

Original research

Damselflies Found in Batu Putu Waterfall Nature Park

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ABSTRACT

Batu Putu Waterfall Nature Park is one of the many local tourist destinations in Bandar Lampung City, yet biodiversity data of it is so scarce. Since this area focused on its waterfall's natural beauty and the river alongside it, it was deemed important to conduct a study to better understand local organism that have close relationship with freshwater bodies. This study aims to determine the damselfly species found in Batu Putu Waterfall Nature Park. Specimens were captured using insect nets along the waterfall and riverbed during the daytime in fine weather. These specimens were then preserved in an insectarium and later identified using taxonomic keys. The result found at least four species of damselflies were living in Batu Putu Waterfall Nature Park area. Those are *Euphaea variegata*, *Vestalis luctuosa*, *Prodasineura* sp, and *Elatoneura* sp.

Keywords: damselfly, Batu Putu, Bandar Lampung

Introduction

Batu Putu Waterfall Nature Park is one of the many local tourist destinations in Bandar Lampung City. This site was located on a lush green plot of land featuring a nice waterfall named Batu Putu (Sukmah, 2023). Because their pristine natural landscape is the main selling point, maintaining biodiversity is crucial in managing nature parks (Siikamäki et al., 2015). Especially if these nature parks are located in cities and other urban areas with high human activities (Aronson et al., 2017). And yet biodiversity data in Batu Putu Waterfall Nature Park is so scarce. At the time this paper is written, the only papers available focusing on biodiversity in that area is from Rahayu (2020) which focused on bamboos and from Rugayah et al (2020) which focused on mangosteen. There was no other published data about other species in that area.

Batu Putu Waterfall Nature Park is surrounded by small rivers and a small natural pool right below the waterfall. Understanding the species present in freshwater habitats can help identify any potential threats or disturbances in freshwater environments (Gatti, 2016). Therefore, it is important to obtain biodiversity data concerning any species that utilize these freshwater bodies to complete their life cycle.

One of the most commonly found species near freshwater bodies is damselflies. These species relies on many environmental factor that could influence the life of their nymph (Ball-Damerow et al., 2014; Barmantlo et al., 2019; Gorham & Vodopich, 1992; Verberk & Calosi, 2012). The overall water quality could affect damselfly communities in ponds (Perron & Pick, 2020). Damselflies was indispensable in aquatic food web and was useful as indicators of ecological health of

streams and lakes (Tennessen, 2009). This study aims to fill the gap in biodiversity data by determining the damselfly species found in Batu Putu Waterfall Nature Park.

Material and Methods

This study utilized an active collecting method using insect nets to capture damselflies along the Batu Putu waterfall and riverbed. Collection was conducted in daytime in fine weather on November 18th, 2023. The time of collection was 10.00 to 15.00 local time. The condition at the time of collection can be seen in Figure 1. The map location of Batu Putu waterfall is in Figure 2.



Figure 1. Batu Putu Waterfall (a) and the riverbed near the waterfall (b). Note that the pond below the waterfall has been modified to form a natural pool.

The tools used are forceps, surgical knives, insect nets, insect envelopes, insect storage tubes, magnifying glasses, containers and killing bottle.

The materials used were insect samples, cottons, 70% alcohol and chloroform.

