

Biodiversity in Lower Montane Forest of Petungkriyono : A Review

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Abstract. One of the symbols of biodiversity in Indonesia's lower montane forest is Petungkriyono. Due to its location adjacent to populated areas, it has an impact on the survival of the local flora and animals in the Petungkriyono forest area. This study aims to provide a preliminary description of the plant and animal species found in the Petungkriyono forest area. A synoptic review method to Petungkriyono biodiversity publications was used in the writing of the article. The study's findings revealed that the Petungkriyono forest region consisted of 168 species of wildlife and 204 species of plants. Certain species are endemic, while others fall into the IUCN conservation status categories of Vulnerable (VU), Endangered (EN), and Critically Endangered (CR). It is also a certain that a number of species will be added to the CITES Appendix list in 2023 (Appendices I and II). The demands of population expansion and poaching are the current issues, burdening the forest areas that are already there. High biodiversity, stunning scenery, and the presence of indigenous knowledge can all present opportunities for ecotourism. Immediate implementation of conservative measures, such as maximizing current opportunities to preserve biodiversity, is essential.

Keywords: flora, fauna, endemic, IUCN, Appendix CITES, challenges, opportunities

1 Introduction

Indonesia has the most abundant species richness in the world. But unfortunately, currently the rate of species extinction is increasing rapidly, including in Indonesia (A. Setiawan, 2022), which is known as "biological failure". A growing number of human activities, including deforestation, changing land uses, and climate change, are endangering our biodiversity. This affects both our natural ecosystems and our capacity to provide for our fundamental necessities, including food, clean water, and medication (Desiana et al., 2019; Rasyid, 2014).

In this setting, it is crucial to carry out biodiversity research to enhance our comprehension of the susceptibility and flexibility of our ecosystems to contemporary pressures. It offers the knowledge required to create effective and long-lasting conservation plans.

According to (Damayanti et al., 2018), Petungkriyono Forest is one of the last remaining natural tropical forests in Java, home to a diverse range of flora and wildlife. Sixty percent of the Petungkriyono District's land is covered by secondary dryland forest (Abdurrahman et al., 2021; Relung Indonesia, 2023). The natural state of Petungkriyono features a comparatively high humidity and rainfall. The objectives of this study are to ascertain the biodiversity, conservation status, and interactions between the forest

and the local community in the Petungkriyono forest environment. The goal of this research is to improve our knowledge of biodiversity and the difficulties it encounters, as well as to serve as a guide for stakeholders in managing the Petungkriyono ecosystem sustainably.

2 Methods

This research was conducted in the Petungkriyono forest area, Pekalongan Regency, Central Java Province. The research was conducted in desk study/desk review to achieve research objectives using thematic analysis based on the literature review method (Randolph, 2009; Cooper, 1998). The stages carried out in the desk study are: framing review question, searching relevant literature, assessing quality of literature,

summarizing evidence, and interpreting findings.

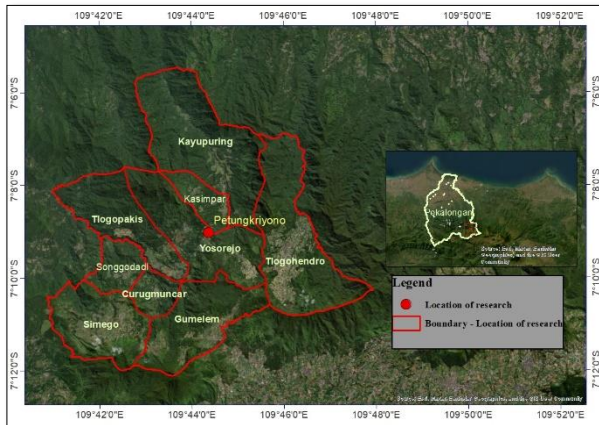


Fig. 1. Reseach location

3 Results and Discussions

3.1 The Sosiogeography of Petungkriyono

One of the subdistricts in the Pekalongan Regency is Petungkriyono. With an area of 7,359 hectares, it is situated in the southeast of the district, around 34 kilometers from Pekalongan, the district capital. Compared to other sub-districts in the Pekalongan district, this one has the lowest temperature (18–30 °C) (Damayanti et al., 2021a; Pradana et al., 2020). This is because the area is mostly covered in forests and has a high altitude of approximately 1,294 meters above sea level (BPS Pekalongan Regency, 2023). Its elevation ranges from 500 to 2,100 meters above sea level (Tanguay, 2020). Most of the Petungkriyono area's slopes are moderate (20–40°) slopes (Arrisaldi, 2018).

The Petungkriyono Forest itself has an area of 5,189,507 ha, which is officially managed by KPH East Pekalongan-BKPH Doro. It is divided into restricted production forest and mixed natural forest, both of which serve as protected forests (Ahmadin, 2016). The community's existence and its relationship with the forest are inextricably linked, given the state of the land cover in the Petungkriyono sub-district, which is dominated by forest regions. Petungkriyono's neighboring communities and the forest are both impacted by these intricate relationships.

Yosorejo village, the subdistrict capital, is the first of nine villages in Petungkriyono. The other villages are Simego, Songgodadi, Curugmuncar, Gumelem, Tlogohendro, Tlogopakis, Kasimpar, and Kayupuring. The community's daily requirements, which are primarily met by farmers, rely heavily on agricultural goods, particularly the resources found in the nearby forests. Within the context of the economy, people in Petungkriyono villages gather non-timber forest products; for instance, residents of Kayupuring village tap sugar palm in natural forests (Fikri & Adinugraha, 2021); residents of several nearby villages, including Kasimpar village, Kayupuring (Wibowo et al., 2022; Widodo, 2021; Tanguay, 2020), tap pine resin from forests with limited production; and people harvest food

items such as bamboo, fruit, cloves, coconut, and other vegetables (BPS Pekalongan Regency, 2023; Damayanti et al., 2018). The aforementioned activities are all direct advantages that the Petungkriyono people can obtain from the forests to meet their financial demands.

The Petungkriyono people have very intimate ties to environment in their traditional traditions. The villages surrounding the Petungkriyono forest have local wisdom known as nyadran Gebyog (Ahmad & Soeprabowati, 2022). This is a synergistic combination of the community's efforts to preserve the forest and the surrounding natural environment while upholding traditions passed down from generation to generation. An earth-friendly charity event called Nyadran Gebyog is a way for people to give back to the natural world that has given them resources to meet their needs.

At the nyadran event, participants carried their harvested produce and traveled down a trail into the heart of the forest. In the jungle, before the Nyadran event starts in a location that has been chosen for generations and is revered by the locals, participants must bathe in a crystal-clear river as a sign of self-purification. People are instinctively conscious of the need to preserve these natural resources because of the tradition of taking a river bath as part of a sequence of nyadran activities in the forest, which are seen to have significant spiritual value. One significant example of how cultural and environmental preservation are integrated into the daily lives of the inhabitants surrounding the Petungkriyono forest is the persistence of clear rivers (Ahmad & Soeprabowati, 2022).

The woodland scenery of Petungkriyono offers great potential for use in ecotourism and education for the local population. Petungkriyono is a vital water supply for the life of villages downstream since it is traversed by eight rivers, six of which are tributaries (Banteng, Pakis, Totogan, Sawangan, Welo, and Mangunan rivers) and two of which are major rivers (Kupang and Sengkarang Rivers). The Petungkriyono forest is still intact, as seen by the crystal-clear water, and several of its locations—Curug Muncar, Welo Asri, Curug Bajing, Embung Rawa, Telaga Mangunan, and Telaga Sigebyar—are visited by tourists. Other natural tourist attractions include Puncak Tugu Jalak, Karang Srity, Black Canyon, Lingga Yoni Site, and Puncak Kendalisodo, in addition to water-based tourism (Andriyani et al., 2022; M. Anam Rahardyan et al., 2021; T. A. Setiawan et al., 2020; Yusron et al., 2020). These numerous tourist attractions make use of Petungkriyono's stunning natural resources. Furthermore, the process of education happens simultaneously with the interaction of humans and environment.

It is very important to maintain the environment while making various enhancements to educational buildings. Talk about creating butterfly gardens and captive breeding programs as a development strategy (Peggie, 2018). Apart from that, the existence of primate watching and bird watching spots also adds to the natural knowledge of the surrounding community and people who visit Petungkriyono. Meanwhile, from a

medical perspective, the diversity of germplasm sources in the Petungkriyono forest also has the potential to become medicinal plants for the surrounding community. The assumption that herbal medicines are believed to carry minimum risk has made herbal medicines increasingly mushroom in Indonesian society, and Petungkriyono is no exception.

From the various explanations that have been given, a common thread can be drawn that Petungkriyono has an interesting sociogeography. The forest area around this community indirectly influences the community's life patterns in various aspects, especially regarding how to fulfill basic human living needs. Fulfillment of food, economic, cultural spirituality, ecotourism, education and forest firewood needs has been provided.

3.2 The biodiversity of Petungkriyono forest

3.2.1 The flora of Petungkriyono forest : IUCN conservation status

Petungkriyono Forest is a lower montane forest, or mountain tropical rain forest, with typical monsoon temperatures ranging from 18 to 300 degrees Celsius. It is situated between 700 and 1500 meters above sea level (masl).(Damayanti et al., 2021a). According to some (Damayanti et al., 2021b, 2018), Petungkriyono is the last remaining high biodiversity tropical forest in Java. There is a whole range of vegetation in Petungkriyono, from bushes to trees (Ahmadin, 2016). Petungkriyono forest region has 204 known species of live plants that are dispersed throughout the area. Magnoliopsida, liliopsida, polypodiopsida, lycopodiopsida and pinopsida are the five classes into which they are divided.

