type, a sample is taken to make a herbarium and identified at the Bogoriensis Herbarium Laboratory.

The data obtained were analyzed qualitatively and quantitatively. The qualitative analysis aimed to describe the condition, population distribution, disease, predators, nest characteristics, and survival of *Megapodius reinwardt*. Quantitative analysis was conducted on vegetation characteristics in nesting areas and resource use was analyzed using the Shannon-Wienner species diversity index (H), species abundance index (E), and Sorenssen Similarity Index.

To determine the biotic and abiotic components of habitat preferred by *M. reinwardt*, the dominant components of habitat were analyzed using multiple linear regression analysis using the stepwise method. Not all independent variables (X) that are thought to have an influence on the dependent variable (Y) are included in the regression model because sometimes one independent variable is correlated with other independent variables (Iriawan and Astuti 2006). The hypothesis is H_0 all observed independent variables have no effect on the frequency of *M. reinwardt* presence in nesting areas, and H_1 at least one observed independent variable has an effect on the frequency of *M. reinwardt* presence in nesting areas. If the p-value is ≤ 0.05, then H_0 is rejected and if $p>0.05$, then H_0 is accepted. Furthermore, to determine the tendency of nesting site selection using Chi-square (X^2) test. The hypothesis is H_0 there is no selection of habitat components in the nesting area of *M. reinwardt* and H_1 there is selection of habitat components in the nesting area by *M. reinwardt*. If X^2 count $>X2$ (0.05) then H_0 is rejected and if X^2 count $\leq X^2$ .05, then H_0 is accepted.

RESULTS AND DISCUSSION

Population distribution of *Megapodius reinwardt* at the research location

Megapodius reinwardt is a terrestrial bird with limited distribution. Almost all of their daily activities are carried out on the ground except when sheltering from predators and sleeping at night (Yamin and Khairuddin 2018). The population on Lombok Island can currently only be found in TWA Gunung Tunak, Central Lombok District, and TWA Kerandangan, West Lombok District. In comparison, no active nests can currently be found at Gili Trawangan, North Lombok District. Megapodidae are very vulnerable in limited home ranges (Harris et al. 2014; Radley et al.

2018). This can be understood because home ranges on Gili Trawangan are very limited.

There were 10 nest mounds for *M. reinwardt*, seven in the TWA Gunung Tunak, Central Lombok District, and three in the TWA Kerandangan, West Lombok District. Among the seven nests, five are within Teluk Ujung, with 26 nest burrows used, and two are within Balisayak Beach. The population of *M. reinwardt* in TWA Gunung Tunak is estimated to be more than 48 pairs of broods, while in TWA Kerandangan, the population is around 9 pairs of broods. From the observations, there were seven active nest holes in TWA Gunung Tunak, while in TWA Kerandangan, there were three holes. The diameter (average 816 cm) and mound height (average 128 cm) of *M. reinwardt* nests were larger in the TWA Gunung Tunak, compared to TWA Kerandangan whose average diameter was 315 cm and mound height was 105 cm. The larger size of nesting mounds in TWA Gunung Tunak due to the number of individual birds that use them is greater; the average of seven birds per mound, the area is relatively flat compared to TWA Kerandangan, where there were only three birds per mound on the area sloping area. In addition, the period of nest mound use in TWA Kerandangan is thought to be earlier and longer than in TWA Gunung Tunak. This follows Frith's report (1959) that the size of the nest mound is determined by a function of the period used for laying eggs length and the distance between successive eggs. This is because the TWA Gunung Tunak is a natural forest. Hence, the litter composition in the nest mounds is higher, and the temperature is higher compared to the TWA Kerandangan, a rehabilitation forest. Moreover, the region is quite flat, the vegetation is limited, the soil is a calcareous and sandy loam, and the location is relatively open; many nest mounds can be found in the Teluk Ujung section of TWA Gunung Tunak. Compared to primary woods, this area offers more food in the form of termites, bugs, worms, and insects.

