BIODIVERSITAS
Volume 24, Number 2, February 2023
Pages: 1004-1009

ISSN: 1412-033X
E-ISSN: 2085-4722
DOI: 10.13057/biodiv/d240240

Short Communication: Avian sanctuary within the city in Timaco Hill, Cotabato City, Bangsamoro Autonomous Region in Muslim Mindanao (BARMM), Mindanao Island, Philippines

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Manuscript received: 13 November 2022. Revision accepted: 9 February 2023.

Abstract. *Vera PJD, Catipay JPC, Tagoon MDT, Baron EMD, Pinggoy BA. 2023. Short Communication: Avian sanctuary within the city in Timaco Hill, Cotabato City, Bangsamoro Autonomous Region in Muslim Mindanao (BARMM), Mindanao Island, Philippines. Biodiversitas 24: 1004-1009.* The habitats provided by urban green spaces are vital for conserving different wildlife species, especially birds. Although several studies outside the Philippines highlight the value of urban green spaces, including urban hills, as essential bird sanctuaries, limited accessible information exists in the Philippines. To date, no published information is available about birds in the urban green spaces of Cotabato City, including Timaco Hill. This gap highlights the need to conduct an avifaunal inventory in the area. In this preliminary, rapid assessment, two field observers documented bird species through vantage point field observations from June 06-13, 2022. A total of forty-three species of birds were documented. Ten avian species recorded are endemic, including the Philippine duck (*Anas luzonica*), which is currently listed in the vulnerable category based on the IUCN Red List of Threatened Species. The results of the current avifaunal inventory highlight the value of Timaco Hill as an important sanctuary of birds in Cotabato City. Results can also be used to promote the declaration of this urban hill as an eco-tourism site. The area may require prompt protection measures to sustain its capacity to serve as a bird sanctuary. More intensive surveys are also necessary to ascertain if the current count presented in the study is the complete list of birds of Timaco Hill.

Keywords: Birds, conservation, Maguindanao, urban diversity, wetland

INTRODUCTION

Urban green spaces provide habitats for different wildlife species, especially birds (Leveau et al. 2019). Urban forest patches serve as spots for food outsourcing and nesting for most bird species (Lerman et al. 2014) and rest stops for migratory birds (Hostetler and Archer 2017). These areas are highly diverse (Sulaiman et al. 2013; Paker et al. 2014; Vallejo and Alloy 2014; Jha 2018; Banzon et al. 2022) and usually comprise the vegetation cover of an urban area (Tryjanowski et al. 2017). Urban isolated forest patches are important in maintaining bird diversity, abundance, and richness (Campos et al. 2018). Moreover, it serves as a key biodiversity conservation spot within urban areas (Ives et al. 2016) by preventing local extinctions and maintaining vital biological interactions (Fath 2019). As such, urban green spaces have an important role in the conservation and enhancement of biodiversity (Threlfall et al. 2017).

The Philippine archipelago has 731 avian species, and 227 are endemic. In Mindanao Island, 455 species are documented, with 39 endemics and 49 globally threatened species (Avibase 2022). Avian species occupy a variety of habitats, including forested sites (Joshi et al. 2012; Lindsey et al. 2019; Duco et al. 2020), agro-ecosystems (Tanalgo et al. 2015), and urban green spaces (Vallejo et al. 2008; Leveau et al. 2019; Banzon et al. 2022; Muvengwi et al. 2022). Avian species were recorded to inhabit different urban green spaces, including lakes (Chen et al. 2021); parks (Sulaiman et al. 2013; Yang et al. 2020); gardens (Paker et al. 2014); school campus vicinity (Ong et al. 1999; Vallejo and Aloy 2014; Serrano et al. 2019); and hills (Jha 2018; Banzon et al. 2022). These studies highlighted the value of urban green spaces as they may serve as habitats for migrant and endemic avian species (Vallejo et al. 2009; Zhou et al. 2012; Yurong et al. 2020; Banzon et al. 2022; Prihandi and Nurvianto 2022). The paper of Banzon et al. (2022) accounted for 15% of endemic avian species in Davao City, indicating the significance of urban green spaces in their survival and proliferation. Avian species are reported to utilize urban green spaces for feeding (Prihandi and Nurvianto 2022), breeding, and wintering (Zhou et al. 2012). Urban green spaces, however, influence avian richness depending on

vegetation type (Prihandi and Nurvianto 2022), habitat diversity (Ayadurai 2012; Thongsoulin et al. 2019), land cover diversity, noise, and building density (Silva et al. 2015).