First off, the Magnoliopsida class, which is dominant in the Petungkriyono region and comprises 117 species, is distinguished by its two components. With fourteen species, the genus *Ficus spp.* is the most prevalent type within the magnoliopsida class in tropical forest (Prapitasari et al., 2020). The markers of this type's proliferation include tolerance to light, liking for warm (tropical) conditions, high humidity (Yulia & Yanti, 2010) in the lower montane forest of Petungkriyono, and the existence of specialized pollinators that coexist harmoniously with *Ficus spp.*

Second, there are 52 species in the Liliopsida class, which is distinguished by one-piece plants. In the Petungkriyono forest area, the Liliopsida class includes the orchid family (Orchidaceae), which is the most frequently seen family, including in Indonesia (Kusmana & Hikmat, 2015). *Dendrobium spp.* (7 species), *Bulbophyllum spp.* (4 species), *Coelogyne spp.* (4 species), *Flickingeria spp.* (4 species), *Liparis* (4 species), and *Asplenium* (4 species) are the most abundant genera of Orchidaceae. Orchids love tropical rain forests, especially those that live on the surface of trees without harming their hosts (epiphytic species). These regions include low-lying mountain tropical rain forests. The tropics provide year-round uniform illumination- shady lighting and enough humidity,

which makes them the perfect environment for a variety of orchid species (Agustin & Widowati, 2015).

Third, there are 29 species in the well-known Polypodiopsida class, which is also known as true ferns. The majority of fern species are members of the Polyopsida class. The majority of this class are epiphytes that grow on rocks or trees in humid environments, and they are distinguished by the spores on the underside of the leaves, or sori. This class is most frequently inhabited by three species of the genus *Selliguea spp.*, followed by two species each of *Microsorium spp.* and *Pyrrosia*.

Fourth, only three species from the genus *Huperzia spp.* were discovered in the Lycopodiopsida class. These, sometimes known as wire nails or kumpai, are typically found growing on rocks or humus soil, which is wet, shaded, and receives little sunshine. Pinopsida, the final class, is comprised of two species: *Pinus merkusii* and *Agathis dammara*.

Table 1. Flora of Petungkriyono forest.

No	Nama lokal	Kelas	Spesies	Status	Sumber
1	Keruing bunga	Magnoliopsida	<i>Dipterocarpus hasseltii</i>	EN	(Damayanti et al., 2021b)
2	Keruing keladan	Magnoliopsida	<i>Dipterocarpus gracilis</i>	VU	(Damayanti et al., 2021b)
3	Damar mata-kucing	Magnoliopsida	<i>Shorea javanica</i>	EN	(Damayanti et al., 2021b)
4	Ki riung anak	Magnoliopsida	<i>Castanopsis acuminatissima</i>	LC	(Damayanti et al., 2021b, 2020)
5	Saninten	Magnoliopsida	<i>Castanopsis argente</i>	EN	(Damayanti et al., 2021b)
6	Akalipa	Magnoliopsida	<i>Acalypha lanceolata</i>	NE	(Damayanti et al., 2021b)
7	Huru bodas	Magnoliopsida	<i>Acer laurinum</i>	LC	(Damayanti et al., 2021b)
8	Ki jeruk	Magnoliopsida	<i>Acronychia trifoliolata</i>	LC	(Damayanti et al., 2021b)
9	-	Magnoliopsida	<i>Actinodaphne glabra</i>	LC	(Damayanti et al., 2021b)
10	Ki Careuh	Magnoliopsida	<i>Alangium rotundifolium</i>	NE	(Damayanti et al., 2021b)
11	Jabon putih	Magnoliopsida	<i>Anthocephalus cadamba</i>	NE	(Damayanti et al., 2021b)
12	Ipuh	Magnoliopsida	<i>Antiaris toxicaria</i>	LC	(Damayanti et al., 2021b)
13	Ande-ande	Magnoliopsida	<i>Antidesma montanus</i>	NE	(Damayanti et al., 2021b)

14	Jengkol	Magnoliopsida	<i>Archidendron pauciflorum</i>	NE	(Damayanti et al., 2021b)
15	Bendo	Magnoliopsida	<i>Artocarpus elasticus</i>	LC	(Damayanti et al., 2020, 2021b; Wulandari et al., 2016)
16	Nangka	Magnoliopsida	<i>Artocarpus heterophyllus</i>	NE	(Damayanti et al., 2021b)
17	Gembirung	Magnoliopsida	<i>Astronia spectabilis</i>	NE	(Damayanti et al., 2021b)
18	Lembayung malabar	Magnoliopsida	<i>Basella alba</i>	NE	(Damayanti et al., 2021b)
19	Gintung	Magnoliopsida	<i>Bischofia javanica</i>	LC	(Damayanti et al., 2021b, 2020)
20	Sembung	Magnoliopsida	<i>Blumea balsamifera</i>	LC	(Damayanti et al., 2021b)
21	Kanyere	Magnoliopsida	<i>Bridelia monoica</i>	NE	(Damayanti et al., 2021b)
22	-	Magnoliopsida	<i>Chisocheton macrophyllus</i>	LC	(Damayanti et al., 2021b)
23	Kina bulu	Magnoliopsida	<i>Cinchona pubescens</i>	LC	(Damayanti et al., 2021b)
24	Kayu manis	Magnoliopsida	<i>Cinnamomum iners</i>	LC	(Damayanti et al., 2021b)
25	Sintok	Magnoliopsida	<i>Cinnamomum sintoc</i>	LC	(Damayanti et al., 2021b)
26	Kopi robusta	Magnoliopsida	<i>Coffea canephora</i>	LC	(Damayanti et al., 2021b)
27	Ki banen	Magnoliopsida	<i>Crypteronia peniculata</i>	NE	(Damayanti et al., 2021b)
28	Ipis kulit	Magnoliopsida	<i>Decaspermum fruticosum</i>	NE	(Damayanti et al., 2021b)
29	Dahu	Magnoliopsida	<i>Dracontomelon mangiferum</i>	NE	(Widodo, 2021)
30	Sengkuang	Magnoliopsida	<i>Dracontomelon dao</i>	LC	(Damayanti et al., 2021b, 2020)
31	Durian	Magnoliopsida	<i>Durio zibethinus</i>	NE	(Damayanti et al., 2021b, 2020)
32	Bawangan	Magnoliopsida	<i>Dysoxylum blumei</i>	NE	(Damayanti et al., 2021b, 2020)
33	Kedoya	Magnoliopsida	<i>Dysoxylum gaudichaudianum</i>	LC	(Damayanti et al., 2021b, 2020)

34	-	Magnoliopsida	<i>Dysoxylum nutans</i>	LC	(Damayanti et al., 2021b, 2020)
35	Antap	Magnoliopsida	<i>Elaeocarpus obtusus</i>	LC	(Damayanti et al., 2021b; Widodo, 2021)
36	Ganitri	Magnoliopsida	<i>Elaeocarpus sphaericus</i>	NE	(Damayanti et al., 2021b)
37	Kilalayu	Magnoliopsida	<i>Erioglossum rubiginosum</i>	NE	(Damayanti et al., 2021b)
38	Dadap serep	Magnoliopsida	<i>Erythrina lithosperma</i>	NE	(Damayanti et al., 2021b)
39	Ki sapu	Magnoliopsida	<i>Eurya acuminata</i>	NE	(Damayanti et al., 2021b)
40	Beringin	Magnoliopsida	<i>Ficus benjamina</i>	LC	(Damayanti et al., 2020, 2021b; Widodo, 2021; Wulandari et al., 2016)
41	Tin	Magnoliopsida	<i>Ficus carica</i>	LC	(Damayanti et al., 2021b)
42	Terep areuy	Magnoliopsida	<i>Ficus globosa</i>	LC	(Damayanti et al., 2021b)
43	Luwing	Magnoliopsida	<i>Ficus lepicarpa</i>	LC	(Damayanti et al., 2021b)
44	Hamerang putih	Magnoliopsida	<i>Ficus padana</i>	LC	(Damayanti et al., 2021b)
45	Hamerang putih	Magnoliopsida	<i>Ficus toxicaria</i>	NE	(Damayanti et al., 2021b)
46	Loa	Magnoliopsida	<i>Ficus racemosa</i>	LC	(Damayanti et al., 2021b)
47	Darangdan	Magnoliopsida	<i>Ficus sinuata</i>	NE	(Damayanti et al., 2021b)
48	Ki ara jingkang	Magnoliopsida	<i>Ficus stupenda</i>	NE	(Damayanti et al., 2021b)
49	Kondang	Magnoliopsida	<i>Ficus variegata</i>	LC	(Damayanti et al., 2021b; Widodo, 2021)
50	Kebak	Magnoliopsida	<i>Ficus alba</i>	NE	(Widodo, 2021)
51	Kiara bulu	Magnoliopsida	<i>Ficus procera</i>	NE	(Widodo, 2021)
52	Spri	Magnoliopsida	<i>Ficus rostrata</i>	NE	(Widodo, 2021)
53	Ipik	Magnoliopsida	<i>Ficus superba</i>	NE	(Widodo, 2021)