In addition, sites such as Teluk Ujung provide heat from the environment, which is needed for incubation (Radley et al. 2018). It is confirmed by Shah (2021) that the distribution, diversity, and abundance of birds in any ecosystem are determined by season, disturbance and resource availability. In addition, *M. reinwardt* is a terrestrial bird that eats insects, insects, seeds, worms, and fruit flesh (Yamin and Khairuddin 2018), and it is very good for use as protection from predators. The habitats that have trees that are too dense will limit *M. reinwardt* hunting because it is blocked by tree branches when hunting insects. On the other hand, locations that are too open are also less popular because they do not provide *M. reinwardt* with a sense of security from predators when hunting. If there are no trees, there is no shelter when chased by predators. In this regard, Orians (1969), claimed that various factors, including the abundance of epiphytic plants fruit, the openness of the floor, and the composition of plant species, affect the presence of birds in a given area. According to Sam et al. (2017), the relative species richness and abundance increased with increasing elevation for insect and nectar-eating birds and decreased with elevation. This follows Monk and Fretes's (2012) statement that each animal species relies highly on the natural elements in its habitat, such as the flora, water, and climate. The distribution location, diameter, mound height, and a number of active holes in each *M. reinwardt* nest mound in study areas are presented in Table 1.

Figure 1 shows that the population and nest distribution of *M. reinwardt* in the two study areas (TWA Kerandangan and TWA Gunung Tunak) is uneven. The *M. reinwardt* nest mound in TWA Kerandangan is located in the northern part of the area, while it is located in the western part of the area towards Teluk Ujung Beach. This area has a relatively flat topography at a height of 7-20 meters above sea level (masl), and access is easy because it is between 35-75 meters from the vehicle road. The eastern part of the TWA Gunung Tunak has a hilly topography dominated by chalky brown Mediterranean soil (alfisol) with clay-textured soil and low levels of organic matter. This soil is yellow-red and contains lime and iron concretions. The type of soil is not suitable for *M. reinwardt*'s nesting areas. In addition, gray grumosol, brown regosol, and litosol soil types are present. Alfisol soil has a rough structure that easily crumbs until it is loose. The older the soil structure and consistency, the denser the porosity that is inhibited. This soil order is the dominant one at the research location, with a sand texture. Mount Tunak TWA is 0-105 masl with a slope of 0-45° (BKSDA NTB 2012). Two mountains flank TWA, the soil is mostly Alfisol type, and the structure is coarse sandy. An overview of the *M. reinwardt* nesting area in TWA Gunung Tunak and TWA Kerandangan is presented in Figure 2.

The nest of *M. reinwardt* is built of soil mixed with plant litter in the form of circular mounds with a diameter of 350 to 1,300 cm and 50-200 cm in height. The nest is built in a forest that is not densely vegetated. The average diameter of the *M. reinwardt* nest mound is ± 816 cm, and the height is ± 129 cm. The number of nest burrows used in each site was recorded from three to twelve, and several parent birds share each nest mound. The relatively sparse vegetation is related to hot sunlight's importance in incubating and hatching the eggs. *M. reinwardt* does not incubate and hatch its eggs but is buried in the ground using the earth's heat or the sun. Egg incubation the sun, geothermal heat, or a combination of the sun and organic materials decomposing. Harris et al. (2014) stated that the nests are used together to increase the safety of the eggs so that they can be guarded from predators. The nest conditions of *M. reinwardt* at both locations were relatively undisturbed by humans, local people around the location very rarely hunt birds for food. Bird hunting in rural areas tends to shift from direct use to commercial forms, such as competitions for sound, intelligence, beauty, and uniqueness (Iskandar et al. 2016). Bird vocalizations, unique colors, physical traits, distinctive habitats, participation in bird song contests, fly-racing events, and selling prices are all used by people to categorize birds according to their cultural heritage. Therefore, the socioeconomic and cultural conditions of local communities around the area can be integrated into bird conservation programs (Iskandar et al. 2020). Apart from that, TWA Gunung Tunak is a conservation area surrounded by the sea and only has one entrance in the north.

