CHECKLIST ON FAUNA DIVERSITY GUNUNG HALIMUN SALAK NATIONAL PARK: Cikaniki-Citalahab

DAFTAR KEANEKARAGAMAN FAUNA TAMAN NASIONAL GUNUNG HALIMUN SALAK: Cikaniki-Citalahab


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ABSTRAK


Kata kunci: hutan pegunungan tropis, keanekaragaman hayati, Cikaniki, Taman Nasional Gunung Halimun Salak, fauna

ABSTRACT

The Cikaniki resort is one of the most accessible research stations located in the Gunung Halimun Salak National Park (GHSNP). It is in adjacent with Citalahab village. The Research Center for Biology, Indonesian Institute of Sciences and other institutions have conducted intensive research on the fauna diversity of GHSNP from this station. Here we formulate a checklist on fauna diversity surrounding the Cikaniki Research Station and Citalahab, GHSNP from various sources, i.e. field work, museum collections (Museum Zoologicum Bogoriense), scientific publications, and technical report. The study was conducted from October 2019 until October 2020. The latest field work was conducted from 8-10 October 2019 under the framework of the Jungle Survival and Biological Collection Management 2019 program. In total, 821 fauna species were recorded in Cikaniki-Citalahab areas which comprises of 48 species of Mollusca, five species of Malacostraca, 523 species of Insects, 22 species of Actinopterygii, 63 species of Amphibia and Reptiles, 115 species of Aves and 45 species of Mammals. The diversity contributes 62.1% of the total 1,323 known fauna species in GHSNP. Five number of species were assigned as endangered and three species critical endangered by IUCN. In addition, 123 species were endemic to Java and 34 species protected by Regulation of the Ministry of Environment and Forestry Republic of Indonesia Number P.106/MENLHK/SETJEN/KUM.1/12/2018. The areas of Cikaniki and Citalahab are rich in biodiversity. Although both areas are in close intact with human activity, research and ecotourism, the need of continuously spreading awareness and enforce species and area conservation is inevitable.

Keywords: tropical mountain forest, biodiversity, Cikaniki research station, Gunung Halimun Salak National Park, fauna

INTRODUCTION

Gunung Halimun Salak National Park (GHSNP) is the largest mountainous tropical rain forest in Java. This conservation area belongs to three regencies (Bogor and Sukabumi Regencies in West Java, and Lebak in Banten Province) and three mountains (Gunung Endut, Halimun, and Gunung Salak complexes) (GHSNPMP 2007). Based on geographical position, GHSNP is located
between 6°36’–6°52’S and 106°16’–106°38’E according to Decree of the Minister of Forestry number 282/Kpts-II/1992. There are three vegetation zones in this national park, i.e. the lowland forest colline zone, altitude between 900-1,150 m asl; the submontane forest zone, altitude between 1,050-1,400 m asl; and the montane forest zone, altitude above 1,500 m (Simbolon et al. 1998).

The national park plays an important and strategic role in biodiversity conservation. Various conservation projects have been conducted in GHSNP. Collaboration project between Japan International Cooperation Agency (JICA), the Research Center for Biology - LIPI, and the Directorate General for Natural Resources and Ecosystem Conservation (KSDAE) was carried out from 1999 to 2002 in the national park to reveal the diversity of fauna species, such as fish, herpetofauna, birds, mammals, and invertebrates (Kahono et al. 2002a, 2002b; Mumpuni 2002; Noerdjito et al. 2002; Prawiradilaga et al. 2002a, 2002c; Rachmatika 2003; Suhardjono 2002; Suyanto 2003). The Indobiosys Project in 2015-2017 (cooperation between Research Center for Biology-LIPI and Museum für Naturkunde Berlin, Germany) also conducted research on invertebrate biodiversity of GHSNP (Cancian de Araujo et al. 2017, 2018; Hilgert et al. 2019: Nurinsiyah et al. 2019b). Although research on biodiversity in the national park have been conducted for consecutive years, researchers still reveal interesting findings for instance new records and new species (Kamitani et al. 2011; Kamitani et al. 2012; Ng & Wowor 2018; Nurinsiyah & Hausdorf 2017; Suwito & Watabe 2010; Suwito et al. 2013; Toda et al. 2020; Wowor & Ng 2019; Yang et al. 2017).

Like many forests in tropical areas, GHSNP though is a conservation area, still suffers from various threats. Forest degradation is one of the major threats to GHSNP (Sahab et al. 2015). Logging and agricultural expansion by local and industrial plantation were suspected to have cause annual deforestation rate being around 1.2-2.3% from 1989 to 2003 (Kubo & Supriyanto 2010). Based on landsat satellite image, forest coverage of GHSNP had degraded about 5,005.71 ha from 2003 to 2007 (Carolyn et al. 2013). The presence of exotic and invasive species, human disturbance from infrastructure (road paths and human settlements), the increase of human population, and distance to villages are among the threats faced by biodiversity inhabiting this conservation area (Carolyn et al. 2013; Endangered Species Team GHSNPMP-JICA 2005; Prabowo et al. 2010). Compiling a list of biodiversity in GHSNP is one of important efforts to record, monitor, and conserve biodiversity and its habitat in this conservation area.

Cikaniki research station is one of the most accessible stations in GHSNP. The station is located about 73-75 km from the Research Center for Biology, Cibinong, or approximately 142 km from Jakarta, and can be reached by car. Citalahab village is located only two km away from Cikaniki research station (DESPA-KLHK 2017). It is the
nearest village located from the research station. The village is often use for ecotourism, providing accommodation for visiting researcher, students, and ecoturist who conduct activity in the Gunung Halimun Salak National Park.

Based on intensive research conducted by various institutions in Cikaniki-Citalahab, we aim to formulate a checklist of fauna covering Mollusca, Malacostraca, Insecta, Actinopterygii, Amphibia, Reptilia, Aves, and Mammalia. The list in Cikaniki-Citalahab derived from various methods. The main objective of this study is to provide updated list on fauna diversity surrounding the Cikaniki-Citalahab of GHSNP.