54	Pari	Magnoliopsida	<i>Glochidion lutescens</i>	LC	(Damayanti et al., 2021b)
55	Ki mareme	Magnoliopsida	<i>Glochidion rubrum</i>	LC	(Damayanti et al., 2021b)
56	Kendung	Magnoliopsida	<i>Helicia javanica</i>	LC	(Damayanti et al., 2021b)
57	Waru	Magnoliopsida	<i>Hibiscus tiliaceus L</i>	LC	(Damayanti et al., 2021b)
58	Kareumbi	Magnoliopsida	<i>Homalanthus populneus</i>	LC	(Damayanti et al., 2021b)
59	Kemadu	Magnoliopsida	<i>Laportea sinuata</i>	NE	(Damayanti et al., 2021b)
60	Girang merah	Magnoliopsida	<i>Leea indica</i>	LC	(Damayanti et al., 2021b)
61	Pasang bodas	Magnoliopsida	<i>Lithocarpus elegans</i>	NE	(Damayanti et al., 2021b)
62	Wuru banyu	Magnoliopsida	<i>Litsea umbellate</i>	NE	(Damayanti et al., 2021b)
63	Wuru kunyit	Magnoliopsida	<i>Litsea angulata</i>	NE	(Damayanti et al., 2021b)
64	Mara	Magnoliopsida	<i>Macaranga tanarius</i>	LC	(Damayanti et al., 2021b)
65	Huru Leuleus	Magnoliopsida	<i>Machilus rimosa</i>	NE	(Damayanti et al., 2021b)
66	Pampung	Magnoliopsida	<i>Macropanax dispermus</i>	LC	(Damayanti et al., 2021b)
67	Pohon payung	Magnoliopsida	<i>Maesopsis eminii</i>	LC	(Damayanti et al., 2021b)
68	Cempaka hutan	Magnoliopsida	<i>Magnolia montana</i>	DD	(Damayanti et al., 2021b)
69	Sampang	Magnoliopsida	<i>Melicope latifolia</i>	NE	(Damayanti et al., 2021b)
70	Bintinu	Magnoliopsida	<i>Melochia umbellata</i>	LC	(Damayanti et al., 2021b)
71	Angrit	Magnoliopsida	<i>Nauclea lanceolata</i>	LC	(Damayanti et al., 2021b)
72	Bengang	Magnoliopsida	<i>Neesia altissima</i>	NE	(Damayanti et al., 2021b)
73	Rambutan	Magnoliopsida	<i>Nephelium lappaceum</i>	LC	(Damayanti et al., 2021b)
74	Mumuncangan	Magnoliopsida	<i>Ostodes paniculata</i>	LC	(Damayanti et al., 2021b)
75	Nyatuh pucung	Magnoliopsida	<i>Palaquium rostratum</i>	LC	(Damayanti et al., 2021b)

76	Picung	Magnoliopsida	<i>Pangium edule</i>	LC	(Damayanti et al., 2021b)
77	-	Magnoliopsida	<i>Pittosporum ramiflorum</i>	LC	(Damayanti et al., 2021b)
78	Sengiran	Magnoliopsida	<i>Pittosporum ferrugineum</i>	EN	(Damayanti et al., 2021b)
79	Putat	Magnoliopsida	<i>Planchonia valida Blume</i>	NE	(Damayanti et al., 2021b)
80	Matoa	Magnoliopsida	<i>Pometia pinnata</i>	LC	(Damayanti et al., 2021b)
81	Kawoyang	Magnoliopsida	<i>Prunus arborea</i>	LC	(Damayanti et al., 2021b)
82	Bayur	Magnoliopsida	<i>Pterospermum javanicum</i>	LC	(Damayanti et al., 2021b)
83	Bedali	Magnoliopsida	<i>Radermachera gigantea</i>	LC	(Damayanti et al., 2021b)
84	Kecapi	Magnoliopsida	<i>Sandoricum koetjape</i>	LC	(Damayanti et al., 2021b, 2020)
85	Lotrok	Magnoliopsida	<i>Saurauia bracteosa</i>	VU	(Damayanti et al., 2021b)
86	Puspa	Magnoliopsida	<i>Schima wallichii</i>	LC	(Damayanti et al., 2021b, 2020)
87	Sindur	Magnoliopsida	<i>Sindora javanica</i>	VU	(Damayanti et al., 2021b)
88	Ki Somang	Magnoliopsida	<i>Sloanea sigun</i>	NE	(Damayanti et al., 2021b)
89	Hantap	Magnoliopsida	<i>Sterculia oblongata</i>	LC	(Damayanti et al., 2021b)
90	Kemenyan	Magnoliopsida	<i>Styrax benzoin</i>	NE	(Damayanti et al., 2021b)
91	Mahoni	Magnoliopsida	<i>Swietenia mahagoni</i>	NT	(Damayanti et al., 2021b)
92	Jirak	Magnoliopsida	<i>Symplocos fasciculata</i>	NE	(Damayanti et al., 2021b)
93	-	Magnoliopsida	<i>Syzygium densiflorum</i>	VU	(Damayanti et al., 2021b)
94	Salam	Magnoliopsida	<i>Syzygium polyanthum</i>	NE	(Damayanti et al., 2021b)
95	Baheda	Magnoliopsida	<i>Terminalia bellirica</i>	LC	(Damayanti et al., 2021b)
96	Suren	Magnoliopsida	<i>Toona sureni</i>	LC	(Damayanti et al., 2021b; Wulandari et al., 2016)

97	Mengkirai	Magnoliopsida	<i>Trema orientalis</i>	LC	(Damayanti et al., 2021b)
98	Kiramo giling	Magnoliopsida	<i>Trevesia sundaica</i>	NE	(Damayanti et al., 2021b)
99	Gletang	Magnoliopsida	<i>Tridax procumbens</i>	NE	(Damayanti et al., 2021b)
100	Ki Bangkong	Magnoliopsida	<i>Turpinia pomifera</i>	LC	(Damayanti et al., 2021b)
101	Ki Bancet	Magnoliopsida	<i>Turpinia sphaerocarpa</i>	NE	(Wulandari et al., 2016)
102	Kluwak	Magnoliopsida	<i>Pangium edule</i>	LC	(Wulandari et al., 2016)
103	Kantung semar	Magnoliopsida	<i>Nepenthes adrianae</i>	NE	(Widhiono, 2009)
104	Sengon	Magnoliopsida	<i>Albizia chinensis</i>	NE	(Damayanti et al., 2021b)
105	Sengon laut	Magnoliopsida	<i>Albizia falcata</i>	NE	(Widodo, 2021)
106	Pulai peucang	Magnoliopsida	<i>Alstonia spectabilis</i>	LC	(Damayanti et al., 2021b)
107	Pule	Magnoliopsida	<i>Alstonia scholaris</i>	LC	(Widodo, 2021)
108	Jabon	Magnoliopsida	<i>Anthocephalus cadamba</i>	NE	(Widodo, 2021)
109	Senduduk bulu	Magnoliopsida	<i>Clidemia hirta</i>	NE	(Widodo, 2021)
110	Sempayang	Magnoliopsida	<i>Evodia aromatica</i>	NE	(Widodo, 2021)
111	Punyam	Magnoliopsida	<i>Mallotus sp.</i>	NE	(Widodo, 2021)
112	Muncang cina	Magnoliopsida	<i>Mallotus paniculatus</i>	LC	(Damayanti et al., 2021b; Widodo, 2021)
113	Gembirit	Magnoliopsida	<i>Tabernaemontana sphaerocarpa</i>	LC	(Widodo, 2021)
114	-	Magnoliopsida	<i>Eugenia sp</i>	NE	(Nuraini, 2018)
115	-	Magnoliopsida	<i>Myristica spp</i>	NE	(Nuraini, 2018)
116	Miniran	Magnoliopsida	<i>Myrica javanica</i>	NE	(Damayanti et al., 2021b)
117	Ki Mangkok	Magnoliopsida	<i>Micromelum minutum</i>	LC	(Damayanti et al., 2021b)
118	Lumbah	Liliopsida	<i>Curculigo capitulata</i>	NE	(Damayanti et al., 2021b)

119	Palem merah	Liliopsida	<i>Cyrtostachys lakka</i>	NE	(Damayanti et al., 2021b)
120	Palem jingga	Liliopsida	<i>Cyrtostachys renda</i>	NE	(Damayanti et al., 2021b)
121	Pinang jawa	Liliopsida	<i>Pinanga javana</i>	NE	(Damayanti et al., 2021b)
122	-	Liliopsida	<i>Malaxis junghuhnii</i>	NE	(Mardiyana et al., 2019)
123	Anggrek peri	Liliopsida	<i>Oberonia similis</i>	NE	(Mardiyana et al., 2019)
124	-	Liliopsida	<i>Acriopsis sp1</i>	NE	(Mardiyana et al., 2019)
125	-	Liliopsida	<i>Agrostophyllum laxum</i>	NE	(Mardiyana et al., 2019)
126	-	Liliopsida	<i>Agrostophyllum sp1</i>	NE	(Mardiyana et al., 2019)
127	-	Liliopsida	<i>Appendicula reflexa</i>	NE	(Mardiyana et al., 2019)
128	-	Liliopsida	<i>Appendicula undulata</i>	NE	(Mardiyana et al., 2019)
129	-	Liliopsida	<i>Bulbophyllum blumei</i>	NE	(Mardiyana et al., 2019)
130	-	Liliopsida	<i>Bulbophyllum sp1</i>	NE	(Mardiyana et al., 2019)
131	-	Liliopsida	<i>Bulbophyllum sp2</i>	NE	(Mardiyana et al., 2019)
132	-	Liliopsida	<i>Bulbophyllum sp3</i>	NE	(Mardiyana et al., 2019)
133	-	Liliopsida	<i>Ceratostylis subulata</i>	NE	(Mardiyana et al., 2019)
134	-	Liliopsida	<i>Coelogyne sp1</i>	NE	(Mardiyana et al., 2019)
135	-	Liliopsida	<i>Coelogyne sp2</i>	NE	(Mardiyana et al., 2019)
136	-	Liliopsida	<i>Coelogyne sp3</i>	NE	(Mardiyana et al., 2019)
137	-	Liliopsida	<i>Coelogyne sp4</i>	NE	(Mardiyana et al., 2019)
138	-	Liliopsida	<i>Dendrobium lobulatum</i>	NE	(Mardiyana et al., 2019)
139	-	Liliopsida	<i>Dendrobium mutabile</i>	NE	(Mardiyana et al., 2019)
140	-	Liliopsida	<i>Dendrobium sp1</i>	NE	(Mardiyana et al., 2019)
141	-	Liliopsida	<i>Dendrobium sp2</i>	NE	(Mardiyana et al., 2019)