Table 1. Distribution, Mound diameter, Mound height, and Number of nest burrows of *Megapodius reinwardt* in TWA Gunung Tunak, Central Lombok District and TWA Kerandangan, West Lombok District, 2023

Nest mound	Site coordinates		Mound diameter	Mound height	Active hole	Population
	South latitude	East longitude				
I	-8° 93'81"	116° 23'78.64"	750	90	7	14
II	-8° 94' 084"	116° 23' 28.6"	500	120	5	10
III	-8°56'29"	116° 22' 22"	580	50	7	14
IV	-8°56'28"	116° 22' 23'2"	800	100	0	0
V	-8°56'58.40"	116° 22' 82"	1030	160	10	20
VI	-8° 45'40"	116° 22' 89"	750	180	12	24
VII	-8°56'90"	116° 03' 46"	1300	200	7	14
Amount			5710	900	48	96
R average			815.7	128.6	7	-
VIII	-8° 28' 67”	-8° 28' 67"	450	140	3	6
IX	-8° 28' 290"	116° 03' 98"	400	100	3	6
X	-8° 28' 800"	116° 03' 44"	350	75	3	6
Amount			1200	315	9	18
Average			400	105	3	-

Note: I-VII: TWA Gunung Tunak, VIII-X: TWA Kerandangan. Data source: Research team, 2023