MATERIALS AND METHODS

Study Area

The study area is located between 06°44′21″S 106°31′53″E and 06°44′47″S 106°32′1″E and altitude range from 973 to 1,129 m asl or in the colline zone of lowland forest according to Simbolon et al. (1998). The vegetation community in this area was dominated by kareumbi (Homalantus populneus), cangcaratan (Nauclea lanceolata) and mara manggong (Macaranga sp.) (Sadili 2011). There were four dominant trees which were recorded along the Cikaniki-Citalahab loop trail during the field work, i.e. Lithocarpus javensis, Altingia excelsa (Rasamala), Litsea sp., and Elaeocarpus sp. Based on the measurement, the results of environmental factors in the Cikaniki-Citalahab trail are pH (6-8.8), soil moisture (40-100%), light intensity (330-4,530), temperature (21-25 °C), humidity (72-89%). Mean annual rainfall in Halimun area ranges from 3,200 to 6,000 mm and annual temperature ranges from 16 °C to 30 °C (DPJLHK 2016).

Methods

The list of fauna from Cikaniki and Citalahab, GHSNP were collected from a) field work, b) museum collections, and c) literatures study.

a. Field work

The field work was carried out from 8 to 10 October 2019. The loop trail between Citalahab to Cikaniki research station of Gunung Halimun Salak National Park were surveyed (Fig. 1). The collection activities were performed during the day with the exception of herpetofauna survey which conducted mainly at night. Afterwards, the collected samples were determined into species level when possible. Nine classes of fauna groups were sampled in this research, i.e. Gastropoda, Bivalvia, Malacostraca, Insecta, Actinopterygii, Amphibia, Reptilia, Aves, and Mammalia. All collected specimens were deposited in Museum Zoologicum Bogoriense (MZB), Research Center for Biology, Cibinong Science Center (CSC), Indonesian Institute of Sciences (LIPI).
1) Mollusca (Gastropoda and Bivalvia)

Fauna from two classes within phylum Mollusca, namely Gastropoda and Bivalvia were collected. Gastropoda from both terrestrial and freshwater were searched, and hand collected along the trail and at several random points. Live specimens and dead shells were collected and stored in collection bottles. Live specimens were stored in the collection bottle or vial with 70% alcohol. In addition, 5 L of soil and leaf litter from each point were sampled. Later, the litter was sieved and sorted in the Cikaniki Research Station to collect microsnails. All specimens were determined into species level referring to Heryanto et al. (2003), Nurinsiyah & Hausdorf (2017, 2019), Nurinsiyah et al. (2019a), and van Benthem Jutting (1948, 1950, 1952, 1956).

2) Crustacea (Malacostraca)

Malacostraca was collected by hand collection and tray net. For each sampling location, the photo of habitat was taken. Collected specimen was photographed, labeled, and stored in 96% alcohol. Identification based on Wowor & Ng (2019).

3) Insecta

Insect samples were collected by several methods, using pitfall trap and sweep net. Pitfall trap was used to collect insects on the ground surface. Each trap consisted of plastic cup (diameter 6.5 cm x depth 9.5 cm) contained 90% alcohol and was placed for a day in each location. Trapped insects were collected and preserved into 70% alcohol and remained for 24 hours. This type of trap is commonly used for soil surface arthropods (Buchholz et al. 2010; Tamaddoni-Nezhad et
al. 2013; Ubaidillah 1999). The sweep net technique was used to collect flying insects such as Odonata and Lepidoptera. Samples of sweep net were taken at each location from 7 AM to 3 PM. Collected insects were placed in glassine paper envelopes (papilot paper). Every specimen was identified up to genus, species, and morphospecies level by a number of references (Beaver et al. 2019; Cameron 1931, 1932; Campbell 1982; Damaska & Aston 2019; Endrodi 1985; Jung 2013; Kondorosy 2008; Löbl & Ogawa 2016; Mawdsley 1996; Oosterbroek 1998; Pace 1999, 2014; Peggie & Noerdhito 2011; Schawaller 1989, 2016; Schilthuizen et al. 2019; Seevors 1978; Shanbhag & Sundararaj 2011; Sornnuwat et al. 2004; Strohecker 1968; Wang et al. 2013; Yamane 2009). For specimen verification, we involve reputable entomologists from various institutions.

4) Fishes (Actinopterygii)

Fish samples were collected from several water stream points at different habitat types from Citalahab to Cikaniki research station of GHSNP. Habitat characteristics at the sampling location were shallow riverbanks with relatively slow currents with rock, litter and mud substrates and in the center of the river which is relatively deep with sand and mud substrates. Some of the fishing gears used included hand net, tray net, and seine net. Collected fish specimens were preserved in 70% ethanol for further analyses and labeled containing field data. Every specimen was counted and identified using several key identification books such as Allen & Swainston (1988), Kottelat et al. (1993), and Weber & Beaufort (1922).

5) Herpetofauna (Amphibia and Reptilia)

Herpetofauna data collection was conducted through an opportunistic search and visual encounter survey (Heyer et al. 1994; Kusri 2019). Herpetofauna collection was carried out by tracing along the rivers and riverbanks, as well as on land routes. Potential habitat such as deadwood, every corner of the buttress roots, in litter were searched for herpetofauna species. Specimens were manually collected by hand, then put into cotton bags. Captured specimens were recorded (species name, sampling location, date of sampling, sample code, and name of collector), photographed, euthanized, measured, injected with formaldehyde in the stomachs, and the bodies were shaped like while still alive, then preserved with formalin. After the specimens arrived at the laboratory, they were washed under running water for one to two hours, then the specimens were sorted by species and put into collection jars containing 70% alcohol. Identifications for Amphibian referred to Frost et al. (2006), Inger (1966), Manthey & Grossmann (1997), Iskandar (1998), and van Kampen (1923); while the reptile group referred to Das (2004), de Rooij (1915), Manthey & Grossmann (1997), and Mausfeld et al. (2002).

6) Birds (Aves)

Bird survey was conducted by capture and release method using mist-nets. Approximately 36 m long mist-nets (three 12 m mist-nets) were set up in the observation area opened from dawn through late afternoon (between 06.00 a.m. and 06.00 p.m.) and
checked continuously. Recorded birds were identified using field guide (MacKinnon et al. 1998; Prawiradilaga et al. 2002b; Prawiradilaga et al. 2003).