142	-	Liliopsida	<i>Dendrobium sp3</i>	NE	(Mardiyana et al., 2019)
143	-	Liliopsida	<i>Dendrobium sp4</i>	NE	(Mardiyana et al., 2019)
144	-	Liliopsida	<i>Dendrobium sp5</i>	NE	(Mardiyana et al., 2019)
145	-	Liliopsida	<i>Eria multiflora</i>	NE	(Mardiyana et al., 2019)
146	-	Liliopsida	<i>Eria sp1</i>	NE	(Mardiyana et al., 2019)
147	-	Liliopsida	<i>Eria sp2</i>	NE	(Mardiyana et al., 2019)
148	-	Liliopsida	<i>Flickingeria sp1</i>	NE	(Mardiyana et al., 2019)
149	-	Liliopsida	<i>Flickingeria sp2</i>	NE	(Mardiyana et al., 2019)
150	-	Liliopsida	<i>Flickingeria sp3</i>	NE	(Mardiyana et al., 2019)
151	-	Liliopsida	<i>Flickingeria sp4</i>	NE	(Mardiyana et al., 2019)
152	-	Liliopsida	<i>Liparis rhombea</i>	NE	(Mardiyana et al., 2019)
153	-	Liliopsida	<i>Liparis sp1</i>	NE	(Mardiyana et al., 2019)
154	-	Liliopsida	<i>Liparis sp2</i>	NE	(Mardiyana et al., 2019)
155	-	Liliopsida	<i>Liparis sp3</i>	NE	(Mardiyana et al., 2019)
156	-	Liliopsida	<i>Luisia Javanica</i>	NE	(Mardiyana et al., 2019)
157	Anggrek Bulan	Liliopsida	<i>Phalaenopsis amabilis</i>	NE	(Mardiyana et al., 2019)
158	-	Liliopsida	<i>Podochilus sp1</i>	NE	(Mardiyana et al., 2019)
159	-	Liliopsida	<i>Pholidota imbricata</i>	NE	(Mardiyana et al., 2019)
160	-	Liliopsida	<i>Polystachya concentra</i>	NE	(Mardiyana et al., 2019)
161	-	Liliopsida	<i>Pteroceras teysmannii</i>	NE	(Mardiyana et al., 2019)
162	-	Liliopsida	<i>Robiquetia spatulata</i>	NE	(Mardiyana et al., 2019)
163	-	Liliopsida	<i>sp1</i>	NE	(Mardiyana et al., 2019)
164	-	Liliopsida	<i>sp2</i>	NE	(Mardiyana et al., 2019)

165	Anggrek bulu	Liliopsida	<i>Trichotosia ferox</i>	NE	(Mardiyana et al., 2019)
166	-	Liliopsida	<i>Trichotosia pauciflora</i>	NE	(Mardiyana et al., 2019)
167	-	Liliopsida	<i>Trichotosia sp1</i>	NE	(Mardiyana et al., 2019)
168	Anggrek permata	Liliopsida	<i>Macodes petola</i>	NE	(Widhiono, 2009)
169	Aren	Liliopsida	<i>Arenga pinnata</i>	NE	(Fikri & Adinugraha, 2021)
170	Penawar jambi	Polypodiopsida	<i>Cibotium barometz</i>	NE	(Damayanti et al., 2021b)
171	-	Polypodiopsida	<i>Asplenium caudatum</i>	NE	(Lestari, 2019)
172	-	Polypodiopsida	<i>Asplenium cuneatum</i>	NE	(Lestari, 2019)
173	Paku sarang burung	Polypodiopsida	<i>Asplenium nidus</i>	NE	(Lestari, 2019)
174	-	Polypodiopsida	<i>Asplenium longissimum</i>	NE	(Lestari, 2019)
175	Paku tertutup	Polypodiopsida	<i>Davallia denticulata</i>	NE	(Lestari, 2019)
176	-	Polypodiopsida	<i>Davallia sp</i>	NE	(Lestari, 2019)
177	-	Polypodiopsida	<i>Crepidomanes minutum</i>	NE	(Lestari, 2019)
178	-	Polypodiopsida	<i>Hymenophyllum sp</i>	NE	(Lestari, 2019)
179	-	Polypodiopsida	<i>Oleandra neritiformis</i>	NE	(Lestari, 2019)
180	Paku ular	Polypodiopsida	<i>Aglaomorpha heraclea</i>	NE	(Lestari, 2019)
181	-	Polypodiopsida	<i>Belvisia sp</i>	NE	(Lestari, 2019)
182	Paku daun kepala tupai	Polypodiopsida	<i>Drynaria quercifolia</i>	NE	(Lestari, 2019)
183	-	Polypodiopsida	<i>Goniophlebium percussum</i>	NE	(Lestari, 2019)
184	-	Polypodiopsida	<i>Lepisorus longifolius</i>	NE	(Lestari, 2019)
185	-	Polypodiopsida	<i>Leptochilus sp</i>	NE	(Lestari, 2019)
186	-	Polypodiopsida	<i>Microsorium heterocarpum</i>	NE	(Lestari, 2019)

187	-	Polypodiopsida	<i>Microsorium membranifolium</i>	NE	(Lestari, 2019)
188	Paku daun picisan	Polypodiopsida	<i>Pyrrosia nummularifolia</i>	NE	(Lestari, 2019)
189	Paku sisik naga	Polypodiopsida	<i>Pyrrosia piloselloides</i>	NE	(Lestari, 2019)
190	-	Polypodiopsida	<i>Selliguea enervis</i>	NE	(Lestari, 2019)
191	-	Polypodiopsida	<i>Selliguea albidosquamata</i>	NE	(Lestari, 2019)
192	-	Polypodiopsida	<i>Selliguea stenophylla</i>	NE	(Lestari, 2019)
193	-	Polypodiopsida	<i>Lemmaphilum accendens</i>	NE	(Lestari, 2019)
194	-	Polypodiopsida	<i>Antrophyum parvulum</i>	NE	(Lestari, 2019)
195	-	Polypodiopsida	<i>Antrophyum semicostatum</i>	NE	(Lestari, 2019)
196	-	Polypodiopsida	<i>Vittaria sp</i>	NE	(Lestari, 2019)
197	-	Polypodiopsida	<i>Sp 13</i>	NE	(Lestari, 2019)
198	-	Polypodiopsida	<i>Sp 2</i>	NE	(Lestari, 2019)
199	Kumpai ekor tikus	Lycopodiopsida	<i>Huperzia carinata</i>	NE	(Lestari, 2019)
200	-	Lycopodiopsida	<i>Huperzia serrata</i>	NE	(Lestari, 2019)
201	Kumpai ekor monyet	Lycopodiopsida	<i>Huperzia squarrosa</i>	NE	(Lestari, 2019)
202	Damar	Pinopsida	<i>Agathis dammara</i>	VU	(Damayanti et al., 2021b)
203	Pinus	Pinopsida	<i>Pinus merkusii</i>	VU	(Damayanti et al., 2021b)
204	Wuru kangkang	-	-	NE	(Damayanti et al., 2021b)

IUCN red list which is a list of the conservation status of species based on their risk of extinction. The track record of research related to Petungkriyono biodiversity has been carried out for many years and provides information about the natural riches and uniqueness of this forest area. This area is home to hundreds of species of flora and fauna and some are categorized as endangered according to the IUCN Red List of Threatened Species. From the results of data analysis, 135 species were in the Not Evaluated (NE) category, 1 species was in the Data Deficient (DD)

category, 57 species were in the Least Concern (LC) category, 1 species was in the Near Threatened (NT) category, 6 species were in the Vulnerable (VU) category, and 4 species categorized as Endangered (EN). Requiring special attention here are species that are categorized as Vulnerable and Endangered. Species with Vulnerable status include: from the magnoliopsida class (*Dipterocarpus gracilis*, *Saurauia bracteosa*, *Sindora javanica*, and *Syzygium densiflorum*) and the pinopsida class (*Agathis dammara* and *Pinus merkusii*). These six species are experiencing significant reductions in natural numbers or threats, making them vulnerable to extinction. Meanwhile, species in the endangered category include: *Dipterocarpus hasseltii*, *Shorea javanica*, *Castanopsis argente*, and *Pittosporum ferrugineum* from the magnoliopsida class. These four species are very at risk of extinction, so urgent conservation action is needed to restore their populations.

3.2.2 Fauna of Petungkriyono forest : IUCN conservation status

Petungkriyono has an abundant diversity of fauna. The results of data processing show that there are 168 species of fauna that can be classified into 5 classes. The class consists of: aves, insects, reptiles, amphibians, and mammals.

The aves class is the majority fauna found in the Petungkriyono forest area. About 91 species of aves with various important roles in a forest ecosystem. Genus *Aethopyga spp.* (4 species) and the genus *Megalaima spp.* (4 species) is the most bird species found. *Aethopyga spp.* is a class of pollinator agents, helping the pollination of plant flowers. As for *Megalaima spp.* are insectivorous and fruit-eating birds. Aktivitas memangsanya membantu ekosistem dalam menjaga keseimbangan populasi serangga mangsa,

On the other hand, eating fruit contributes to the spatial dispersal of forest plant seeds. Three more genera with a sizable number of species are the genus *Rhipidura spp.* (3 species), the genus *Arachnothera spp.* (3 species), and the genus *Zosterops spp.* (3 species), which are primarily insectivores.