Information on the composition of avian species in urban green spaces in the Philippines is available but still needs to be made available. Several papers have reported bird species encountered within the country's campuses (Ong et al. 1999; Vallejo et al. 2008; Vallejo and Aloy 2014; Tanalgo et al. 2015; Medina and Cabras 2018; Serrano et al. 2019). Urban parks in various metropolitan areas designed primarily to provide a recreational spot for residents also harbor several bird species (Vallejo et al. 2009; Banzon et al. 2022). Cemeteries with vegetation patches also cater to several bird species (Vallejo et al. 2009). Scattered vegetation patches were also reported to provide bird refuge (Yurong et al. 2020). Banzon et al. (2022) also reported that spare lands in subdivisions harboring trees and shrubs also allow diverse birds to visit and possibly inhabit. They also reported that several species of birds inhabit a portion of an urban hill in Davao City. Although the mentioned publications disclosed bird species composition in various urban green spaces of the country, data is still considered not encompassing. Such is primarily due to the limited areas covered by the previous reports. Additional data on birds in urban green spaces from other localities of the Philippines are significant.

Timaco Hill is an urban green space located in Cotabato city. It is a proposed protected forest reserve with its environs included in the Timaco Port Master Plan for the Year 2036 that involves the construction of port facilities for both cargo and passengers (Japan International Cooperation Agency 2022). To our knowledge, there are no accessible published studies documenting avifaunal composition and richness in this urban hill. Data generated from this study are a valuable addition to the knowledge of bird species from urban green spaces of the Philippines and possibly the first published report on birds of Timaco Hill. It is also a noteworthy contribution to the knowledge of avifaunal species in urban hills. Concerned agencies may also benefit from the data for crafting research-based decisions, initiatives, and policies that enhance Timaco Hill's capacity to support wildlife apart from birds.

MATERIALS AND METHODS

Study site description

Timaco Hill (197 masl, 7°13'4.01", 124°10'43") is located in Barangay Kalanganan II, Cotabato City (Figure 1). The hill is approximately 11.2 km away from the commercial area of Cotabato city. Although the hill is currently not yet declared as a local conservation area, its area of about 200 hectares is currently managed by the Ministry of Environment, Natural Resources and Energy (MENRE). The eastern and northern sides of the hill are surrounded by concrete roads, making the hill accessible. On-going construction is also evident on the hill's eastern side, where the proposed port will be erected. The northeast and northwest sides of Timaco Hill face the estuarine portion of Moro Gulf, fronting Illana Bay. Fish ponds and artificial wetlands are adjacent to the northern portion of the hill. Although the area is one of the highest peaks in Cotabato City (apart from PC Hill), it is essentially lowland characterized by limestone outcrops.