7) Mammalia

Mammal collection methods were conducted by applying direct observation and trap method. In addition to visual encounter, records of pellet and feces were also accounted as direct observation. Trap methods were conducted using mist net and harp net for bats. Capturing flying bats especially for Megachiroptera using mist net was commonly applied because it is inexpensive, lightweight, compact, and easy to install. Meanwhile, harp net commonly used for Microchiroptera because the principle of this trap is the wires hard to detect by echolocation, and that the bank of wires is sufficient to stop the flight momentum of bats (Kunz & Kurta, 1988). Kasmin cage trap and snap trap were utilized for rats and small terrestrial mammals. All specimens were determined into species level referring to Corbet & Hill (1992), Payne et al. (2000), Suyanto (2001), and Suyanto et al. (2002).

c. Literatures Study


Validation of Scientific Name and Species Status

We validated the scientific names of all taxa according to several comprehensive database sources, i.e. Amphibian Species of the World, AntWeb, AntWiki, Avibase, Birds of the World – Cornell Lab of Ornithology, Bio-Nica.info: Lucanidae of the World, Cassidae.uni.wroc.pl, Catalogue of Life, Coreoidea Species File, FishBase, GBIF, Lamiines of World, Lepidoptera – nic.funet.fi, Lygaeoidea Species File, Molluscabase, Orthoptera Species File, Startseite Plazi, the Biodiversity of Singapore, the Moths of Borneo, the Reptile Database, Tree of Life Web Project, and Wikispecies.

The status of threatened and protected species was validated through IUCN Red List of Threatened Species and Regulation of the Ministry of Environment and Forestry Republic of Indonesia Number P.106/MENLHK/SETJEN/KUM.1/12/2018 about protected plant and animal species. Meanwhile, the status of introduced species was validated through Balon (1974), CABI, FishBase, Nurinsiyah & Hausdorf (2019), Rachmatika (2003), and Rachmatika & Wahyudewantoro (2006).

RESULTS AND DISCUSSION

Results

According to the recent field work, there were 98 species (Table 1; App.1) recorded from Cikaniki-Citalahab, GHSNP. The most abundant group was Insecta (62.9%). The rest of the percentage comprises of Actinopterygii (11.4%), Gastropoda (9.65%), Amphibia (6.4%), Malacostraca and Mammalia each 3.2%, Reptilia (2.5%), Aves (0.5%), and lastly Bivalvia (0.25%).

Based on all three sources, i.e. recent field work, museum collections, and literatures, there were 821 fauna species were recorded in Cikaniki-Citalahab (Table 1; App.2). The fauna diversity comprises of 63.7% of Insecta, 14% of Aves, 5.7% of Gastropoda, 5.5% of Mammals, 4.4% of Reptilia, 3.3% of Amphibia, 2.7% of Actinopterygii, 0.6% of Malacostraca, and 0.1% of Bivalvia. There are 123 endemic species to Java inhabit the area (Table 1; App. 3). Among the fauna diversity, 34 species (4.1%) were assigned as protected Indonesian fauna under the decree P.106/MENLHK/SETJEN/KUM.1/12/2018, whereas five species
(0.6%) were categorized as endangered and three species (0.4%) were categorized as critically endangered by IUCN. In addition, there are eleven introduced species recorded in the area, i.e. four Actinopterygii and seven Mollusca (Table 2).

The proportion of our species compilation data compared to the fauna species data recorded in Indonesia includes 2.32% for non-marine (terrestrial and freshwater) Gastropoda, 8.98% for Insecta, 6.57% for Aves, 5.86% for Amphibia, 5.82% for Mammalia, 7.14% for non-marine (freshwater) Bivalvia, 4.51% for Reptilia, 0.42% for non-marine (fresh-water) Malacostraca, and 1.77% for non-marine (freshwater) Actinopterygii (Table 3). We believe the fauna diversity particularly the invertebrate species recorded in Indonesia were still underestimate from the actual number in nature.

**Table 1.** Species comparison between field work and compilation data (*protected by P.106/2018; **IUCN Red List status).**

<table>
<thead>
<tr>
<th>No.</th>
<th>Class</th>
<th>Field Work</th>
<th>Compilation Data (species)</th>
<th>Status (species)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Abundance</td>
<td>Species Richness</td>
<td>Endemic</td>
</tr>
<tr>
<td>1</td>
<td>Mammalia</td>
<td>13</td>
<td>13</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>Aves</td>
<td>2</td>
<td>2</td>
<td>115</td>
</tr>
<tr>
<td>3</td>
<td>Reptilia</td>
<td>10</td>
<td>4</td>
<td>36</td>
</tr>
<tr>
<td>4</td>
<td>Amphibia</td>
<td>26</td>
<td>9</td>
<td>27</td>
</tr>
<tr>
<td>5</td>
<td>Actinopterygii</td>
<td>46</td>
<td>3</td>
<td>22</td>
</tr>
<tr>
<td>6</td>
<td>Insecta</td>
<td>254</td>
<td>51</td>
<td>523</td>
</tr>
<tr>
<td>7</td>
<td>Malacostraca</td>
<td>13</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>8</td>
<td>Gastropoda</td>
<td>39</td>
<td>14</td>
<td>47</td>
</tr>
<tr>
<td>9</td>
<td>Bivalvia</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>404</td>
<td>98</td>
<td>821</td>
</tr>
</tbody>
</table>

**Table 2.** Introduced species recorded in Cikaniki-Citalahab.

<table>
<thead>
<tr>
<th>No.</th>
<th>Scientific Name</th>
<th>Local Name</th>
<th>Native Range</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Mollusca: Gastropoda</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td><em>Allopeas clavulinum</em> (Potiez &amp; Michaud, 1838)</td>
<td>Keong sumpil</td>
<td>Africa</td>
</tr>
<tr>
<td>2</td>
<td><em>Allopeas gracile</em> (Hutton, 1834)</td>
<td>Keong sumpil</td>
<td>Neotropics, Old World</td>
</tr>
<tr>
<td>3</td>
<td><em>Bradybaena similaris</em> (Férussac, 1822)</td>
<td>Keong semak</td>
<td>Probably China</td>
</tr>
<tr>
<td>4</td>
<td><em>Physella acuta</em> (Draparnaud, 1805)</td>
<td>-</td>
<td>North America</td>
</tr>
<tr>
<td>5</td>
<td><em>Pomacea canaliculata</em> (Lamarck, 1822)</td>
<td>Keong mas</td>
<td>South America</td>
</tr>
<tr>
<td>6</td>
<td><em>Subulina octona</em> (Bruguière, 1789)</td>
<td>Keong sumpil</td>
<td>Neotropics</td>
</tr>
<tr>
<td></td>
<td><strong>Mollusca: Bivalvia</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td><em>Sinanodonta woodiana</em> (Lea, 1834)</td>
<td>Kijing Taiwan</td>
<td>Eastern Asia</td>
</tr>
</tbody>
</table>
Table 3. Comparison of fauna diversity in Cikaniki-Citalahab, GHSNP, and Indonesia.