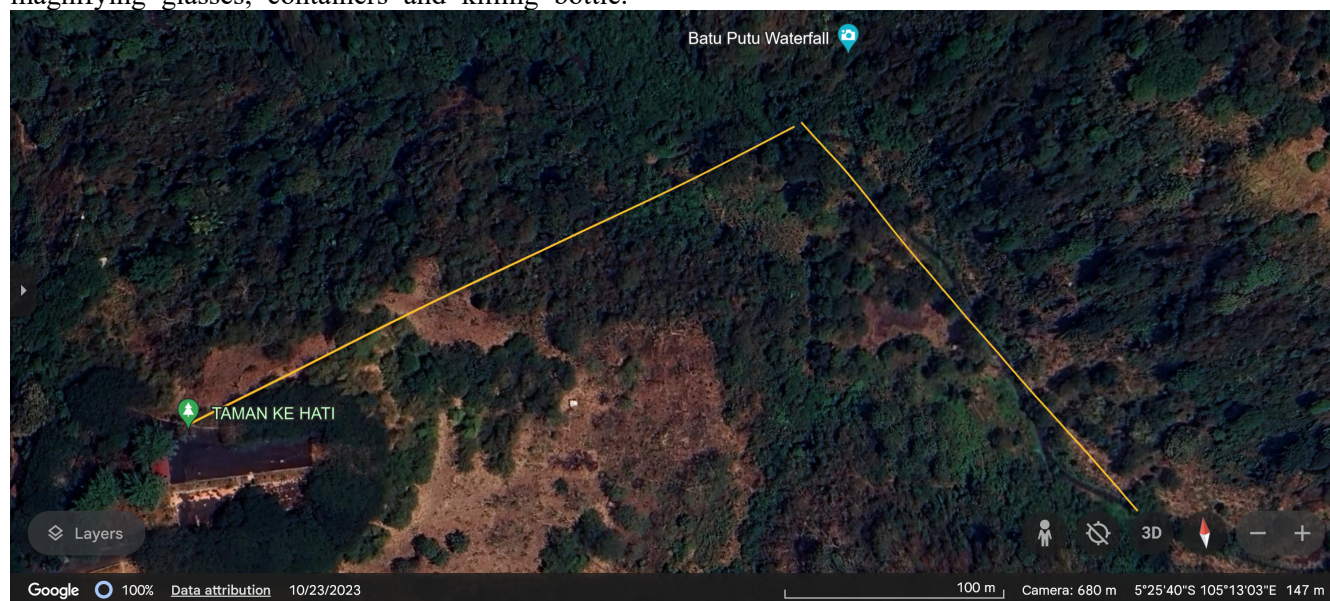


Figure 1. Sampling area along the track of Taman Kehati (Keanekaragaman Hayati) Batu Putu, Batu Putu Waterfall and Batu Putu River (Source: Google Earth)

Damselflies were collected using insect net. They were then inserted into killing bottle equipped with chloroform cottons. Samples were brought to Zoology Laboratory of Institut Teknologi Sumatera for preservation. The samples were then stretched on wooden span block and then left for 1-2 days. The next step was identification by comparing the samples caught with the description on identification keys. For future purposes, these specimens were preserved in an insectarium.

Results and Discussion

Four species of damselflies in Batu Putu Waterfall Nature Park have been identified. Those are *Euphaea variegata*, *Vestalis luctuosa*, *Prodasineura* sp., and *Elatoneura* sp. Their presence shows that the aquatic environment surrounding Batu Putu Waterfall is ideal for damselflies to complete their life cycle, especially because damselflies need freshwater bodies for their nymph stage (Tennessen, 2009).

Euphaea variegata (Figure 3) is a member of the Euphaeidae family. This is a species of damselfly found in the tropical rainforests of Asia, particularly in Indonesia (Nafisah & Soesilohadi, 2021; Pranoto et al., 2019; Rachman & Rohman, 2016; Saefullah et al., 2021; Sugiman et al., 2020; Yuditaningtyas et al., 2022). *Euphaea variegata* is characterized by its large needle-like body, black head with slight white color below the eyes, black thorax, yellow sinthorax, and metallic blue dorsal side. Its abdomen and legs are metallic black, and the wings are black with a rainbow-like metallic pattern when closed. Females show similar shape and coloration, but with a broader yellow

coloration on their thorax and an overall paler color (Saefullah et al., 2021). These damselfly specimens were captured near riversides, sometimes flown across the river. *Euphaea variegata*'s population status is listed as Least Concern (LC), indicating no immediate threat to its survival (IUCN, 2018).



Figure 3. *Euphaea variegata* found in Batu Putu Waterfall Natural Park.

Vestalis luctuosa (Figure 4) is a damselfly from the family Calopterygidae and the suborder Zygoptera. The Calopterygidae family is commonly known as the ebony jewelwing. This name is given because the wings of this damselfly are metallic black, resembling jewelry. Similarly, *Vestalis luctuosa* has metallic black wings with a blue iridescence when exposed to light. Its body measures approximately 40-45 mm in length, with a wingspan of 75-80 mm. The large eyes are clearly visible on both the right and left sides. The male

damselfly's body is metallic blue-purple, and all four wings are metallic black with a bluish-purple sheen. In contrast, the head and thorax of the female damselfly are metallic green, and the abdomen is brown, with all four wings lacking color (Aswari, 2004).

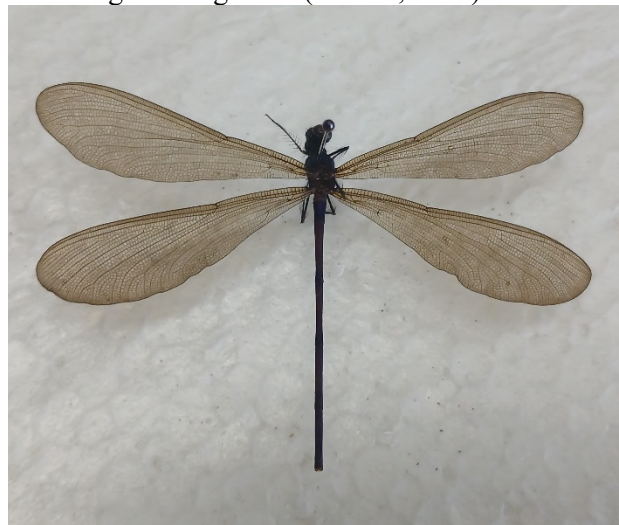


Figure 4. *Vestalis luctuosa* found in Batu Putu Waterfall Natural Park.