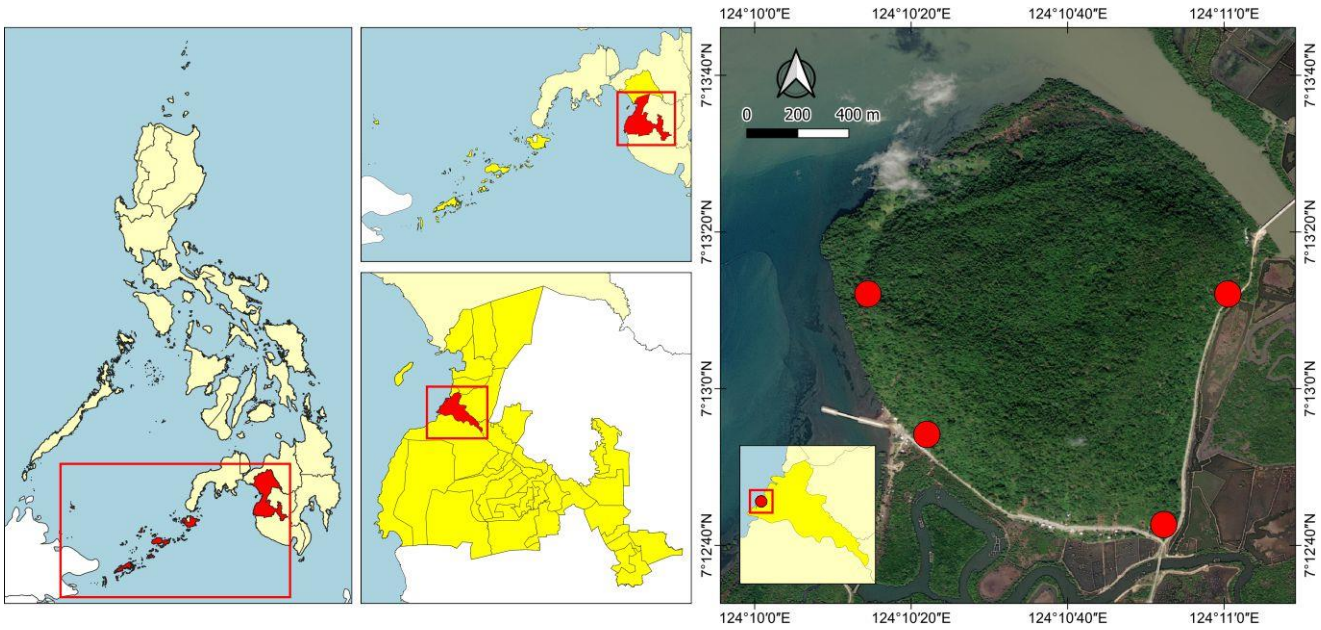

Figure 1. Map of Timaco hill in Brgy. Kalangan II, Cotabato City, BARMM show the four strategic observation sites used to document birds (QGISv.3, PJdeVera)

Several mangrove species were thriving in the surrounding environs, including *Rhizophora apiculata*, *Avicennia officinalis*, and *Xylocarpus granatum*. The interior section of the hill contains several stands of trees. However, the native weeds, including cogon (*Imperata cylindrica*), invasive shrubs like lantana (*Lantana camara*), and several other species of shrubs and weeds, dominate the outskirts. Faunal species such as monkeys (*Macaca fascicularis philippensis*), bats, and monitor lizards (*Varanus cumingi*) were spotted in some sites, including the fringes of the hill. The monkeys are common on the roadside of the hill and interact with humans to look for food. The forest interior is densely covered with trees. However, it is subject to anthropogenic pressure, evidenced by firewood gathering, the construction of households, and other buildings within the vicinity. In the past, local anecdotal reports showed that monkeys and monitor lizards were collected from the forest interior. Weather was generally sunny at the sampling time, as rain showers often start in the late afternoon. The extent of the effects of urbanization in Timaco Hill is still being determined since there are no baseline surveys and data in Cotabato City; thus, comparisons with studies conducted in the country with analogous settings were made for analysis and discussion.

Bird sampling technique

From June 06-13, 2022, the rapid preliminary assessment to document bird species in the area utilized the "look and see" method from vantage points (Senarillos et al. 2020). Four strategic observation sites with numerous vantage points were used to document bird species, including raptorial species and some passage flyovers. Proximity to access roads and distance to the nearest anthropogenic activity were the basis for selecting the observation sites. Two field observers visited each observation post four (4) times daily, and twenty minutes (20 mins) were spent in each site between 06.00 hrs to 09.00 hrs and 15.00 hrs to 17.30 hrs. The observation sites had at least 100 meters of vantage point to one of four cardinal directions facing Timaco Hill. Observations were done using 8x42 mm binoculars, a DSLR camera with a telephoto lens, bird guide (Kennedy et al. 2000). Only the number of species sighted in each observation post was recorded. Audio-playback of bird calls acquired from the Xeno-Canto database was used to help validate the bird species documented (Shonfield and Bayne 2017). The habitat range and spatial distribution of avian species identified were checked using the database of Birdlife International and eBird Cornell Laboratory for Ornithology. The conservation status of avian species accounted for in Timaco Hill was obtained from the International Union for Conservation of Nature Red List of Threatened species (2022).

RESULTS AND DISCUSSION

Forty-three species of birds were documented during the rapid assessment conducted at Timaco Hill and its surrounding wetland environment (Table 1). The number is slightly higher (43 against 32 species) than recorded from a Davao City urban hill (Banzon et al. 2022). The recorded species richness in Timaco Hill may be attributed to anthropogenic activities confined only to the periphery of the hill. In contrast, limited anthropogenic inputs were observed in its interior during sampling. Infrastructures, including food stalls, were only confined to the sides of the access road facing the hill. The hill, boarded by a mudflat, is also surrounded by several aquaculture pens, considered the locals' main income source. The entry and, thereby, possible collection of forest products in the interior of the hills is thus limited. Such practice is likely to contribute to the denseness of the hill's interior, while the lesser entry of humans also contributed to less disturbance of its wildlife inhabitants. Such observation parallels the study of Muhamad et al. (2014) that locals living near a forested area will promote forest preservation as long as their basic needs are addressed.