<table>
<thead>
<tr>
<th>No.</th>
<th>Class</th>
<th>Cikaniki-Citalahab* (species)</th>
<th>Gunung Halimun Salak National Park* (species)</th>
<th>Indonesia** (species)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mammalia</td>
<td>45</td>
<td>83</td>
<td>773</td>
</tr>
<tr>
<td>2</td>
<td>Aves</td>
<td>115</td>
<td>271</td>
<td>1,751</td>
</tr>
<tr>
<td>3</td>
<td>Reptilia</td>
<td>36</td>
<td>61</td>
<td>798</td>
</tr>
<tr>
<td>4</td>
<td>Amphibia</td>
<td>27</td>
<td>32</td>
<td>461</td>
</tr>
<tr>
<td>5</td>
<td>Non-marine Actinopterygii</td>
<td>22</td>
<td>69</td>
<td>1,243</td>
</tr>
<tr>
<td>6</td>
<td>Insecta</td>
<td>523</td>
<td>713</td>
<td>5,825</td>
</tr>
<tr>
<td>7</td>
<td>Non-marine Malacostraca</td>
<td>5</td>
<td>7</td>
<td>1,200</td>
</tr>
<tr>
<td>8</td>
<td>Non-marine Gastropoda</td>
<td>47</td>
<td>84</td>
<td>2,025</td>
</tr>
<tr>
<td>9</td>
<td>Non-marine Bivalvia</td>
<td>1</td>
<td>3</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td>821</td>
<td>1,323</td>
<td>14,090</td>
</tr>
</tbody>
</table>

*Based on field work, literatures, and museum collections

**Based on Amphibian Species of the World, Avibase, BOLD Systems, FishBase, Marwoto et al. (2020), Maryanto et al. (2019), the Reptile Database, Widjaja et al. (2014)

**a. Mollusca (Gastropoda & Bivalvia)**

Based on the recent field work, in total of 40 specimens of molluscs belonging to 14 Gastropoda (snails) and one Bivalvia (mussels) species were collected (Table. 1). Although more specimens were collected from the freshwater (57.5%) compare to the terrestrial (42.5%), they belonged to only five species (from 15 species) of freshwater molluscs. The number of species collected from the terrestrial (land snails) were ten species. The most species-rich family was Cyclophoridae (20%), while the most abundant family was Physidae (30%) (App. 1). Using the same method, Heryanto (2001) reported that land snail species (26 species from 11 families) were collected more than freshwater snail species (10 species from 5 families). All terrestrial gastropod species that were recorded in the recent field work were not new records and included in the list of land snails of GHSNP (Nurinsiyah et al., 2019b).
Compilation data from field work, MZB collections, and literatures resulted 48 species of Mollusca consists of 47 Gastropoda and one Bivalvia. In Java, there were at least 242 species of land snails (Nurinsiyah 2018), 67 species of freshwater snails and 14 species of freshwater bivalves (Marwoto et al. 2020). Molluscs in Cikaniki-Citalahab contributed 14.9% to the total non-marine molluscs in Java, 25% if the total mollusca in GHSNP are included. The molluscs diversity in GHSNP are expected to be higher than the current record since the estimated species richness of terrestrial gastropod alone might reach 93 species (Nurinsiyah et al. 2019).

Figure 2. Left: Geotrochus conus (Pfeiffer, 1841). Right: Japonia ciliocincta (Martens, 1865).

Figure 3. Geosesarma cikaniki at Cikaniki-Citalahab track.
Eight species endemic to Java were recorded in the area and all of them are terrestrial gastropoda (land snails), i.e. Diplommatina halimunensis Nurinsiyah & Hausdorf 2017, Pupina junghuhni Martens 1867, Microcystina subglobosa (Möllendorff 1897), Chloritis fruhstorferi Möllendorff 1897, Amphidromus alticola Fulton 1896, Oospira salacana (Böttger 1890), Elaphroconcha patens (Martens 1898), and Geotrochus conus (Pfeiffer 1841) (Fig. 2). There were seven introduced species recorded in Cikaniki-Citalahab which consists of four land snails and three freshwater species (Table 2). There were no molluscs in Cikaniki-Citalahab or GHSNP in general that are protected by Permen LHK P.106/2018. However, they are protected by its locality (inhabit inside a conservation area).

b. Crustacea (Malacostraca)

Previous surveys and studies recorded seven crustaceans from GHSNP, namely Geosesarma cikaniki, Malayopotamon sp., Macrobrachium pilimanus, Macrobrachium empulipke, Occulthusa halimun, Parathelphusa bogorensis, and Parathelphusa convexa (Hernawati unpublished; Ng & Wowor 2018; Wowor 2010; Wowor & Ng 2019). The species were recorded in Cikaniki-Citalahab area, except M. empulipke and P. bogorensis. From the current study, one crustacean was collected by hand at elevation 1,066-1,155 m asl, i.e. Geosesarma cikaniki (Fig. 3). Thirteen collected G. cikaniki specimens consist of seven males, four females, and two juveniles. Based on the recent field work, tubercle on the dactylus is only present on adult male specimen around 15-19 teeth. The fact corresponds to Wowor & Ng (2019). However, young male with mature pleopod, width length (WL) 7.32-7.62 mm and carapace length (CL) 6.9-7.17 mm, has only seven tubercles on the proximal dactylus. G. cikaniki and O. halimun are endemic to GHSNP. M. empulipke can be found in Java and Sumatra (Wowor 2010), P. bogorensis and convexa occurred in Java (Esser & Cumberlidge 2008), and M. pilimanus is distributed from Sumatra, Java, and Kalimantan (Cai et al. 2004; Chace & Bruce 1993).

c. Insecta

Study on insects in the Halimun Salak National Park in 2015 to 2017 under the IndoBioSys project revealed the diversity of insect species from four orders (Coleoptera, Lepidoptera, Hymenoptera, and Trichoptera) reaching around 3,500 species (Cancian de Araujo et al. 2017). Our recent field work collected 254 insect specimens consisted of nine orders, 23 families, and 51 species (Table 1; App. 1). The family Formicidae represented the order Hymenoptera had the highest abundance with 98 specimens (from nine species). This result was in accordance with the research of Haneda et al. (2019), but Kahono & Noerdjito (2002) reported that the order Homoptera was the most abundant during October 2000 or even from March 2000 until February 2001 by applying the same method. Suhardjono (2002) reported that Formicidae and Staphylinidae were two of the most abundant insect families in Cikaniki, GHSNP. Meanwhile based on the compilation
data from recent field work, museum collections, and literatures, in total of 523 species of Insecta were recorded in Cikaniki-Citalahab (Table 4). Ordo Coleoptera and Lepidoptera had greater members than other orders. The species was dominated by family Cerambycidae (20.07%), followed by family Nymphalidae (15.67%) and family Geometridae (7.45%). The three families have been recorded in Cikaniki-Citalahab and its surroundings respectively by Makihara et al. (2002), Peggie & Harmonis (2004) and Ubaidillah et al. (1998), and Sutrisno et al. (2015).

