



## Butterfly Record from Salak Mountain, Indonesia

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### ABSTRACT

**Keanekaragaman kupu-kupu dari Gunung Salak, Indonesia.** Penelitian mengenai kupu-kupu telah banyak dilakukan di seluruh dunia, namun informasi basis data tentang kupu-kupu sangat terbatas di Indonesia. Penelitian ini bertujuan mengetahui spesies dari komunitas kupu-kupu yang berada di hutan alam dan habitat sekitarnya di areal Gunung Salak, Taman Nasional Gunung Halimun-Salak, Bogor, Jawa Barat. Pengumpulan data ekologi dilakukan pada bulan September sampai dengan Desember 2003. Survei kupu-kupu dilakukan dengan menggunakan transek sepanjang 200 meter di lima lokasi terpilih yang berbeda. Survei mengumpulkan 237 individu dari 28 spesies yang terdiri dari 4 famili. Famili yang paling sering dijumpai adalah Nymphalidae. Pencatatan yang dilakukan menunjukkan bahwa Nymphalidae memiliki jumlah species terbanyak dan kelimpahan individu tertinggi. Dalam tataran species, *Melanitis leda* adalah spesies dengan kelimpahan tertinggi. Penelitian lebih jauh diperlukan untuk menyediakan informasi yang lebih lengkap tentang komunitas kupu-kupu di daerah ini.

**KEY WORDS:** butterfly, natural forest, paddy field, species, transect

### INTRODUCTION

Tropical rainforests are known to harbor the highest diversity of organisms (e.g. Wilson 1988). This is also true for many groups of insects, for example parasitic wasps (Quicke 1997), ants (Brühl 2001), moths (Beck & Schulze 2000; Beck *et al.* 2002) and butterflies (Schulze *et al.* 2004). Butterfly is a well studied insect taxon across the world since it is a sensitive insect group to habitat disturbance that plays a very important role in the ecosystem. As tropical country, with

thousand of islands, Indonesia is expected to be the home for many species of butterfly; however information on butterfly diversity and its database is very incomplete. Therefore further studies are needed to provide more information to determine the status of butterfly community in Indonesia.

Some investigations have been conducted in several islands and provided valuable published information on several scientific journals including butterfly from Central Sulawesi (Schulze *et al.* 2004), East Kalimantan (Cleary & Grill 2004;

Charrete *et al.* 2006), Bromo Tengger Semeru National Park (Suharto *et al.* 2005) and Mount Tangkuban Perahu (Tati-Subahar *et al.* 2007). Some project reports and books have also recorded butterfly species from a certain area such as butterfly from Button-Sulawesi (Wallace 2004; Winarni & Jones 2007), Bukit Barisan Selatan National Park (Nurhasanah *et al.* 2006), Papua (van Mastrigt & Rosariyanto 2005), Bogor Botanical Garden (Peggie & Amir 2006). This information showed that there is substantially a significant progress of butterfly database development in Indonesia, however much studies are still required to capture more records of butterflies community inhabiting the risky remaining natural habitats. Java is the most populated Island in Indonesia that is now suffering from vast conversion of natural ecosystem due to the increasing rate of land use change. Since many butterfly species are susceptible to the type of environmental change and to the loss of their plant hosts, more investigations are needed to record species list of butterfly before their extinction precedes discovery by human.

Salak Mountain is among the remaining natural ecosystem in Java that is now facing tremendous habitat destruction. Our work in this area was focused on exploring butterfly species inhabiting natural forest and

surrounding habitats. This study was the first survey to look at butterfly community living in and around the study area. Here, we present a preliminary information on butterfly species list recorded by transect walk sampling. We believe that this would be valuable progress of butterfly investigation in Indonesia and would also enrich database information for consideration of conservation strategy of the study area.