Figure 5. *Prodasineura* sp. found in Batu Putu Waterfall Natural Park.



Figure 6. *Elatoneura* sp. found in Batu Putu Waterfall Natural Park.

Prodasineura sp. (Figure 5), commonly known as the Asian threadtails, is a damselflies genus in the family Platycnemididae. These damselflies are delicately built, characterized by their wide heads. The males exhibit striking color contrasts, typically having a black body with blue, red, or yellow stripes. When distinguishing species within the genus, the color pattern on the male's synthorax (which carries the wings) and the tip of his abdomen, along with the shape of the four terminal appendages (cerci and paraprocts, or male claspers for copulation), serve as useful features. The cerci resemble hammer-like structures with pointed apices, while the broad paraprocts taper abruptly toward rounded tips. Although females share broad similarities with males, details of their well-developed prothorax aid in species differentiation. These damselflies inhabit various environments, including fast-flowing streams and slower streams over sandy substrates. Some are found in open streams within secondary forests or the tributaries of lowland rivers (Phan & Ngo, 2020).

Elatoneura sp. (Figure 6) is another member of Platycnemididae family. *Elatoneura*, also known as African threadtails, belongs to the damselfly genus in the Platycnemididae family (Dijkstra et al., 2014). Previously classified under the genus *Prodasineura*, which now form a distinct group. These delicately built damselflies are relatively small, and their males have notably wide heads (in comparison to *Platycnemis* and *Copera*) (Dijkstra, 2016). Typically, adults inhabit sheltered areas near running water, although some prefer calmer waters with abundant debris. There seem to be two distinct groups based on habitat preferences: those with frosty grey or white faces and mostly blue epleaseyes inhabit open terrain watercourses, while those with black or brightly colored faces are found near forested streams (Dijkstra, 2016).

Dragonflies play essential roles in ecosystems as pollinators, food chain links, and environmental indicators. Their presence in an area can serve as a bioindicator of clean water (Tennessen, 2009). Factors affecting dragonfly diversity include temperature, humidity, light intensity, and food availability (Corbet, 1999). Temperature, air humidity and light intensity adversely affect the life of some species of dragonflies. Among others, it affects flying activities, looking for prey, and wings usage. Dragonflies like to fly in areas with greater temperatures. Wing venation will function well in temperatures above 30°C (Miller, 1995). Sufficient light intensity can move the thoracic muscles of the wings to perform flight, with a minimum temperature of 20°C and a humidity of at least 70% (Wakeling & Ellington, 1997). In addition to a clean aquatic environment, dragonflies also like places that have a lot of vegetation around or in the water. They use vegetation to find food and as a refuge from

predators (Buchwald, 1992; Silva et al., 2010). Batu Putu Waterfall natural park has those ideal conditions mentioned above, which can be seen in Figure 1 above. The clean waters and lush vegetation contribute to dragonflies' presence in that area.

The biotic factor that affects the existence of dragonflies is the existence of other organisms. In this case, dragonfly nymphs are the predators of small animals in the waters such as mosquito larvae, and fish of smaller size. Meanwhile, the adult dragonflies (imago) preys on pests, mosquitoes, flies, and other insects on plants (Putri et al., 2019). Which is why these insects held an important part in human life, e.g. by preying on mosquito larvae that can cause malaria (Herlambang et al., 2016). In addition, dragonflies are also prey for other predators. In this case, eggs or dragonfly nymphs in water become prey for water beetles, frogs and toads (Soendjoto, 2016). Meanwhile birds, spiders, lizards, and frogs become predators for adult dragonflies (Dalia & Leksono, 2014).

Conclusion

The damselfly found in Batu Putu Waterfall Nature Park are *Euphaea variegata*, *Vestalis luctuosa*, *Prodasineura* sp., and *Elatoneura* sp. Further in-depth analysis is essential to determine their roles within the park's food web, mating behaviors, and interactions with other organisms to gain insights into the ecological dynamics of Batu Putu Waterfall Nature Park and how the damselfly species contribute to its overall biodiversity. This finding also needs to be studied further to obtain more comprehensive data about biodiversity in Batu Putu Waterfall Nature Park.

Author Contribution

D.A.S. designed the research and identified the specimens, L.H.I. wrote the manuscript, the other names collected and identified the specimens.

Conflict Of Interest

The authors confirm that there is no conflict of interest.

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