**Table 4.** Insect diversity from Cikaniki-Citalahab based on field work, MZB collections, and literatures

<table>
<thead>
<tr>
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**Table 4.** Insect diversity from Cikaniki-Citalahab based on field work, MZB collections, and literatures.
Checklist on Fauna Diversity Gunung Halimun Salak National Park: Cikaniki-Citalahab

<table>
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The recent field work revealed *Odontoponera* and *Pheidole* were more abundant genera than the others in Formicidae (App. 1). *Odontoponera* that we collected in altitude 1,060-1,076 m asl near Cikaniki research station (Fig. 4) are either *Odontoponera denticulata* or *O. transversa*. Based on two characteristics (relative length of antennal scape and development of raised area on vertex), our specimens are expected to be *Odontoponera transversa* which is mostly known to be found in natural habitat, while *O. denticulata* is contrary (Yamane 2009) at least when both species are overlapping in distribution. Yamane’s specimens (four workers) from around Cikaniki are *O. transversa* that are rather dark-colored. Nevertheless, Yamane commented to our specimens that they are probably *O. denticulata*. There is a strong possibility that *O. transversa* and *O. denticulata* have related cryptic species. Moreover, there is a possibility that mountain populations are specifically different from lowland populations (S. Yamane 2020, pers. comm.).

Meanwhile, the beetles (Coleoptera) had the highest species richness with 21 recorded species, and the member of rove beetles (Coleoptera: Staphylinidae) was the largest (10 species) of all insect families (App.1). The greatest abundance in rove beetles was represented by tribe Athetini (subfamily Aleocharinae; fig. 5a). This result corresponded to Qodri et al. (2016) by the same method (pitfall trap). Seevers (1978) declared that the athetine beetles could adapt in various microhabitat, so they become the most successful small beetles. In comparison to other trap, Yamamoto et al. (2013) denoted the tribe Athetini occupied the second place to Oxytelini (Staphylinidae: Oxytelinae) in abundance by the dung trap method. We also collected one individual which was expected a member of genus *Stilicoderus* (Staphylinidae: Paederinae; fig. 5b) based on Cameron (1931). In Mount Halimun, Assing (2017) reported his finding of *Stilicoderus parvus* on August 2009. Another *Stilicoderus* was known to be distributed in Java, i.e. *S. bacchusi* (Rougemont, 1986), *S. brunneipennis* Cameron, 1936, and *S. drescheri* Cameron, 1936 (Assing 2016). The other staphylinid beetles were from subfamily Staphylininae, i.e. *Philonthus* sp. (Fig. 5c) and *Thoracostrongylus* sp. (Fig. 5d). Cameron (1937) has described a number of species from these two genera that were collected by Mr. F. C. Drescher in Java, one of which is from Mount Slamet.
Figure 4. *Odontoponera transversa* from Cikaniki. Left: front side, Right: lateral side. White arrow shows development of raised area on vertex (triangular bump form). The rest of the antennal scape that exceeds the head is 1.7-2.6 times longer than the first funicular segment.

(a)  
(b)  
(c)  
(d)  
(e)  

Figure 5. Rove beetles from Cikaniki. a) An athetine member (BL = ±1.5 mm), b) *Stilicoderus* sp. (BL = ±4.2 mm), c) *Philonthus* sp. (BL = ±5 mm), d) *Thoracostrongylus* sp. (BL = ±8mm), e) *Ystrixoxygymna* sp. (BL = ±1.6 mm). Annotation: BL = Body Length.

When viewed per species, *Odontotermes* sp. (termite colony; Fig. 6a-c) of the order Blattodea which was collected at Curug Macan (973 m asl) near Cikaniki research station had the highest number of collected specimens (63 individuals; App.1) consists of 52 workers and eleven soldiers. These termites were obtained through hand
collections from the decayed wood which has been crushed together with the soil. Interestingly, we found a beetle from the Tachyporine group, i.e. *Ystrixoxygymna* sp. (Fig. 5e), which was strongly suspected of being associated with termites. Based on morphological characters, it was similar to termitophilous Staphylinidae, e.g. *Coptotermocola clavicornis* (Kanao et al. 2012), *Discoxenus katayamai* (Kanao et al. 2010), and *Termitodiscus* sp. (Yamamoto et al. 2016). *C. clavicornis* was collected in nest of *Coptotermes gestroi*, while *D. katayamai* and *Termitodiscus* sp. were found to be symbiotic with genus *Odontotermes*.

Based on the sweep netting method, we collected five individual odonates and 13 individual lepidopterans (App. 1). The two dragonfly species were identified as *Vestalis luctuosa* (male and female; fig. 7a,b) and *Zygonyx ida* (Fig. 7c). They were previously recorded in Cikaniki and more frequently found near stream (Aswari 2004; Aswari & Cholik 2002). In line with the data compilation result, Nymphalidae is the most abundant and diverse butterfly family in recent field work.

Figure 6. *Odontotermes* sp. from Cikaniki. (a) Pronotum shaddle shaped, b) Head: left mandible with small tooth, c) Lateral view (scale = 1 mm).

Figure 7. Dragonflies from Cikaniki-Citalahab loop trail. (a) *Vestalis luctuosa* ♀, (b) *V. luctuosa* ♂, (c) *Zygonyx ida*.
Neptis clinia (Fig. 8a,b), Cupha erymanthis (Fig. 8c), and Tanaecia iapis (Fig. 8d) are representatives of Nymphalidae in our recent field work. The first species was collected near Cikaniki research station, and the last two were found at Cikaniki-Citalahab loop trail. Neptis clinia was never reported its presence in Halimun-Salak. However, Eliot (1969) described new subspecies (N. c. phrasylas) of N. clinia which was collected by Fruhstorfer one of which in Lawang, East Java in 1897. From GBIF occurrence datasets, only N. c. phrasylas which occurred in Java and all recorded specimens were deposited in Museum Leiden. Especially for West Java, the specimens were known to be distributed in Mega Mendung, Raja Mandala, and Sukabumi (de Vos & Creuwels 2020). On the other hand, Cupha erymanthis and Tanaecia iapis were also recorded in the western part of Java (Banten and West Java) (Bahar et al. 2016; Dendang 2009; Lestari et al. 2018; Murwaningsih & Dharma 2016; Mustari & Gunadharma 2016; Peggie 2012; Peggie & Amir 2006; Peggie & Harmonis 2014; Septianella et al. 2015).