Second, there are 47 species in the Insecta class, which includes dragonfly and butterfly members. The genus *Mycalesis spp.* (3 species) and the genus *Melanitis spp.* (3 species) are the most prevalent butterfly genera. As pollinator agents, these two genera play a major role in the Petungkriyono forest area. Butterflies move pollen from one flower to another when they are seeking nectar. Smaller insect predators include the three species of dragonflies in the genus *Orthetrum* and the three species of *Drepanosticta*.

Third, a class of 15 species of reptiles that are present in the Petungkriyono forest. The class of reptiles in this region is divided into three major genera: *Eutropis spp.* (2 species), *Bronchocela spp.* (2 species), and *Draco spp.* (2 species). A flying lizard known as a *Draco* species feeds effectively on little insects found in forest tree habitats. Reptiles in the genus *Eutropis* are

omnivores, while those in the genus *Bronchocela* are mostly herbivorous.

Fourth, the Petungkriyono forest region is home to the twelve species of amphibians. Only the genus *Limnodynastes* spp. was determined to have more than one species in this class of amphibians (two species). This genus consumes a variety of small insects, small aquatic animals like larvae of water insects, and other small amphibians.

Fifth, the class Mammal comprises three species. *Presbytis comata*, *Hylobates moloch*, and *Trachypithecus auratus* are the mammals found in the Petungkriyono forest area. Being primates, all three have a propensity for herbivory.

Table 2. Fauna of Petungkriyono forest.

No	Local name	Class	Spesies	Status	Source
1	Lutung Hitam	Mammalia	<i>Trachypithecus auratus</i>	VU	(Damayanti et al., 2018; Fatmasari et al., 2017; Nijman & Setiawan, 2000)
2	Surili	Mammalia	<i>Presbytis comata</i>	VU	(Damayanti et al., 2018; Nijman & Setiawan, 2000)
3	Owa Jawa	Mammalia	<i>Hylobates moloch</i>	EN	(Damayanti et al., 2018; Nijman & Setiawan, 2000; Nofiyani & Nugroho, 2016; A. Setiawan et al., 2012)
4	Burung pekakak biru	Aves	<i>Alcedo euryzona</i>	CE	(Rachmawati et al., 2022)
5	Elang Hitam	Aves	<i>Ictinaetus malaiensis</i>	LC	(Damayanti et al., 2018; Apriyanti, 2017; Nijman & Setiawan, 2000)
6	Elang Jawa	Aves	<i>Nisaetus bartelsi</i>	EN	(Widodo, 2021; Damayanti et al., 2018; Nijman & Setiawan, 2000)
7	Julang Mas	Aves	<i>Aceros undulatus</i>	VU	(Damayanti et al., 2018; Nijman & Setiawan, 2000)
8	Seriwang sangihe	Aves	<i>Eutrichomyias rowleyi</i>	CE	(Hendriati et al., 2019)
9	Butbut besar	Aves	<i>Centropus sinensis</i>	LC	(Hendriati et al., 2019; Nijman & Setiawan, 2000)
10	Burung kopi	Aves	<i>Pomatorhinus montanus</i>	LC	(Hendriati et al., 2019)
11	Tepus leher putih	Aves	<i>Stachyris thoracica</i>	LC	(Hendriati et al., 2019; Nijman & Setiawan, 2000)
12	Tepus dada putih	Aves	<i>Stachyris grammiceps</i>	NT	(Ahmadin, 2016; Hendriati et al., 2019)

13	Cica matahari	Aves	<i>Laniellus albonotatus</i>	NT	(Hendriati et al., 2019)
14	Brencet wergan	Aves	<i>Alcippe pyrrhoptera</i>	LC	(Hendriati et al., 2019)
15	Bintayung	Aves	<i>Fregata andrewsi</i>	VU	(Hendriati et al., 2019)
16	Kasumba	Aves	<i>Apalharpactes reinwardtii</i>	VU	(Hendriati et al., 2019)
17	Piong	Aves	<i>Lophozosterops javanica</i>	LC	(Hendriati et al., 2019; Widodo, 2021)
18	Elang Perut-karat	Aves	<i>Lophotriorchis kienerii</i>	NT	(Apriyanti, 2017; Nijman & Setiawan, 2000)
19	Pleci	Aves	<i>Zosterops flavus</i>	EN	(Hendriati et al., 2019)
20	Kacamata gunung	Aves	<i>Zosterops montanus</i>	LC	(Hendriati et al., 2019)
21	Kacamata biasa	Aves	<i>Zosterops palpebrosus</i>	LC	(Hendriati et al., 2019; Nijman & Setiawan, 2000)
22	Burung madu pipi merah	Aves	<i>Anthreptes singalensis</i>	LC	(Hendriati et al., 2019)
23	Burung Madu Kelapa	Aves	<i>Anthreptes malacensis</i>	LC	(Hendriati et al., 2019)
24	Burung madu merah ekor panjang	Aves	<i>Aethopyga mystacalis</i>	LC	(Hendriati et al., 2019)
25	Burung madu merah	Aves	<i>Aethopyga siparaja</i>	LC	(Hendriati et al., 2019)
26	Burung madu gunung	Aves	<i>Aethopyga eximia</i>	LC	(Hendriati et al., 2019; Nijman & Setiawan, 2000)
27	Burung madu Sepah Raja	Aves	<i>Aethopyga siparaja</i>	LC	(Nijman & Setiawan, 2000)
28	Jantung kecil	Aves	<i>Arachnothera longirostra</i>	LC	(Widodo, 2021; Hendriati et al., 2019; Nijman & Setiawan, 2000)
29	Burung jantung besar	Aves	<i>Arachnothera robusta</i>	LC	(Hendriati et al., 2019)
30	Burung jantung gunung	Aves	<i>Arachnothera affinis</i>	LC	(Hendriati et al., 2019; Nijman & Setiawan, 2000)
31	Glatik gunung	Aves	<i>Psaltria exilis</i>	LC	(Hendriati et al., 2019)
32	Celepuk jawa	Aves	<i>Otus angelinae</i>	VU	(Hendriati et al., 2019)

33	Burung kipas	Aves	<i>Rhipidura javanica</i>	LC	(Widodo, 2021; Hendriati et al., 2019)
34	Kipasan mutiara	Aves	<i>Rhipidura euryura</i>	LC	(Widodo, 2021; Hendriati et al., 2019)
35	Kipasan merah	Aves	<i>Rhipidura phoenicura</i>	LC	(Widodo, 2021; Hendriati et al., 2019)
36	Sikatan dada merah	Aves	<i>Philentoma velatum</i>	NT	(Hendriati et al., 2019)
37	Burung kipas biru	Aves	<i>Muscicapa ruecki</i>	NE	(Hendriati et al., 2019)
38	sikatan bubik	Aves	<i>Muscicapa dauurica</i>	LC	(Widodo, 2021)
39	Cekakak jawa	Aves	<i>Halcyon cyanoventris</i>	LC	(Widodo, 2021; Hendriati et al., 2019)
40	Pelatuk bawang	Aves	<i>Dinopium javanense</i>	LC	(Widodo, 2021; Hendriati et al., 2019)
41	Kacer	Aves	<i>Copsychus saularis</i>	LC	(Hendriati et al., 2019)
42	Cucak hijau	Aves	<i>Chloropsis sonnerati</i>	EN	(Hendriati et al., 2019)
43	Anis kembang	Aves	<i>Geokichla interpres</i>	EN	(Hendriati et al., 2019)
44	Takur gunung	Aves	<i>Psilopogon monticola</i>	LC	(Hendriati et al., 2019)
45	Gelatik jawa	Aves	<i>Lonchura oryzivora</i>	EN	(Hendriati et al., 2019)
46	Bondol Jawa	Aves	<i>Lonchura leucogastroides</i>	LC	Nijman et al., 2000
47	Jalak kebo	Aves	<i>Acridotheres javanicus</i>	VU	(Hendriati et al., 2019)
48	Ciung mungkal jawa	Aves	<i>Cochoa azurea</i>	VU	(Hendriati et al., 2019)
49	Opior jawa	Aves	<i>Heleia javanica</i>	LC	(Hendriati et al., 2019)
50	Serindit jawa	Aves	<i>Loriculus pusillus</i>	NT	(Widodo, 2021)
51	Kepudang hutan	Aves	<i>Oriolus xanthonotus</i>	NT	(Widodo, 2021)
52	Sikatan Dada-merah	Aves	<i>Ficedula dumetoria</i>	LC	(Widodo, 2021)
53	Puyuh gonggong	Aves	<i>Arborophila javanica</i>	LC	(Nijman & Setiawan, 2000)
54	Sikep madu Asia	Aves	<i>Pernis ptilorhynchus</i>	LC	(Nijman & Setiawan, 2000)