Another factor contributing to the increased number of species accounted for in Timaco Hill is its distance from the commercial center of Cotabato City, as the hill is approximately 11.2 km away. This observation conforms with previous avifaunal surveys in the Philippines that urban green spaces situated not within the city center have more bird species than those found in the city center (Vallejo et al. 2008; Vallejo et al. 2009; Banzon et al. 2022). In addition, the presence of forested sites, even in urban areas, may serve as a habitat for several bird species by providing shelter, a food source, and a venue for reproduction (Rega-Brodsky and Nilon 2017). Moreover, aside from being forested, Timaco Hill is surrounded by mangrove habitats, swamps, and ponds. These ecosystems' aggregates could provide food for diverse groups of birds in the area (Mohd-Azlan et al. 2014). However, the current study did not account for the floristic composition in Timaco Hill.

Ten Philippine endemic species were documented during the survey done in June 2022. Two out of the ten species are known to occur only on the island of Mindanao in the southern Philippines. These species are the Short-billed Brown-dove (*Phapitreron brevirostris*) and the Rufous-fronted Tailorbird (*Orthotomus frontalis*). Thirty-two species (74.42%) are Philippine residents, while one (2.33%) is a global migrant (*Numenius phaeopus*) (Figures 2-3). The presence of endemic species positively connotes the hill's capacity to harbor range-restricted species of birds despite being located in urban areas. Although the density of birds is declining in urban areas, they can still harbor endemic birds (Aronson et al. 2014). This observation is similar to data presented by Banzon et al. (2022), where an urban hill in Davao City also accommodates endemic species (n: 7). The presence of endemic species can also be used to determine the ecosystem status of the hill as previously utilized in other urban green spaces (Vallejo et al. 2009; Gatesire et al. 2014).

Table 1. List of birds recorded at Timaco Hill, Kalanganan 2, Cotabato City, Philippines

Family	Species	Common name	Endemism*)	Conservation status**)
Accipitridae	*Haliastur indus*	Brahminy Kite	Resident	Least Concern
Alcedinidae	*Todiramphus chloris*	Collared Kingfisher	Resident	Least Concern
Anatidae	*Anas luzonica*	Philippine Duck	Endemic	Vulnerable
	Dendrocygna arcuata	Wandering Whistling Duck	Resident	Least Concern
Apodidae	*Cypsiurus balasiensis*	Asian Palm Swift	Resident	Least Concern
	Collocalia isonota	Ridgetop Swiftlet	Endemic	Least Concern
Ardeidae	*Ardeola speciosa*	Javan Pond Heron	Resident	Least Concern
	Ardea purpurea	Purple Heron	Resident	Least Concern
	Bubulcus ibis	Cattle Egret	Resident	Least Concern
	Egretta garzetta	Little Egret	Resident	Least Concern
	Nycticorax nycticorax	Black-crowned Night-heron	Resident	Least Concern
Artamidae	*Artamus leucorynchus*	White-breasted Woodswallow	Resident	Least Concern
Campephagidae	*Lalage nigra*	Pied Triller	Resident	Least Concern
Cisticolidae	*Orthotomus frontalis*	Rufous-fronted Tailorbird	Endemic	Least Concern
Columbidae	*Chalcophaps indica*	Common Emerald Dove	Resident	Least Concern
	Columba livia	Rock Dove (Feral Pigeon)	Resident	Least Concern
	Geopelia striata	Zebra Dove	Resident	Least Concern
	Phapitreron brevirostris	Short-billed Brown Dove	Endemic	Least Concern
	Streptopelia tranquebarica	Red Collared Dove	Resident	Least Concern
Corvidae	*Corvus macrorhynchos*	Large-billed Crow	Resident	Least Concern
Cuculidae	*Cacomantis merulinus*	Plaintive Cuckoo	Resident	Least Concern
	Centropus viridis	Philippine Coucal	Endemic	Least Concern
	Eudynamys scolopaceus	Asian Koel	Resident	Least Concern
Dicaeidae	*Dicaeum australe*	Red-keeled Flowerpecker	Endemic	Least Concern
Estrildidae	*Lonchura atricapilla*	Chestnut Munia	Resident	Least Concern
Hirundinidae	*Hirundo tahitica*	Pacific Swallow	Resident	Least Concern
Locustellidae	*Megalurus palustris*	Striated Grassbird	Resident	Least Concern
Megalaimidae	*Megalaima haemacephala*	Coppersmith Barbet	Resident	Least Concern
Monarchidae	*Hypothymis azurea*	Black-naped Monarch	Resident	Least Concern
Muscicapidae	*Copsychus mindanensis*	Philippine Magpie Robin	Endemic	Least Concern
Nectariniidae	*Cinnyris jugularis*	Olive-backed Sunbird	Resident	Least Concern
Oriolidae	*Oriolus chinensis*	Black-naped Oriole	Resident	Least Concern
Pandionidae	*Pandion haliaetus*	Osprey	Migrant	Least Concern
Passeridae	*Passer montanus*	Eurasian Treesparrow	Resident	Least Concern
Pittidae	*Pitta sordida*	Hooded Pitta	Resident	Least Concern
Podicipedidae	*Tachybaptus ruficollis*	Little Grebe	Resident	Least Concern
Pycnonotidae	*Hypsipetes philippinus*	Philippine Bulbul	Endemic	Least Concern
	Pycnonotus goiavier	Yellow-vented Bulbul	Resident	Least Concern
Rallidae	*Amaurornis phoenicurus*	White-breasted Waterhen	Resident	Least Concern
Rhipiduridae	*Rhipidura nigritorquis*	Philippine Pied Fantail	Endemic	Least Concern
Scolopacidae	*Numenius phaeopus*	Whimbrel (Eurasian)	Global migrant	Least Concern
Sturnidae	*Aplonis panayensis*	Asian Glossy Starling	Resident	Least Concern
Timaliidae	*Macronus striaticeps*	Brown Tit-babbler	Endemic	Least Concern