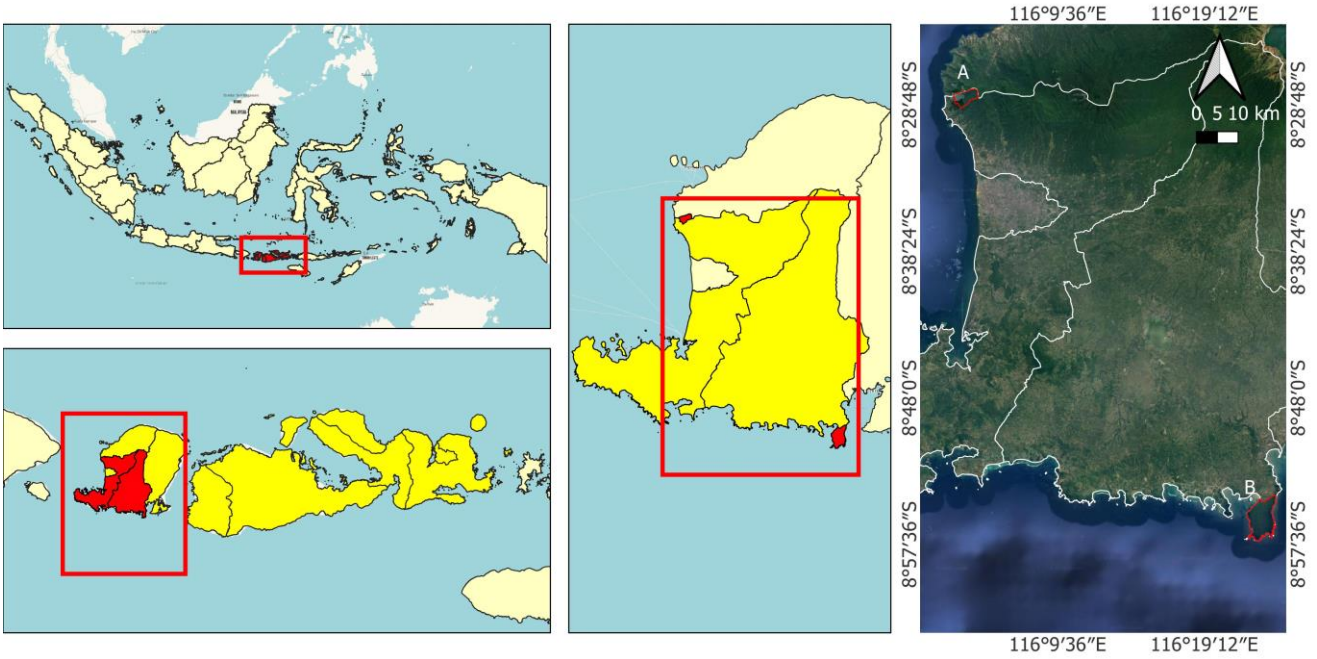

Figure 1. Research location and distribution of *Megapodius reinward* bird's nest mounds on Lombok Island, West Nusa Tenggara Province, Indonesia, in 2023. A. TWA Gunung Tunak; B. TWA Kerandangan

Figure 2. Active nest of *Megapodius reinwardt* in on Lombok Island, Indonesia: A. TWA Gunung Tunak and; B. TWA Kerandangan in 2023

Megapodius reinwardt prefers habitats at an altitude of 0-25 m asl. with flat topography (Oktovianus et al. 2018). Another study reported that *M. reinwardt* nest mounds in Moyo Island Game Reserve (now: Moyo Satonda National Park) were found at an altitude of 10-60 masl, preferring relatively flat nesting areas, close to water sources with humidity between 50% to 74% compared to sloping places (Yamin and Khairuddin 2018).

Characteristics of *Megapodius reinwardt* nests at the research location

This research also examines the nest characteristics of *M. reinwardt* and the habitat components that influence its presence in a selected area. Measurements of habitat components were carried out on 14 variables, namely (1) topography and altitude (masl), (2) litter composition, (3) distance to river channels (on a meter scale), (4) distance to human roads (on a meter scale), (5) slope (degrees), (6) soil acidity (pH), (7) canopy cover (%), (8) light intensity (lux), (9) temperature (ºC), (10) humidity (%), (11) number of vegetation species, (12) vegetation density, (13) soil texture, and (14) number of predators. Table 2 shows the measurement results on each nest mound and the surrounding area at the research location, with the 14 variables. It shows the results of multiple linear regression using the stepwise method at α 0.05 for each F value and significance =0≤0.05. This means that all 14 independent factors combined significantly affect the frequency of *M. reinwardt* in each selected area.

Further investigation on the testing of the tendency of preference for the nesting component areas obtained significance value ≥0.05. This means there is a selection of habitat components for nesting areas by *M. reinwardt*. There are ten factors preferred as nesting areas, namely distance to river channels (Drc), light intensity (Li), canopy cover (Cc), vegetation density (Vd), humidity (Hmd), distance to human roads (Dhr), composition of plant litter (Cpl), Soil texture (St), temperature (Tmp), and number of vegetation species as in Figure 3.

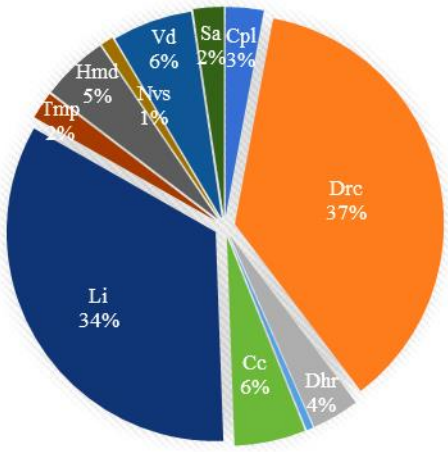

Figure 3. The proportion of habitat component contributes to the presence of *Megapodius reinwardt* in the study area

Table 2. Conditions and results of abiotic component analysis of *Megapodius reinwardt* nesting areas at TWA Gunung Tunak and TWA Kerandangan in June 2023