55	Elang brontok	Aves	<i>Spizaetus cirrhatus</i>	NE	(Nijman & Setiawan, 2000)
56	Ayam Hutan Hijau	Aves	<i>Gallus varius</i>	LC	(Nijman & Setiawan, 2000)
57	Tekukur Biasa	Aves	<i>Spilopelia chinensis</i>	LC	(Nijman & Setiawan, 2000)
58	Elang ular bido	Aves	<i>Spilornis cheela</i>	LC	(Apriliyani, 2017; Nijman & Setiawan, 2000)
59	Kangkak Ranting	Aves	<i>Cuculus saturatus</i>	LC	(Nijman & Setiawan, 2000)
60	Wiwik Uncuing	Aves	<i>Cacomantis sepulchralis</i>	LC	(Nijman & Setiawan, 2000)
61	Kadalan Kembang	Aves	<i>Phaenicophaeus javanicus</i>	LC	(Nijman & Setiawan, 2000)
62	Kadalan Birah	Aves	<i>Phaenicophaeus curvirostris</i>	LC	(Nijman & Setiawan, 2000)
63	Walet Sarang Putih	Aves	<i>Collocalia fuciphaga</i>	NE	(Nijman & Setiawan, 2000)
64	Walet sapi	Aves	<i>Collocalia linchi</i>	LC	(Nijman & Setiawan, 2000)
65	Walet Palembang-Asia	Aves	<i>Cypsiurus balasienensis</i>	LC	(Nijman & Setiawan, 2000)
66	Tepekong jambul	Aves	<i>Hemiprocne longipennis</i>	LC	(Nijman & Setiawan, 2000)
67	Luntur Harimau	Aves	<i>Harpactes oreskios</i>	LC	(Nijman & Setiawan, 2000)
68	Udang Punggung Merah	Aves	<i>Ceyx rufidorsa</i>	LC	(Nijman & Setiawan, 2000)
69	Cekakak Batu	Aves	<i>Lacedo pulchella</i>	LC	(Nijman & Setiawan, 2000)
70	Takur Bututut	Aves	<i>Megalaima corvina</i>	LC	(Nijman & Setiawan, 2000)
71	Takur Tulungtumpuk	Aves	<i>Megalaima javensis</i>	NT	(Hendriati et al., 2019; Nijman & Setiawan, 2000)
72	Takur Tohtor	Aves	<i>Megalaima armillaris</i>	LC	(Widodo, 2021; Hendriati et al., 2019; Nijman & Setiawan, 2000)
73	Takur Tengeret	Aves	<i>Megalaima australis</i>	NE	(Hendriati et al., 2019; Nijman & Setiawan, 2000)
74	Sempur Hujan Rimba	Aves	<i>Eurylaimus javanicus</i>	NT	(Nijman & Setiawan, 2000)
75	Paok Pancawarna	Aves	<i>Pitta guajana</i>	LC	(Nijman & Setiawan, 2000)

76	Jingjing Batu	Aves	<i>Hemipus hirundinaceus</i>	LC	(Nijman & Setiawan, 2000)
77	Sepah Hutan	Aves	<i>Pericrocotus flammeus</i>	LC	(Nijman & Setiawan, 2000)
78	Gagak Hutan	Aves	<i>Corvus enca</i>	LC	(Nijman & Setiawan, 2000)
79	Gelatik batu Kelabu	Aves	<i>Parus major</i>	LC	(Nijman & Setiawan, 2000)
80	Munguk Beledu	Aves	<i>Sitta frontalis</i>	LC	(Nijman & Setiawan, 2000)
81	Pelanduk Semak	Aves	<i>Malacocincla sepiaria</i>	LC	(Nijman & Setiawan, 2000)
82	Berencet Berkening	Aves	<i>Napothera epilepidota</i>	LC	(Nijman & Setiawan, 2000)
83	Meninting Kecil	Aves	<i>Enicurus velatus</i>	LC	(Nijman & Setiawan, 2000)
84	Ciung Batu Siul	Aves	<i>Myophonus caeruleus</i>	LC	(Nijman & Setiawan, 2000)
85	Remetuk Laut	Aves	<i>Gerygone sulphurea</i>	LC	(Nijman & Setiawan, 2000)
86	Cinenen Jawa	Aves	<i>Orthotomus sepium</i>	LC	(Nijman & Setiawan, 2000)
87	Perenjak Jawa	Aves	<i>Prinia familiaris</i>	NT	(Nijman & Setiawan, 2000)
88	Sikatan Biru Muda	Aves	<i>Cyornis unicolor</i>	LC	(Nijman & Setiawan, 2000)
89	Sikatan Cacing	Aves	<i>Cyornis banyumas</i>	CR	(Nijman & Setiawan, 2000)
90	Pentis Pelangi	Aves	<i>Prionochilus percussus</i>	LC	(Nijman & Setiawan, 2000)
91	Cabai Bunga Api	Aves	<i>Dicaeum trigonostigma</i>	LC	(Nijman & Setiawan, 2000)
92	Cabai Gunung	Aves	<i>Dicaeum sanguinolentum</i>	LC	(Nijman & Setiawan, 2000)
93	Cabai jawa	Aves	<i>Dicaeum trochileum</i>	LC	(Nijman & Setiawan, 2000)
94	Bondol Hijau Binglis	Aves	<i>Erythrura prasina</i>	LC	(Nijman & Setiawan, 2000)
95	Bangkong tuli	Amphibia	<i>Limnonectes kuhlii</i>	LC	(Eprilurahman et al., 2010)
96	-	Amphibia	<i>Limnonectes sp</i>	NE	(Eprilurahman et al., 2010)
97	Bancet rawa	Amphibia	<i>Occidozyga sumatrana</i>	LC	(Eprilurahman et al., 2010)
98	Kongkang kolam	Amphibia	<i>Hylarana chalconota</i>	LC	(Eprilurahman et al., 2010)

99	Kongkang jeram	Amphibia	<i>Huia masonii</i>	LC	(Eprilurahman et al., 2010)
100	Katak-tanduk Jawa	Amphibia	<i>Megophrys montana</i>	LC	(Eprilurahman et al., 2010)
101	Bangkong Serasah	Amphibia	<i>Leptobrachium hasseltii</i>	LC	(Eprilurahman et al., 2010)
102	Katak-pohon bergaris	Amphibia	<i>Polypedates leucomystax</i>	LC	(Eprilurahman et al., 2010)
103	Katak terbang Jawa	Amphibia	<i>Rhacophorus margaritifer</i>	LC	(Eprilurahman et al., 2010)
104	Katak-pohon Emas	Amphibia	<i>Philautus aurifasciatus</i>	LC	(Eprilurahman et al., 2010)
105	-	Amphibia	<i>Ichthyophis sp</i>	NE	(Eprilurahman et al., 2010)
106	Cecak Batu	Amphibia	<i>Cyrtodactylus marmoratus</i>	LC	(Eprilurahman et al., 2010)
107	Cecak terbang	Reptilia	<i>Draco volans</i>	LC	(Eprilurahman et al., 2010)
108	Naga terbang berjanggut merah	Reptilia	<i>Draco haematopogon</i>	LC	(Eprilurahman et al., 2010)
109	Bunglon jambul hijau	Reptilia	<i>Bronchocela cristatella</i>	LC	(Eprilurahman et al., 2010)
110	Bunglon surai	Reptilia	<i>Bronchocela jubata</i>	LC	(Eprilurahman et al., 2010)
111	Bunglon Hutan	Reptilia	<i>Gonocephalus chamaeleontinus</i>	LC	(Eprilurahman et al., 2010)
112	Kadal mimikri	Reptilia	<i>Pseudocalotes tympanistriga</i>	LC	(Eprilurahman et al., 2010)
113	Kadal pohon hijau	Reptilia	<i>Dasia olivacea</i>	LC	(Eprilurahman et al., 2010)
114	Kadal kebun	Reptilia	<i>Eutropis multifasciata</i>	LC	(Eprilurahman et al., 2010)
115	Kadal serasah cokelat	Reptilia	<i>Eutropis rudis</i>	LC	(Eprilurahman et al., 2010)
116	Kadal hutan	Reptilia	<i>Sphenomorphus puncticephalus</i>	LC	(Eprilurahman et al., 2010)
117	Ular gadung	Reptilia	<i>Ahaetulla prasina</i>	LC	(Eprilurahman et al., 2010)
118	Ular viper palsu	Reptilia	<i>Psammodynastes pulverulentus</i>	LC	(Eprilurahman et al., 2010)
119	Ular alang-alang	Reptilia	<i>Calamaria linnaei</i>	LC	(Eprilurahman et al., 2010)
120	Sanca kembang	Reptilia	<i>Python reticulatus</i>	LC	(Eprilurahman et al., 2010)

121	Viper Pohon Hijau	Reptilia	<i>Cryptelytropis albolabris</i>	LC	(Eprilurahman et al., 2010)
122	Kupu male	Insecta	<i>Terinos clarissa</i>	NE	(Nuraini, 2018; Peggie, 2018)
123	Kupu pangeran hitam	Insecta	<i>Rohana parisatis</i>	NE	(Nuraini, 2018; Peggie, 2018)
124	-	Insecta	<i>Chersonesia peraka</i>	NE	(Peggie, 2018)
125	-	Insecta	<i>Chersonesia rahria</i>	NE	(Nuraini, 2018)
126	Kupu baron	Insecta	<i>Euthalia aconthea</i>	NE	(Nuraini, 2018; Peggie, 2018)
127	-	Insecta	<i>Discophora necho</i>	NE	(Nuraini, 2018; Peggie, 2018)
128	-	Insecta	<i>Discophora sondaica</i>	NE	(Nuraini, 2018; Peggie, 2018)
129	-	Insecta	<i>Ramelana jangala</i>	NE	(Nuraini, 2018)
130	-	Insecta	<i>Amathusia phidippus</i>	NE	(Nuraini, 2018)
131	-	Insecta	<i>Faunis canens</i>	NE	(Nuraini, 2018)
132	Kupu Merak	Insecta	<i>Junonia almana</i>	LC	(Nuraini, 2018)
133	-	Insecta	<i>Lethe confusa</i>	NE	(Nuraini, 2018)
134	Kupu Ilalang	Insecta	<i>Melanitis leda</i>	LC	(Nuraini, 2018)
135	-	Insecta	<i>Melanitis phedima</i>	NE	(Nuraini, 2018)
136	-	Insecta	<i>Melanitis zitenius</i>	NE	(Nuraini, 2018)
137	-	Insecta	<i>Mycalesis horsfieldii</i>	NE	(Nuraini, 2018)
138	-	Insecta	<i>Mycalesis mineus</i>	NE	(Nuraini, 2018)
139	-	Insecta	<i>Mycalesis moorei</i>	NE	(Nuraini, 2018)
140	-	Insecta	<i>Neorina crishna</i>	NE	(Nuraini, 2018)
141	Kupu Rumput Hitam	Insecta	<i>Orsotriaena medus</i>	NE	(Nuraini, 2018)
142	Kupu Ekor Gunting	Insecta	<i>Polyura athamas</i>	NE	(Nuraini, 2018)
143	-	Insecta	<i>Ragadia makuta</i>	NE	(Nuraini, 2018)