Figure 8. Brush-footed butterflies from Cikaniki-Citalahab. (a) Neptis clinia (upper-side; W = ±4.3 cm), (b) N. clinia (down-side), (c) Cupha erymanthis (W = ±4.5 cm), (d) Tanaecia iapis ♀. Annotation: W = Wingspan.
Highlighting the beetles, we did not collect longicorns due to the different method applied. However, two coleopterans were identified to species level, i.e. *Eumorphus columbinus* (Endomychidae) and *Omadius indicus* (Cleridae). We collected a handsome fungus beetle *E. columbinus* (Fig. 9a) at Curug Macan, while two checkered beetles *O. indicus* (Fig 9b) was found in groups together with *Stigmatium* sp. (Fig. 9c) in fallen rotten wood on the Cikaniki-Citalahab loop trail (1,124 m asl). Strohecker (1968) described *E. columbinus* originating from Banten and presumed to be confined to Java. In 1986, Mawdsley (1996) examined *Omadius indicus* collected by P. M. Hammond from the Bogani Nani Wartabone National Park, North Sulawesi. *Omadius indicus* recorded in Java is known to be deposited in the collection of British Museum (Gray 1849). In the meantime, *Stigmatium* badly needs revision (Gerstmeier 2020, pers.comm.).

![Figure 9](image_url)

**Figure 9.** Endomychidae and Cleridae from Cikaniki-Citalahab. (a) *Eumorphus columbinus* (BL = ±9.7 mm), (b) *Omadius indicus* (BL = ±8.7 mm), (c) *Stigmatium* sp. (BL = ±6 mm). Annotation: BL = Body Length.
According to the compilation data, we also calculated 77 species among the insects were endemic to Java. A single species (*Troides helena*) was reported to be protected by government (Permen LHK P.106/2018). In the meantime, several species of longhorn (Cerambycidae) and stag beetles (Lucanidae), namely *Bandar pascoei*, *Batocera parryi*, *Hexarthrius rhinoceros*, *Odontolabis dalmani bellica*, *Prosopocoius astacoides*, *Prosopocoius zebra*, and *Serrognathus taurus* were registered in the list of Non-Appendix CITES based on Decree of the Directorate General of Natural Resources and Ecosystem Conservation No. SK.1/KS-DAE/KKH/KSA.2/1/2020 concerning quotas for harvesting natural plants and capturing wild animals for the period 2020.

d) **Fishes (Actinopterygii)**

There were 46 fish specimens that we collected covering three species from three different families, i.e. *Rasbora lateristriata* (33 specimens) and *Poecilia reticulata* (11 specimens) were collected at Cikaniki-Citalahab, and *Channa gachua* (two specimens) only found from Citalahab. We collected them in shallow river with gravel sand substrate and the flow is relatively swift. Those three species were also recorded by Rachmatika (2003). Based on the compilation data from various methods, there were 22 species of Actinopterygii from five orders and eight families that recorded in Cikaniki-Citalahab (App. 2), and four species of which are introduced species (Table 2). Due to sampling duration, the number of species found in recent field work is relatively less than previous study by Rachmatika *et al.* (2002b) which reported seven species of fishes from Cikaniki. At least, Rachmatika (2003) collected five species near our study site, i.e. *Glyptothorax platypogon, Rasbora aprotaenia, Channa gachua, Monopterus albus*, and *Cyprinus carpio*.

*Rasbora lateristriata* (Fig. 10) was found abundant during the recent field work. Rachmatika (2003) previously reported that the distribution of this freshwater fish included Sundaland, Bali, Lombok, and Sumbawa. However, the latest records state that this species is endemic to the western part of Java and adapted in the upstream and downstream rivers, with clear water condition, moderate current, and rock and gravel substrates (Kusuma et al. 2016; Lumbantobing 2019). In GHSNP, this species has been found at the upstream of Cisadane and Cikaniki river, also in Kampung Central, Citalahab (Lumbantobing 2014) and inhabited rocky and gravel waters with moderate flow in Cisadane river (Rachmatika 2003). The conservation status in IUCN Red List is vulnerable (VU) and not protected by the Ministry of Environment and Forestry regulation number P.106/2018.

*Poecilia reticulata* is originated from part of South America (Farr 1975) and had been introduced widely around the world (CABI [accessed on 19 Nov 2020]). This species can be found in various types of freshwater and tend to be more abundant in smaller rivers or ponds than in large, deep, or fast-flowing rivers (Magurran & Philip 2001). This species is not evaluated (NE) in IUCN Red List and not protected by the government regulation.
Channa gachua is widespread in Asia region, including Indonesia (FishBase [accessed on 19 Nov 2020]). Adults inhabit medium to large rivers, brooks, rapid-running mountain streams, and stagnant water bodies including sluggish flowing canals (Taki, 1978) as well tributary in Halimun-Salak Mountain (Rachmatika 2003). The conservation status in IUCN Red List is least concern (LC) and also not protected by the government regulation.

e) Herpetofauna (Amphibia & Reptilia)

The recent field work recorded nine species of amphibian and four species of reptiles. The species include five families of amphibians (Ranidae, Dicroglossidae, Bufonidae, Rhacophoridae, and Megophryidae) and three families of reptiles (Scincidae, Agamidae, and Colubridae). A total of 10 species (76.92%) were listed in IUCN Red List of Threatened Species as least concern (LC). Two species of reptiles, i.e. Gonocephalus kuhlii (Fig. 11) and Sphenomorphus sanctus listed as not evaluated (NE). Among the 13 recorded species, five are endemic to Java, they are Huia masonii, Leptophyrene borbonica (Fig. 12), Limnonectes microdiscus, Philautus pallidipes, and Rhacophorus margaritifer. According to the previous records, eight endemic herpetofauna species were recorded in GHSNP, namely Rhacophorus margaritifer, Philautus pallidipes, Leptophyrene cruentata, Microhyla achatina, Huia masonii, Philautus vittiger, and Sphenomorphus punicentralis (Kurniati 2005; Mumpuni 2001). In October 2008, Riyanto (2011) reported four Javan endemic anurans (Huia masonii, Megophrys montana, Microhyla achatina, and Rhacophorus margaritifer) were found in Gunung Ciremai National Park. Eight herpetofauna species were recorded in lowland forest, seven of which were Chalcorana chalconota, Limnonectes kuhlii, Gonocephalus chamaeleontinus, Cyrtodactylus fumosus, Hemidactylus frenatus, Sphenomorphus sanctus, and Sphenomorphus temminckii. Meanwhile, Gonocephalus kuhlii was collected in the shrub-old pine forest (1500-1600 m asl), secondary forest (1600-1700 m asl), and primary forest (1700-2000 m asl) of Gunung Ciremai National Park.
Based on data compilation from recent field work, MZB collections, and literatures, there were 63 species recorded from Cikaniki-Citalahab (Table 1). The highest number of species came from family Rhacophoridae and Colubridae, each with seven species (App. 2). Two species of snakes, namely *Naja sputatrix* and *Malayopython reticulatus* were assigned in the list of Appendix CITES for trade quota, in which regulated globally. Among the recorded species, eleven species are endemic to Java and one species, *Leptophryne cruentata*, listed as critically endangered (CR).