Nest	Y	Asl	Cpl	Drc	Dhr	Slp	Sa	Cc	Li	Tmp	Hmd	Nvs	Vd	St	Np
I	7	36	40	500	50	0	7.0	75	460	29	70	13	84	32	0
II	5	25	40	1000	3	15	7.0	60	455	30	69	12	108	32	2
III	7	20	75	200	40	15	6,8	50	440	28	67	8	240	32	1
IV	0	20	75	170	43	20	6,7	80	150	28	69	9	292	32	3
V	10	15	50	25	35	0	6,8	50	240	29	71	10	344	37	0
VI	12	15	50	10	40	0	6,8	50	900	29	74	9	396	37	0
VII	7	7	25	100	75	0	6,8	35	1160	31	58	10	78	70	1
VIII	3	58	30	100	50	55	7.0	65	430	31	75	33	125	70	2
IX	3	69.5	20	80	15	60	7.0	60	420	30	69	30	196	32	2
X	3	75.6	25	30	20	75	6,8	50	440	29	67	38	308	32	2
Amount	57	351	430	2215	371	240	68.7	575	5095	294	689	172	2171	406	13
Average	7	19.4	50.7	286	40.8	7.14	6,8	57	543.57	29	68	10	816	38	0.85
Chi- test	1.27	1.09	0.82	1.27	4.91	4.64	4.91	0,82	1.27	2.18	2.82	1.27	0.00	5.36	3.09
df	4	8	6	9	8	6	3	6	9	4	7	8	10	3	4
Ash. Sig.	2.29	0.99	0.98	0.99	0.99	0.50	0.20	0.56	1.00	0.72	0.90	0.99	1.00	0.15	0.54

R^2 value = 118.100 with df = 9
The F value and significance each = 0
α = 0.05

Notes: Y: presence of *Megapodius reinwardt*; Asl: altitude from sea level meters); Cpl: composition of plant litter; Drc: distance to river channel (meters); Dhr: distance to human roads (meters); Slp: slope (degrees); Sa: soil acidity (pH); Cc: canopy cover (%); Li: light intensity (lux); Tmp: temperature (°C); Hmd: humidity (%); Nvs: number of vegetation species; Vd: vegetation density; St: soil texture; Np: number of predators

The preference for light intensity, canopy cover, and vegetation density is understandable because *Megapodius reinwardt* does not incubate its eggs. The eggs are buried in mounds of soil mixed with plant litter, and the incubation uses heat from the mound of earth around the nest. In connection with this, sunlight is very important to heat the nest mound. The average nest mound temperature is 26℃, the lowest is 19℃, and the highest is around 31℃. Air humidity ranges from 58% to 74%, with an average of 68%. The light intensity in the nest area ranges from 150 lux to 1,160 lux (Table 2). The monthly average percentage of sunshine duration varies from 64% to 89% and according to Oldeman's climate classification system, is classified as type E climate (Harahap 2021).

Moreover, *M. reinwardt's* preference for being close to water sources (rivers), canopy cover, and not dense vegetation is shown in Figure 3. Water is the main need for living creatures, including *M. reinwardt*, for metabolism and to shine its feathers. As for the vegetation, it acts as a direct or indirect source of food for insects and bugs, a place to play, rest, and protect. This is in line with Shah's (2021) report that environmental parameters such as distance to water sources, forest habitat, and canopy cover significantly affect the presence of birds. Soil acidity (pH) at both research locations ranged from 6.7 to 7.0. In TWA Gunung Tunak, rivers only exist during the heavy rainy season, and there are no springs, whereas, in TWA Kerandangan, there is a river in the middle of the area. The nesting area of *M. reinwardt* in TWA Gunung Tunak in 2023 was recorded at an altitude of 7-36 masl loose soil, slope 0°-20°, canopy cover between 35% - 80%, and litter composition between 25-75%; the TWA Kerandangan nest were found at 58 - 75.6 masl. Meanwhile, in the Nicobar Islands, India, it is reported at 1-429 masl (Sivaperuman et al. 2022). *Megapodius reinwardt* buries its eggs in mounds of soil mixed with plant litter and utilizes heat from sunlight, geothermal heat, or a combination of solar heat and decaying organic material to incubate its eggs (Harris et al. 2014; Pattiselanno and Arobaya 2015).