144	-	Insecta	<i>Stibochiona coresia</i>	NE	(Nuraini, 2018)
145	-	Insecta	<i>Tanaecia palguna</i>	NE	(Nuraini, 2018)
146	Kupu sayap biru	Insecta	<i>Graphium sarpedon</i>	LC	(Nuraini, 2018)
147	Kupu Pastur	Insecta	<i>Papilio memnon</i>	NE	(Nuraini, 2018)
148	Kupu belerang	Insecta	<i>Eurema blanda</i>	NE	(Nuraini, 2018)
149	Kupu rumput biasa	Insecta	<i>Eurema hecabe</i>	LC	(Nuraini, 2018)
150	-	Insecta	<i>Heliogomphus drescheri</i>	NT	(Nafisah & Soesilohadi, 2021)
151	-	Insecta	<i>Heliocypha fenestrata</i>	LC	(Nafisah & Soesilohadi, 2021)
152	-	Insecta	<i>Leptogomphus lansbergei</i>	LC	(Nafisah & Soesilohadi, 2021)
153	Capung tengget jala tunggal	Insecta	<i>Neurothemis ramburii</i>	LC	(Nafisah & Soesilohadi, 2021)
154	Capung jala lurus	Insecta	<i>Neurothemis terminata</i>	LC	(Nafisah & Soesilohadi, 2021)
155	-	Insecta	<i>Orthetrum glaucum</i>	LC	(Nafisah & Soesilohadi, 2021)
156	Capung sambar merah	Insecta	<i>Orthetrum pruinosum</i>	LC	(Nafisah & Soesilohadi, 2021)
157	Capung sambar hijau	Insecta	<i>Orthetrum sabina</i>	LC	(Nafisah & Soesilohadi, 2021)
158	Capung ciwet	Insecta	<i>Pantala flavescens</i>	LC	(Nafisah & Soesilohadi, 2021)
159	Capung Jemur Tarum	Insecta	<i>Potamarcha congener</i>	LC	(Nafisah & Soesilohadi, 2021)
160	-	Insecta	<i>Zygonyx ida</i>	NE	(Nafisah & Soesilohadi, 2021)
161	-	Insecta	<i>Vestalis luctuosa</i>	LC	(Nafisah & Soesilohadi, 2021)
162	-	Insecta	<i>Rhinocypha heterostigma</i>	NT	(Nafisah & Soesilohadi, 2021)
163	-	Insecta	<i>Pericnemis stictica</i>	LC	(Nafisah & Soesilohadi, 2021)
164	-	Insecta	<i>Coeliccia membranipes</i>	LC	(Nafisah & Soesilohadi, 2021)
165	-	Insecta	<i>Drepanosticta gazella</i>	LC	(Nafisah & Soesilohadi, 2021)

166	-	Insecta	<i>Drepanosticta spatulifera</i>	DD	(Nafisah & Soesilohadi, 2021; Nugrahaningrum & Soesilohadi, 2021)
167	-	Insecta	<i>Drepanosticta sundana</i>	DD	(Nafisah & Soesilohadi, 2021)
168	Capung beludru sunda	Insecta	<i>Euphaea variegata</i>	LC	(Nafisah & Soesilohadi, 2021)

The data analysis results showed that 31 species were classified as Not Evaluated (NE), 2 species as Data Deficient (DD), 107 species as Least Concern (LC), 11 species as Near Threatened (NT), 8 species as Vulnerable (VU), 6 species as Endangered (EN), and 3 species as Critically Endangered (CR).

Two mammalian species (*Trachypithecus auratus* and *Presbytis comata*) and six avian species (*Aceros undulatus*, *Fregata andrewsi*, *Apalharpactes reinwardtii*, *Otus angelinae*, *Acridotheres javanicus*, and *Cochoa azurea*) are included in the Vulnerable group. Because of a decline in their geographic habitat or population size, these eight species face extinction.

Of the species classified as Endangered, five belong to the avian class (*Nisaetus bartelsi*, *Zosterops flavus*, *Chloropsis sonnerati*, *Geokichla interpres*, and *Lonchura oryzivora*), and one belongs to the mammals class (*Hylobates moloch*). The conservation and preservation of nature are necessary for species that fall into the endangered category because they are very vulnerable to extinction. The aves class includes the species *Alcedo euryzona*, *Eutrichomyias rowleyi*, and *Cyornis banyumas* that are classified as Critically Endangered. This species faces immediate extinction if appropriate conservation measures are not implemented, as it is critically endangered.

3.2.3 Endemic species in CITES appendix

There are many endemic species of plants and animals in the Petungkriyono Forest. Because they have evolved and adapted to a specific geographic environment, endemic species are limited to that geographic area. since of the geographic restrictions on their range, endemic species are more susceptible to the threat of extinction since they will go extinct in the wild if they disappear from their endemic locations. The Petungkriyono forest is reported to have a large number of endemic plants and animals, according to tables 3 and 4. There are 56 endemic species of animals in Java, Bali, Lombok, Kalimantan, Sumatra, and the Bangka Belitung Islands, and eight endemic plants that are unique to Java, Sumatra, Kalimantan, or Indonesia.

Table 3. Endemic flora categorized in CITES appendix

No	Local name	Class	Species	Endemic	CITES 2023
1	Damar mata-kucing	Magnoliopsida	<i>Shorea javanica</i>	Sumatera, jawa	-

2	Saninten	Magnoliopsida	<i>Castanopsis argente</i>	Sumatera, jawa, kalimantan	-
3	-	Magnoliopsida	<i>Dysoxylum nutans</i>	Indonesia	-
4	Hamerang putih	Magnoliopsida	<i>Ficus padana</i>	Indonesia	-
5	Kecapi	Magnoliopsida	<i>Sandoricum koetjape</i>	-	Appendix II
6	Mahoni	Magnoliopsida	<i>Swietenia mahagoni</i>	-	Appendix II
7	Kantung semar	Magnoliopsida	<i>Nepenthes adriani</i>	Jawa	Appendix II
8	Gembirit	Magnoliopsida	<i>Tabernaemontana sphaerocarpa</i>	Indonesia	-
9	-	Liliopsida	<i>Malaxis junghuhnii</i>	Jawa	-
10	Anggrek peri	Liliopsida	<i>Oberonia similis</i>	Jawa	-
11	-	Liliopsida	<i>Dendrobium lobullatum</i>	-	Appendix II
12	-	Liliopsida	<i>Dendrobium mutabile</i>	-	Appendix II
13	-	Liliopsida	<i>Dendrobium sp1</i>	-	Appendix II
14	-	Liliopsida	<i>Dendrobium sp2</i>	-	Appendix II
15	-	Liliopsida	<i>Dendrobium sp3</i>	-	Appendix II
16	-	Liliopsida	<i>Dendrobium sp4</i>	-	Appendix II
17	-	Liliopsida	<i>Dendrobium sp5</i>	-	Appendix II
18	-	Liliopsida	<i>Eria multiflora</i>	-	Appendix II
19	-	Liliopsida	<i>Eria sp1</i>	-	Appendix II
20	-	Liliopsida	<i>Eria sp2</i>	-	Appendix II
21	-	Liliopsida	<i>Flickingeria sp1</i>	-	Appendix II
22	-	Liliopsida	<i>Flickingeria sp2</i>	-	Appendix II
23	-	Liliopsida	<i>Flickingeria sp3</i>	-	Appendix II
24	-	Liliopsida	<i>Flickingeria sp4</i>	-	Appendix II
25	-	Liliopsida	<i>Liparis rhombea</i>	-	Appendix II
26	-	Liliopsida	<i>Liparis sp1</i>	-	Appendix II
27	-	Liliopsida	<i>Liparis sp2</i>	-	Appendix II

28	-	Liliopsida	<i>Liparis sp3</i>	-	Appendix II
29	-	Liliopsida	<i>Luisia Javanica</i>	-	Appendix II
30	Anggrek Bulan	Liliopsida	<i>Phalaenopsis amabilis</i>	-	Appendix II
31	-	Liliopsida	<i>Podochilus sp1</i>	-	Appendix II
32	-	Liliopsida	<i>Pholidota imbricata</i>	-	Appendix II
33	-	Liliopsida	<i>Polystachya concentra</i>	-	Appendix II
34	-	Liliopsida	<i>Pteroceras teysmannii</i>	-	Appendix II
35	-	Liliopsida	<i>Robiquetia spatulata</i>	-	Appendix II
36	-	Liliopsida	<i>sp1</i>	-	Appendix II
37	-	Liliopsida	<i>sp2</i>	-	Appendix II
38	Anggrek bulu	Liliopsida	<i>Trichotosia ferox</i>	-	Appendix II
39	-	Liliopsida	<i>Trichotosia pauciflora</i>	-	Appendix II
40	-	Liliopsida	<i>Trichotosia sp1</i>	-	Appendix II
41	Anggrek permata	Liliopsida	<i>Macodes petola</i>	-	Appendix II
42	Penawar jambi	Polypodiopsida	<i>Cibotium barometz</i>	-	Appendix II