## **MATERIAL AND METHODS**

### **Study Area and Study Site**

Salak Mountain is located about two hours from the nearest city, Bogor and approximately four hours from the Capital City, Jakarta. The size of the study area was about 31.237 ha covering two districts, Bogor (sub district Ciampea, Ciomas, Cibungbulan) and Sukabumi (Cicurug, Parung Kuda). Previously, the study area was managed by Government state forest company (Perhutani). Rainfall was about 300 mm/month and temperature ranged between 21.2°C and 29.9° with mean of temperature was about 25.7°C (BMG 1997). Highest rainfall was occurred from November to May and highest altitude of the Mountain is about 2.211 m. Samplings were conducted at five different selected areas in and around Gunung Salak, Gunung Bunder (S: 0,6°41'24,8'' E ; 106°41'52,1''), Ciapus (S ; 0,6°40'42,8''E ;

106°44'42,9''), Cidahu (S ; 0,6°43'51,8''E ; 106°42'25,0''), Jayanegara (S ; 0,6°46'14,0''E ; 106°38'15,3''). Insects were surveyed both in forest and paddy fields in the vicinity of the forest margin.

### **Sampling**

Samplings were conducted between September and December 2003. Insects were surveyed by using sweep net following transect walks along 200 m. Butterflies were collected using a time-constrained area search during peak flight periods (09.00 to 15.00 hours). Specimens that could not be designated to species in the field were caught with a sweep net and identified subsequently in the laboratory. The surveys were restricted to condition where the weathers were most favorable for flight.

### **Specimen Handling and Identification**

Butterflies caught from the field were then brought into laboratory for sorting and identification. All specimens that were brought into the laboratory were handled and mounted using conventional procedures. Dry collections were made by exposing the specimen inside oven for three days. Identification was conducted by referring to standart references including Morrel (1968), Tsukada (1981,1982,1985,1991).

### **Data analyses**

Sorted and identified specimens were then compiled into MS Exell. Data was not analyzed using specific statistical tool. Data was not statistically calculated instead of ecologically analyzed.

## **RESULTS**

In total, approximately 237 individual belonging to 26 species and four families were recorded in and around Salak Mountain (24 species collected from forest, 13 species collected from paddy field, 11 species recorded from both forest and paddy field) by surveying five selected locations with two habitat types. Nymphalidae was the most abundant and species rich family, lowest number of individual and species was recorded from Papilionidae with only two singleton species (*Graphium evemon* and *Papilio demolion*). *Melanitis leda* was the species frequently found in Salak Mountain. Cidahu was recorded to be the most species rich than other selected locations (Gunung Bunder = 9 species, Cidahu = 10 species, Ciapus = 7 species, and Cisarua = 9 species).

## **DISCUSSION**

Our work in Salak Mountain was intended to provide preliminary information on species list of butterfly community instead of measuring diversity. Therefore butterflies were surveyed by using only a single

**Table 1.** Species list of butterfly community inhabiting Salak Mountain (F= Forest, P=Paddy field)

Family	Species	Gunung bunder		Cidahu		Jayanegara		Ciapus		Cisarua	
		F	P	F	P	F	P	F	P	F	P
Nymphalidae	<i>Lethe confusa</i>	3	3	5	1	6	3	-	-	-	-
Nymphalidae	<i>Ypthima</i> sp.	10	-	-	-	-	-	-	1	9	3
Nymphalidae	<i>Ideopsis</i> sp.	1	-	-	-	1	-	-	-	-	-
Nymphalidae	<i>Melanitis leda</i>	-	20	20	17	17	5	8	3	-	-
Nymphalidae	<i>Faunis canens</i>	-	1	3	2	2	-	4	1	-	-
Nymphalidae	<i>Taenaris</i> sp.	-	-	3	-	-	-	-	-	-	-
Nymphalidae	Nymphalidae sp.1	-	-	1	-	-	-	-	-	-	-
Nymphalidae	Nymphalidae sp.2	-	-	1	-	-	-	-	-	-	-
Nymphalidae	<i>Hypolimnas</i> sp. 1	-	-	1	1	1	-	2	-	2	-
Nymphalidae	<i>Euploea mulciber</i>	-	-	-	-	1	1	-	-	-	1
Nymphalidae	<i>Cethosia</i> sp.	-	-	-	-	1	-	-	-	1	-
Nymphalidae	<i>Junonia</i> sp.	-	-	-	2	1	-	-	-	2	-
Nymphalidae	<i>Mycalasis</i> sp.	-	-	-	2	-	-	5	-	-	-
Nymphalidae	<i>Hypolimnas</i> sp. 2	-	-	-	-	-	-	-	-	1	-
Nymphalidae	<i>Charaxes polyxena</i>	-	-	-	-	-	1	-	-	-	-
Nymphalidae	<i>Danaus harina</i>	-	-	-	-	-	1	-	-	-	-
Papilionidae	<i>Graphium evemon</i>	1	-	-	-	-	-	-	-	-	-
Papilionidae	<i>Papilio demolion</i>	-	-	1	-	-	-	-	-	-	-
Lycanidae	<i>Celastrina dilecta</i>	3	-	2	-	-	-	-	-	-	-
Lycanidae	<i>Jamines</i> sp.	2	-	-	-	-	-	-	-	-	-
Lycanidae	Lycanidae sp.1	-	-	-	-	-	-	-	-	6	-
Lycanidae	<i>Arthropala</i> sp.	-	-	5	-	-	-	-	-	-	-
Pieridae	<i>Gandaca harina</i>	-	1	-	-	7	1	4	-	-	-
Pieridae	<i>Leptosia nina</i>	-	2	-	-	-	1	1	1	-	-
Pieridae	<i>Eurema hecabe</i>	1	2	-	-	-	6	5	-	3	1
Pieridae	<i>Cepora aspasis</i>	1	-	-	-	-	-	-	-	-	-
Total		22	29	42	25	37	19	29	5	24	5