Plant ecological index at the study location

Species diversity, evenness, density, and species richness are important in ecosystem stability. The plant-species diversity index value explains the number of species and the number of individuals within each species. The value of the species diversity index at a site is based on how the two are related. In addition, the diversity index is the services provided by plant communities as a habitat for the *M. reinwardt* bird. Habitat greatly influences the population of *M. reinwardt* and is a basic need for survival, such as food, space to play, rest, and shelter. The Evennes Index also describes the evenness of people in various communities. The species richness index describes the overall number of species in a community. Table 3 lists the findings of the ecological index analysis.

The index values for diversity, evenness, and richness of plant species at both study locations are high and evenly distributed. This means that the ecosystem in the study area is relatively stable. This means that if a disturbance occurs, for example, if one type of plant plays a role in the cycle of matter or the flow of energy is lost, the ecological processes in the habitat will continue because there are alternative types of plants that will replace its role. The Evennes index in TWA Gunung Tunak is (0.82) and TWA Kerandangan is 0.65. Both are relatively high. It is reported that the coastal areas of Lombok Island have high bird species diversity and richness index values (Syukur et al. 2023). The TWA Gunung Tunak is a natural forest that is always maintained. The robustness of ecosystem services and the effectiveness of forest management with biodiversity protection measures are demonstrated by the high ecological index in the TWA Kerandangan. However, using ecological indices as environmental indicators is time-consuming, especially in conservation areas with a revegetation approach model (Lindenmayer et al. 2015). This can improve the diversity of *M. reinwardt* bird populations and other species. In this relationship, the value of species variety can be combined with the functional characteristics of all environmental factors (Almeida et al. 2018). Furthermore, it could potentially attract tourists, especially with the presence of the *M. reinwardt* bird, whose distribution is limited as an ecotourism attraction.

At the research site at TWA Gunung Tunak, at are found in the seven nesting areas of *Megapodius reinwardt* there are 21 species of plants. These plants are important in foraging, sheltering, resting, and nesting (Sudaryanto et al. 2019). Of the 21 vegetation species found in TWA Gunung Tunak and Kerandanagan TWA (Figures 4 & 5), no endemic or rare species were found. All vegetation species found in this area are common, widespread, and easily found in various regions.

The number of vegetation species in each area of the nest mound was recorded between eight and 13 species. TWA Gunung Tunak, at 36 masl, has the most diverse vegetation, while TWA Kerandangan, which is 20 masl and has only eight species has the least. Low diversity of vegetation in TWA Kerandangan because the topography is sloping sandy with a thin layer of soil. While in TWA Gunung Tunak, the topography is flat, and the soil layer is relatively thick. The results of the analysis of the similarity index of plant species on each *Megapodius reinwardt* nest mound at the study site are presented in Figure 6.

Table 3. Species Diversity Index Shannon-Wienner (H'), Evennes Index (E), Density (K), Richness and Dominant type at each research location 2023

Site	H'	E	K	∑ species	Community
Mount Tunak TWA	2.52	0.82	204	22	*Bambusa blumeana Protium javanicum, Schoutenia ovata,* and *Saripellus asper.*
TWA Kerandangan	2.4	0.65	375	40	*Dalbergia latifolia, Derris elliptica, Leea aequata, Gmelina* sp and *Tamarundus indica.*

The results show that the plant types between areas three and four and between areas five and six are 87.97 and 90.24, respectively. This is because areas three and four are in the same location, while five and six are close to each other, at around 100 meters. The smallest similarity index was found between areas five with eight and areas three with eight at 2.97 and 3.82, respectively. The vegetation in area eight is rehabilitated by secondary reforestation, while area three is a natural forest. Besides, the two are in different areas, namely one in the Central Lombok District area and the other in the West Lombok District area. The similarity index between observation locations is classified as low to high. This means that the plant communities in the seven nest mound areas are relatively different from one location to another (Table 4).