**f) Birds (Aves)**

From the mist net method, two bird species were recorded, i.e. *Alcedo meninting* (Blue-eared Kingfisher) and *Zoothera andromedae* (Sunda Thrush) (Fig. 13). The small number of species obtained was supposed to be the result of short period of mist-netting activity and insufficient availability of bird catching nets. The presence of the blue-banded kingfisher
(Alcedo euryzona) on the forest floor of Gunung Kendeng, GHSNP was previously reported in May and October 2001, while Sunda Thrush (Zoothera andromedae) was reported from August to November 2001 (Prawiradilaga et al. 2002). In Cikaniki, we recorded A. meninting near the stream. A. meninting was reportedly suitable to inhabit not far from river shingles (Noske et al. 2011) and stream (Chan & Setiawan 2019). The natural habitat of A. meninting was streams, creeks, channels and estuaries in evergreen and wet deciduous forest, bamboo-forest and dense mangroves, regenerating and tall secondary forest, forest edge, and occasionally found at streams through tree plantations (Woodal 2020). Meanwhile, Z. andromedae can be found in understorey of dense primary mossy hill forest and montane forest (Collar 2020). Since 2016, the conservation status of Alcedo meninting and Z. andromedae was reportedly included in the least concern (LC) category (Prawiradilaga 2016).

Figure 13. Alcedo meninting (left) and Zoothera andromedae (right) in Cikaniki.

Based on the compilation data from field work, MZB collections, and literatures, there were 115 species of birds recorded in Cikaniki-Citalahab (Table 1) consist of 12 orders and 42 families (App. 2). Ordo Passeriformes (77 species) contributed as the most diverse species than others, in which, family Muscicapidae (19 species) had the largest members. The two bird species (Nisaetus bartelsi & Chloropsis cochinchinensis) were categorized as endangered and one species (Alcedo euryzona) as critically endangered according to the IUCN Red List. They were also assigned in the list of protected species based on Permen LHK No. P.106/2018, except C. cochinchinensis. Five species were registered in the list of Non-Appendix CITES for trade quota regulated by the government, i.e. Alophoixus bres, Erythrura prasina, Pomatorhinus montanus, Prinia familiaris, and Zosterops palpebrosus. For the migratory birds, one species (Cyornis bruneatus) was recorded before in Cikaniki-Citalahab (Noske et al. 2011). Mahood et al. (2013) confirmed that C. bruneatus as a migratory bird and its status in the IUCN Red List was globally vulnerable. We also recorded 16 species of Javan endemic birds from Cikaniki-Citalahab and surroundings. Prawiradilaga (2016)
revealed that GHSNP is very important for the survival of 43 endemic bird species (17 are endemic to Indonesia, 26 are endemic to Java and Bali), in which 32 of the total endemic species in the national park are birds with restricted distribution.

**g) Mammalia**

Three bats were collected during the recent field work. They consist of two common species, *i.e.* *Chironax melanocephalus* and *Cynopterus brachyotis* (Fig. 14) which were both trapped in mist net. In addition, ten mammal species were encountered by direct observation. *Cuon alpinus* was not encountered by visual observation but recorded by its sound. Based on previous studies, ten species were reported in Cikaniki Research Station (Tobing 2002, Mustari *et al.* 2015). Chiroptera was captured on this site in 2002 (Mustari *et al.* 2015), however identification did not carry out up to species level. One of interesting findings was Sunda Stink-badger (*Mydaus javanensis*) which visually encountered in the observation track (Fig. 13). Sunda Stink-badger was reported to have nocturnal activity (Higashide *et al.* 2018, Vickers *et al.* 2017). Nevertheless, *Mydaus javanensis* at Halimun was active during the day (Suyaanto 2003). At the Gunung Botol resort, also belongs to GHSNP, *M. javanensis* was reportedly caught by camera trap between October and November 2012 (Mustari *et al.* 2015).

![Figure 14. Cynopterus brachyotis (left) from Cikaniki and Mydaus javanensis (right) at Cikaniki-Citalahab loop trail.](image)

Based on the recent field work, MZB collections, and literatures there were 45 species of Mammalia in Cikaniki-Citalahab (Table 1). The family Pteropodidae and Muridae had the most species (each 11.11%), followed by Vespertilionidae and Viverridae (each 8.89%). Another family member ranged between 2.22%–6.67% (App. 2). However, several species were not found in this recent field work such as *Panthera pardus*, *Prionailurus bengalensis*, *Prionodon linsang*, *Amblonyx cinereus*, *Muntiacus muntjak*, and Muridae species. It might be caused by short collecting time and inappropriate tools. Some mammals required different methods and efforts. The two species of mammals were only identified to genus level. According to the IUCN Red List, one mammal species was
assigned as Critically Endangered (CR), i.e. *Manis javanica*. A single species (*Viverricula indica*) recorded from Cikaniki-Citalahab was registered in the list of Appendix CITES and eleven species were listed in protected species.

**Discussion**

There are 552 conservation areas in Indonesia which covers 27.4 million ha comprises of 22.1 million ha or terrestrial conservation area and 5.3 million ha of marine conservation area (KLHK, 2018). Approximately 59.79% from the total conservation area assigned as national parks. These areas are the center for Indonesian biodiversity (DESPA-KLHK 2017). In Indonesia, there are 54 national parks which covers 16.52 million ha. Among twelve national parks in Java, Gunung Halimun Salak National Park is the largest tropical mountain rain forest remaining in Java with total area of 113,357 ha (DESPA-KLHK 2017). Based on compilation data from field work, literatures, and museum collections, at least 1,323 fauna species (Table 3) inhabit the national park. This number might underestimate the actual number of fauna diversity in GHSNP. The Indobiosys project estimated around 3,500 insect species of specimen collection from 2015 to 2017 in GHSNP (Cancian de Araujo et al. 2017). Prawiradilaga et al. (2016) emphasized that GHSNP is one of the National Parks which has the highest bird species richness in Java and Bali.