transect walk without replication. Our discussion mostly emphasize on comparison of species richness of the study area and other regions in Java and other islands in Indonesia. Some studies from neighboring countries were also taken into account in this discussion. Our preliminary survey on butterfly community has recorded only 28 species from both forest and surrounding paddy fields. This number is lower than butterfly community recorded in Bromo-

Tengger Semeru National Park that identified 31 species (Suharto *et al.* 2005), but higher than butterfly record in Tangkuban Perahu, West Java with only 23 species (Tati-Subahar *et al.* 2007).

Compared with butterfly record in East Kalimantan, Central Sulawesi, Buton and Bukit Barisan Selatan, those numbers was significantly lower. Cleary & Grill (2004) recorded 211 species of butterfly community in East Kalimantan, even though the number

then declined become 39 due to ENSO-induced forest fire. Approximately 185 species of Butterfly were recorded from Bukit Barisan Selatan National Park (Nurhasanah *et al.* 2006), 88 species from Central Sulawesi (Schulze *et al.* 2004), 55 species from Buton Island (Wallace 2004) and 252 species from Papua (van Mastrigt & Rosariyanto 2005, survey series between 2000 and 2004). Higher number of species richness was also recorded in several neighboring countries for example in Tioman Island, Peninsular Malaysia with 78 species (Quek *et al.* 1999), Makiling Mountain Philippines with 145 species (Cayabyab 2000) and Ton Nga-Chang Wildlife Sanctuary, Thailand with 147 species (Boonvanno *et al.* 2000).

By comparing those data, it seems that butterfly species in Java was significantly lower than other islands in Indonesia and several neighboring countries. Lower number of butterfly species in Java may relate to several factors: (1) sampling efforts, our work on Butterfly in Salak Mountain and Butterfly record in Bromo-Tengger-Semeru (Suharto *et al.* 2005) only employed a single transect walk without replication. In contrast, in other studies, sampling effort was higher that is expected to record more species number, (2) habitat destruction, Java is the most populated island in Indonesia where natural habitats are

patchily distributed among modified ecosystems. Higher rate of habitat conversion may result in butterfly loss. Comprehensive studies covering a wide variety of taxonomic groups clearly documented that generally forest modification and transformation to land-use systems have a negative effect on diversity and species richness (Lawton *et al.* 1998)

In our samples, Nymphalidae represented the most abundant and the most species family of Butterfly, in contrast Papilionidae was recorded to be very rare. Similar pattern was also documented by Baltazar (1991) who recorded that Nymphalidae and Lycaenidae dominated butterfly community in Philippines, and the same result was confirmed by Boonvanno *et al.* (2000) in Thailand. Nymphalid butterflies are cosmopolitan with high number of species and individual distributed across many region of the world and inhabit various type of habitats. Those butterflies are polyphagous insect that have high capability to survive (Primark 1998). *Melanitis leda* was the most abundant Nymphalid recorded from Salak Mountain. This may be related its behaviour that feeds on various members of the grass family (van Mastrigt & Rosariyanto 2005).

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