Table 4. Results of analysis of the Similarity Index of vegetation types in each *Megapodius reinwardt* nest mound areas in TWA Gunung Tunak and TWA Kerandangan 2023

Similarity matrix										
Sample	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1	-	33.66	13.58	15.96	6.76	5.85	36.62	15,19	13.91	29.03
2	-	-	8.94	11.71	10.71	16.22	22.72	14.58	13.64	51.06
3	-	-	-	87.97	80	79.86	9.39	3.82	5.18	10.89
4	-	-	-	-	79.74	82.20	8.0	8.74	9.13	14.04
5	-	-	-	-	-	90.24	9.28	2.97	6.72	11.33
6	-	-	-	-	-	-	7.29	5.0	7.63	13.06
7	-	-	-	-	-	-	-	15.15	17.65	27.03
8	-	-	-	-	-	-	-	-	41.82	26.89
9	-	-	-	-	-	-	-	-	-	28.39
10	-	-	-	-	-	-	-	-	-	-

Note: Sampel 1-7: TWA Gunung Tunak; 8-10: TWA Kerandangan

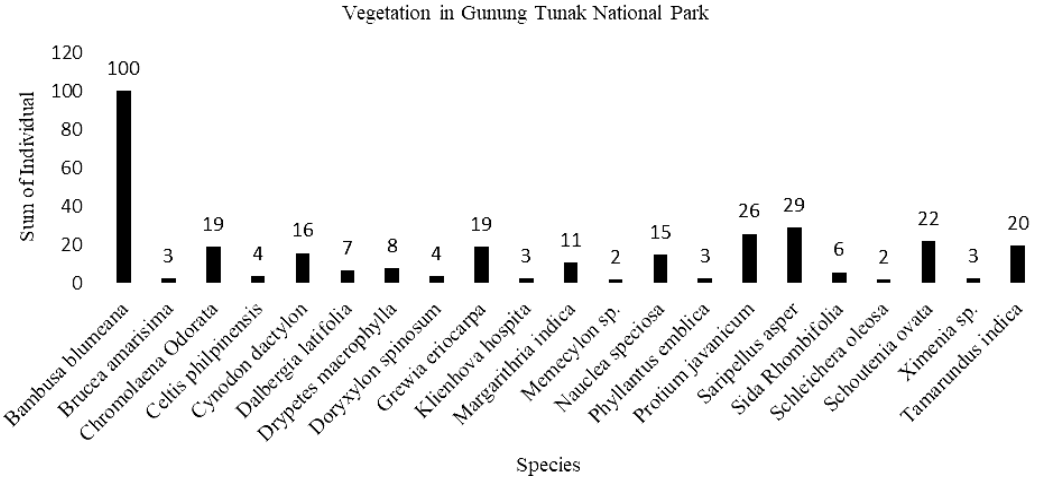

Figure 4. Species and number of individual plants in the area and around the *Megapodius reinwardt* bird's nest in TWA Gunung Tunak, Cenrtal Lombok District, 2023