Note: *) eBird Cornell Laboratory for Ornithology 2022; **) International Union for Conservation of Nature Red List of Threatened species (2022)

Although 42 out of the 43 species documented during the rapid assessment are under the Least Concern category of IUCN, one species, the Philippine Duck (*Anas luzonica*), is currently listed as Vulnerable (International Union for the Conservation of Nature 2022). This species was observed perching in a mudflat. Anecdotal reports from locals reveal that this species is expected in the wetlands proximal to Timaco Hill and was hunted for food seasonally. Since the Philippine duck is listed as vulnerable, identifying protected status in selected key sites are conservation actions that can be done to protect and conserve its presence in the area (BirdLife International 2022).

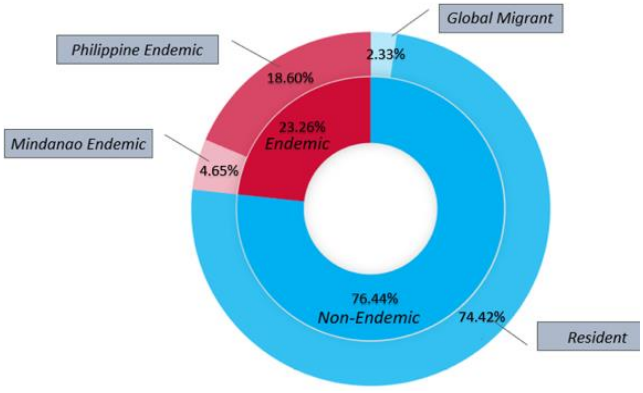

Figure 2. Summary of endemism status of documented avian species from Timaco Hill, Kalanganan II, Cotabato City. (Endemism based on eBird Cornell Laboratory for Ornithology 2022)