In the last decade alone, at least 13 new species were described from GHSNP. Most of the newly described species were insects, namely *Cardiodactylus erniae* Robillard & Gorochov 2014, *Drosophila sungaicol*a Suwito & Watabe 2010, *Drosophila hitam* Suwito & Watabe 2010, *Drosophila barobusta* Suwito & Watabe 2010, *Drosophila sundaensis* Suwito & Watabe 2010, *Drosophila albipalpis* Katoh, Toda & Gao 2018, *Dichaetophora javaensis* Yang & Gao 2017, *Halimunella tadauchii* Kamitani 2012, *Hishimonus bilobatus* Kamitani 2011, *Phortica halimunensis* Toda 2020. There were two Malacostraca described from GHSNP in the past decade, i.e. *Occulthusa halimun* Ng & Wowor 2018 and *Geosesarma cikaniki* Ng & Wowor 2019. In addition, one terrestrial Gastropoda was described from the national park which was *Diplommatina halimunensis* Nurinsiyah & Hausdorf 2017.

The fauna diversity in GHSNP also higher compare to most of national parks in Java. Compare to Gunung Ciremai National Park (GCNP), GHSNP inhabits 2.65 times more species of Cerambycidae (106 species) in Cikaniki-Citalahab alone. Noerdjito (2011), Aswari (2011), and Peggie & Noerdjito (2011) reported 40 species of Cerambycidae, 20 species of dragonflies, and 109 species of butterflies from 2006 to 2008 at Mount Ciremai. The number of terrestrial gastropods also higher in GHSNP compare to GCNP which recorded 48 species (Heryanto 2012). The total vertebrate species recorded in Cikaniki-Citalahab were 245 species. The number is higher compare to vertebrate diversity reported from GCNP which was 165 species (Gunawan et al. 2008;
Maharadatun & Maryati 2008; Rachmatika & Wahyudewantoro 2009; Riyanto 2011; Surahman 2010).

Compare to the neighbouring montane forest, Gunung Gede Pangrango National Park (GGPNP), species richness of vertebrates recorded in GHSNP was 1.4 times greater than the species found in GGPNP. Birds in GGPNP consist of 48 families and 262 species (Ario 2010), while in GHSNP at least 53 families and 271 species were reported (Prawiradilaga 2016). Mammals in GGPNP consist of seven orders, 20 families, and 50 species (Ario 2010). A total of 39 mammal species in GHSNP based on our compilation data were also recorded in GGPNP. From the seven species of fishes reported in GGPNP (Ario 2010), all were recorded in GHSNP and six species among them occurred in Cikaniki-Citalahab.

The number of species richness in GHSNP is slightly higher compare to Alas Purwo National Park (APNP) which located in the most eastern part of Java. Nugraha et al. (2012) revealed 46 species of mammals, 283 species of birds, 49 species of reptiles, 15 species of amphibians, and 10 species of fish in APNP. The species composition between the two national parks is somewhat different. Based on the 13 species recorded by Ainullah et al. (2015), only one species was recorded both in GHSNP and APNP namely Caranx sexfasciatus. Broto & Subeno (2012) recorded 18 species of reptiles and 13 species of amphibians in 2008-2009 and eight species among them were not recorded in GHSNP. The different species composition might be caused by different climatic conditions. Annual temperature and soil pH in Java increased and the annual precipitation decreased toward the eastern part of Java (Whitten et al. 1997; Wikramanayake 2002).

Among other stations in GHSNP, fauna diversity in Cikaniki-Citalahab is quite high which supported about 62.1% of fauna diversity in GHSNP (Table 3). However, increasing human activity might lead to the disruption on the fauna habitat and diversity. GHSNP, especially Cikaniki research station and its surroundings, is an important conservation area which inhabits high number of endemic species. Some species among them are currently under critical or critically endangered status. This shows that information on biodiversity needs to be continuously disclosed because of the role of national park as conservation area. Furthermore, periodic research needs to be carried out with the aim of uncovering population trends of each species group, conservation management, and uncovering new species discoveries.

CONCLUSION

Gunung Halimun Salak National Park is the largest tropical mountain rainforest in Java. Cikaniki and Citalahab area of GHSNP, although located near human settlement, the number of species inhabited the area was still high. 821 species were recorded based on recent field work, MZB collection, and literatures study. 123 endemic species to Java inhabit the area. Furthermore, five species were assigned as endangered, three species as
critically endangered by IUCN, and 34 species were included in the list of protected species based on P.106/MEN-LHK/SETJEN/KUM.1/12/2018. Further and comprehensive research on the fauna biodiversity in the Gunung Halimun Salak National Park are still needed. Species inventory and monitoring are compulsory as part of biodiversity conservation in particular and area conservation in general. Moreover, raising awareness and enforcing conservation effort in these areas are very important to protect both the species and the habitat.

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None of authors has a conflict of interest. The details of our contribution are as follows: AQ, ASN, E, IVU, M, NS, PRF, PSS, RTH, SR, and UN conducted sampling at the study sites. ED is in charge for mammalian taxa, Y for birds and mapping, AENH for herpetofauna, IVU and R for fishes, RTH for crustaceans, ASN for mollusks, and finally AQ, ASB, and E are responsible for insect taxa. FS and GA assisted in the manuscript work and data checking. ASN reviewed the manuscript before submission. AQ coordinated and ensured the entire process in the manuscript processing.

**SUPPLEMENTARY DOCUMENTS**

**Appendix 1.** Field Work Specimens from Cikaniki-Citalahab
(https://hdl.handle.net/20.500.12690/RIN/KN T3WX)

**Appendix 2.** Fauna Diversity at Cikaniki-Citalahab Resort, GHNSP
(https://hdl.handle.net/20.500.12690/RIN/KN T3WX)

**Appendix 3.** Endemic Fauna at Cikaniki-Citalahab Resort, GHSNP
(https://hdl.handle.net/20.500.12690/RIN/KN T3WX)

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Checklist on Fauna Diversity Gunung Halimun Salak National Park: Cikaniki-Citalahab


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