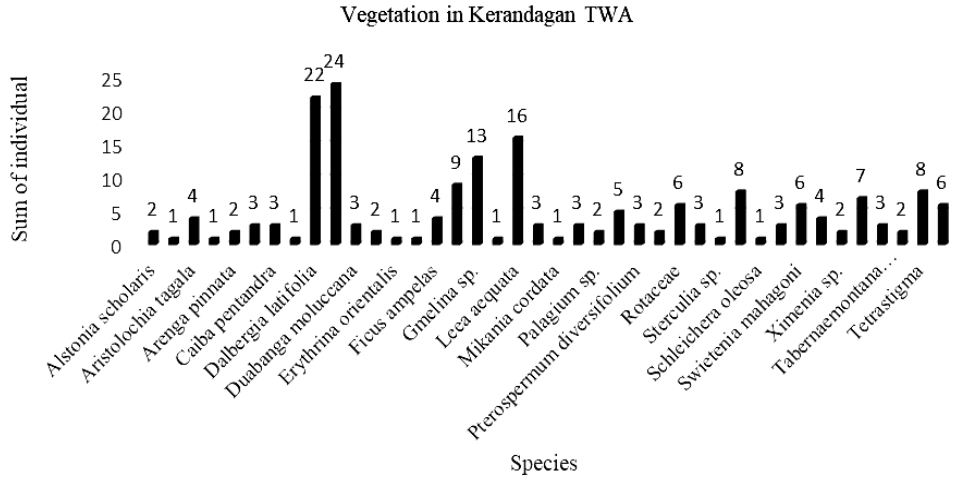

Figure 5. Species and number of individual plants in the area and around the *Megapodius reinwardt* bird's nest in TWA Kerandangan, West Lombok District, 2023

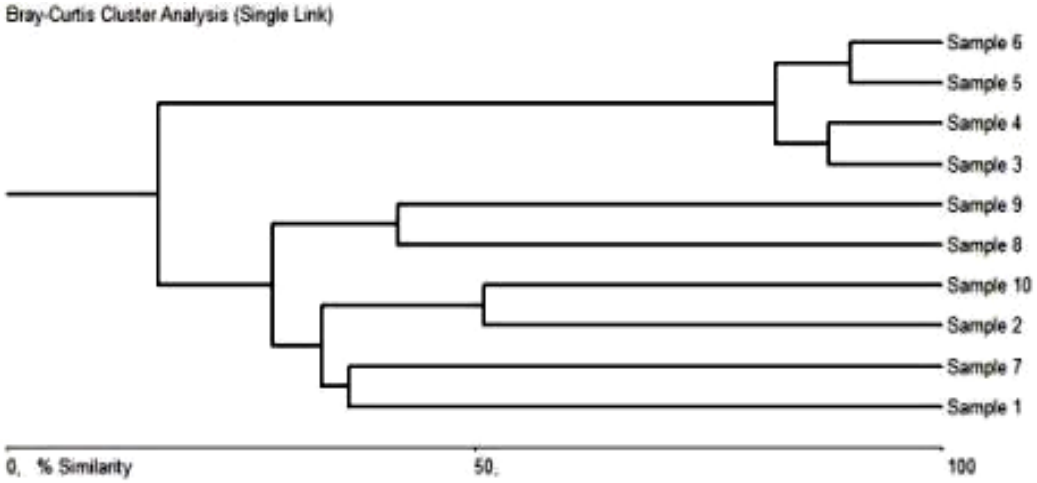

Figure 6. Dendrogram of plant species similarities between *Megapodius reinwardt* nest mound areas in the 2023

In conclusion, the characteristic of *M. reinwardt's* nest is a mound of earth with a mixture of plant litter, shaped like a circle inside the forest, its diameter reaches 1300 cm with a height of up to 200 cm. Its population distribution on Lombok Island is currently only found in Gunung Tunak National Park and Kerandangan National Park. The nest mound was built and shared by several pairs of brood parents. The selection of nesting areas is significantly influenced by ten factors: distance to water sources (rivers), light intensity, canopy cover, vegetation density, humidity, distance to human roads, composition of plant litter, soil texture, temperature, and number of vegetation species. Water is the main parameter for living creatures. In comparison, the composition of plant litter, canopy cover, vegetation density, and light intensity are related to the importance of heat for incubating and hatching its eggs. Incubation of its eggs is done by utilizing the sun, geothermal, or a combination of the sun and organic matter decompositions. In addition, the value of the vegetation ecology index at the study location was relatively high. The health condition of the ecosystem and the uniqueness of *M. reinwardt* nests are potential ecosystem services that can be utilized to develop ecotourism and conservation efforts.

ACKNOWLEDGEMENTS

The authors would like to thank the Universitas Mataram Research Institute, Indonesia, which provides funding facilities to provide funds to carry out research based on SK no.: 1961/UN18.L1/PP/2023 and agreement no.: 3459/N18/HK/2-23. Thanks to the reviewers for the correction and improvement.

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