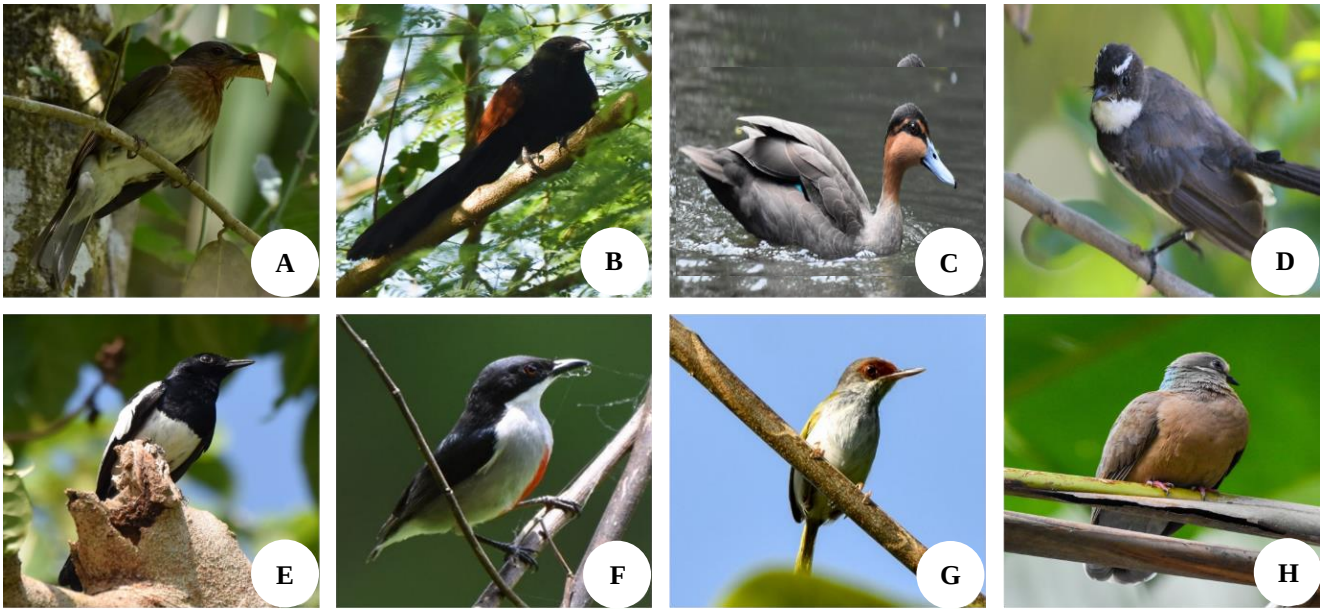

Figure 3. Endemic birds found in Timaco Hill, Barangay Kalanganan II, Cotabato City. A. Philippine Bulbul (*Hypsipetes philippinus*); B. Philippine Coucal (*Centropus viridis*); C. Philippine Duck (*Anas luzonica*); D. Philippine Pied Fantail (*Rhipidura nigritorquis*); E. Philippine Magpie Robin (*Copsychus mindanensis*); F. Red-keeled Flowerpecker (*Dicaeum austral*); G. Rufous-fronted Tailorbird (*Orthotomus frontalis*); H. Short-billed Brown Dove (*Phapitreron brevirostris*). Photos were taken by B. A. Pingoy

A flock of Eurasian Whimbrel (*Numenius phaeopus*) was also observed on Timaco Hill in mud flats, possibly looking for food such as crustaceans during low tide. This bird species is a non-breeding visitor and passage migrant in Southeast Asia and is expected to be in the country from September until February next year (Allen 2020). However, during the data collection, a flock of Eurasian Whimbrel in Timaco Hill suggests that this species is possibly overstaying. Moreover, the presence of this species in Timaco Hill may indicate that the study area may be a part of the migratory route while escaping the cold season in its country of origin. The presence of forested patches and the wetland areas adjacent to the study area could be ideal for migratory birds (Xu et al. 2019).

To conclude, the study accounted for the first time 43 bird species from Timaco Hill. However, the data may be just a glimpse of the entire composition of the avifauna of this urban green space as an output of rapid assessment. The endemic species documented and the presence of the Vulnerable Philippine duck (*Anas luzonica*) highlight the value of Timaco Hill as an essential habitat for birds. The MENRE-BARMM can use this limited information to lobby more intensive bird surveys in the area. Augmented data from future studies will be valuable in crafting appropriate management policies and programs for Timaco Hill. Data from this baseline survey is hoped to incite the declaration of Timaco Hill as an important biodiversity site that requires prompt conservation measures. The same data can also be utilized to lobby for the declaration and promotion of Timaco Hill as an eco-tourism area of Cotabato City.

ACKNOWLEDGEMENTS

We want to thank Minister Akmad A. Brahim of the Ministry of Environment, Natural Resources, and Energy (MENRE) of the Bangsamoro Autonomous Region in Muslim Mindanao (BARMM) and the Biodiversity, Ecosystems, Research, and Development Services (BERDS) led by Director Mohamad Ali Dimaren and to Chief Bahar S. Baulo for funding this research. In addition, special thanks are credited to Barangay Chairman Datu Edris P. Ayunan and Kagawad Amin B. Saidali of Barangay Kalangan II Cotabato City and the local guides for the security and assistance that were given to the researchers during the survey.

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