2	Surili	Mammalia	<i>Presbytis comata</i>	Jawa	-
3	Owa Jawa	Mammalia	<i>Hylobates moloch</i>	Jawa	Appendix I
4	Burung pekakak biru	Aves	<i>Alcedo euryzona</i>	Jawa	-
5	Elang Jawa	Aves	<i>Nisaetus bartelsi</i>	Jawa	-
6	Julang Mas	Aves	<i>Aceros undulatus</i>		Appendix II
7	Tepus leher putih	Aves	<i>Stachyris thoracica</i>	Jawa, bali	-
8	Tepus dada putih	Aves	<i>Stachyris grammiceps</i>	Jawa	-
9	Cica matahari	Aves	<i>Laniellus albonotatus</i>	Jawa	-
10	Brencet wergan	Aves	<i>Alcippe pyrrhoptera</i>	Jawa	-
11	Bintayung	Aves	<i>Fregata andrewsi</i>		Appendix I
12	Kasumba	Aves	<i>Apalharpactes reinwardtii</i>	Jawa	-
13	Piong	Aves	<i>Lophozosterops javanica</i>	Jawa, bali	-
14	Burung madu merah ekor panjang	Aves	<i>Aethopyga mystacalis</i>	Jawa	-
15	Burung madu gunung	Aves	<i>Aethopyga eximia</i>	Jawa	-
16	Glatik gunung	Aves	<i>Psaltia exilis</i>	Jawa	-
17	Celepuk jawa	Aves	<i>Otus angelinae</i>	Jawa	-
18	Kipasan mutiara	Aves	<i>Rhipidura euryura</i>	Jawa	-
19	Kipasan merah	Aves	<i>Rhipidura phoenicura</i>	Jawa	-
20	Cekakak jawa	Aves	<i>Halcyon cyanoventris</i>	Jawa	-
21	Gelatik jawa	Aves	<i>Lonchura oryzivora</i>		Appendix II
22	Bondol Jawa	Aves	<i>Lonchura leucogastroides</i>	Jawa, bali, lombok, sumatera	-

A number of species found in the Petungkriyono forest region are included in Appendices I, II, and III of the CITES, which will become effective on May 21, 2023. A list of international agreements that control trade in specific animal and plant species worldwide can be found in Appendix CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora). Appendices I, II, and III of this list each contain three sets of regulations pertaining to the control of trade in that species. The appendix (appendix II) had 35 species of Petungkriyono flora, and the appendix (4 appendix II, 2 appendix I) contained 6 species of Petungkriyono fauna. These findings were derived from the data processing results. The species included in appendix I—*Hylobates moloch* and *Fregata andrewsi*—should be taken very seriously since they face the greatest threat to extinction. Trade in these two species is virtually usually forbidden, with the exception of very particular uses and controlled environments, such as scientific study.

Table 4. Endemic fauna included in CITES Appendices

No	Local name	Class	Species	Endemic	CITES 2023
1	Lutung Hitam	Mammalia	<i>Trachypithecus auratus</i>	Jawa, bali, lombok	-

23	Ciung mungkal jawa	Aves	<i>Cochoa azurea</i>	Jawa	-
24	Opor jawa	Aves	<i>Heleia javanica</i>	Jawa	-
25	Serindit jawa	Aves	<i>Loriculus pusillus</i>	Jawa	-
26	Puyuh gonggong	Aves	<i>Arborophila javanica</i>	Jawa	-
27	Takur Bututut	Aves	<i>Megalaima corvina</i>	Jawa	-
28	Takur Tulungtumpuk	Aves	<i>Megalaima javensis</i>	Jawa	-
29	Takur Tohtor	Aves	<i>Megalaima armillaris</i>	Jawa	-
30	Sempur Hujan Rimba	Aves	<i>Eurylaimus javanicus</i>	Jawa	-
31	Paok Pancawarna	Aves	<i>Pitta guajana</i>	Jawa, bali	Appendix II
32	Meninting Kecil	Aves	<i>Enicurus velatus</i>	Jawa, sumatera	-
33	Cinenen Jawa	Aves	<i>Orthotomus sepium</i>	Jawa, bali, lombok	-
34	Perenjak Jawa	Aves	<i>Prinia familiaris</i>	Jawa, sumatera, bali	-
35	Cabai Gunung	Aves	<i>Dicaeum sanguinolentum</i>	Jawa, bali	-
36	Cabai jawa	Aves	<i>Dicaeum trochileum</i>	Jawa, bali, lombok, kalimantan, sumatera, kepulauan bangka belitung	-
37	Bancet rawa	Amphibia	<i>Occidozyga sumatrana</i>	Jawa, sumatera	-
38	Kongkang kolam	Amphibia	<i>Hylarana chalconota</i>	Jawa, bali, sumatera	-
39	Kongkang jeram	Amphibia	<i>Huia masonii</i>	Jawa	-
40	Katak-tanduk Jawa	Amphibia	<i>Megophrys montana</i>	Jawa	-
41	Bangkong Serasah	Amphibia	<i>Leptobranchium hasseltii</i>	Jawa, bali, sumatera	-
42	Katak terbang Jawa	Amphibia	<i>Rhacophorus margaritifer</i>	Jawa	-

43	Katak-pohon Emas	Amphibia	<i>Philautus aurifasciatus</i>	Jawa, sumatera	-
44	Cecak Batu	Amphibia	<i>Cyrtodactylus marmoratus</i>	Jawa, bali	-
45	Cecak terbang	Reptilia	<i>Draco volans</i>	Jawa, bali	-
46	Bunglon surai	Reptilia	<i>Bronchocela jubata</i>	Jawa, bali, kalimantan	-
47	Kadal mimikri	Reptilia	<i>Pseudocalotes tympanistriga</i>	Jawa, sumatera	-
48	Kadal hutan	Reptilia	<i>Sphenomorphus puncticentralis</i>	Jawa	-
49	Ular alang-alang	Reptilia	<i>Calamaria linnaei</i>	Jawa	-
50	Sanca kembang	Reptilia	<i>Python reticulatus</i>		Appendix II
51	-	Insecta	<i>Heliogomphus drescheri</i>	Jawa, sumatera	-
52	-	Insecta	<i>Heliocypha fenestrata</i>	Jawa, bali	-
53	-	Insecta	<i>Leptogomphus lansbergei</i>	Jawa, sumatera	-
54	-	Insecta	<i>Vestalis luctuosa</i>	Jawa, bali, sumatera	-
55	-	Insecta	<i>Rhinocypha heterostigma</i>	Jawa	-
56	-	Insecta	<i>Coeliccia membranipes</i>	Jawa, bali, sumatera	-
57	-	Insecta	<i>Drepanosticta gazella</i>	Jawa	-
58	-	Insecta	<i>Drepanosticta spatulifera</i>	Jawa	-
59	-	Insecta	<i>Drepanosticta sundana</i>	Jawa	-
60	Capung beludru sunda	Insecta	<i>Euphaea variegata</i>	Jawa, bali, sumatera	-

3.3 The urgency of conservative efforts: opportunities and challenges

Within the Petungkriyono forest, there is a tight link between the flora and wildlife. There are more various animal species in a region, or there may be more individual animals within a species, the more complicated the vertical structure is and the greater the diversity of the surrounding flora. A study conducted in 2016 on the white-breasted tepus bird (Strachyris

grammiceps) found that the bird's population increased in a more complex microhabitat with higher levels of vegetation cover and vertical arrangement than in a smaller microhabitat with lower levels of flora biodiversity.

An additional example would be the research conducted on Lepidoptera butterflies in the Petungkriyono forest. The more varied flora that makes up the forest is consistent with the increased diversity of butterfly fauna seen in research conducted in the Sokokembang forest (Nuraini, 2018). The individual density of the Javanese gibbon in the Sokokembang forest was also found to be higher than that of the gibbon in other Petungkriyono woods, including Tlogohendro (Salmah Widyastuti & Siti Nurleily Marlina, 2016). This gibbon density was 5.15/km². One possible explanation for this could be because the habitat structure of the Sokokembang forest in Kayupuring Village is more adapted to the requirements of Javan gibbons. Soko Kembang is a lowland tropical rain forest with a more complex forest composition than other villages in Petungkriyono. Its density is relatively high and continuous, and its altitude is appropriate for the environment (Nofiyani & Nugroho, 2016). The height of the trees that make up Sokokembang's vegetation is ideal for sleeping trees and cover trees for the Javanese Owa, as evidenced by the huge diameter trees that were discovered there (Damayanti et al., 2021a).

The intricate natural resources found in the Petungkriyono forest are a gift from Almighty God that need to be protected. Needless to say, achieving sustainability requires addressing a number of opportunities and difficulties. The following is a summary of these opportunities and challenges.

Poaching is a problem that the people in the Petungkriyono area face, particularly with regard to the aves class. This includes poaching of birds that are endangered, like *Lonchura oryzivora* and *Fregata andrewsi*, as well as several wild animal species that are protected under government regulations Number 106 of 2018 and Number 20 of 2018 and Number 7 of 1999 concerning the preservation of plant and animal species, like mongooses, pangolins, langurs, squirrels, and Javan gibbons (Hendriati et al., 2019). One of the challenges lies in the fact that Indonesia's rapid pyramidal population growth (BPS Pekalongan Regency, 2023) raises the likelihood of increased strain on forest regions due to land use changes, particularly in the Petungkriyono forest. This poses a threat to the sustainability of current species.

Two important opportunities that can be used to the fullest in attempts to protect endemic and endangered flora and wildlife are the possibility of ecotourism as a substitute for stopping unlawful hunting or poaching, and local wisdom. Planning for conservation can be made more sustainable and effective by incorporating indigenous knowledge, such as that of the nyadran gebyog culture (Ahmad & Soeprabowati, 2022). Local communities can have a significant impact on the preservation of nature and enabling coexistence with it by making use of their knowledge of the local environment.

An additional example would be the research conducted on Lepidoptera butterflies in the Petungkriyono forest. The more varied flora that makes up the forest is consistent with the increased diversity of butterfly fauna seen in research conducted in the Sokokembang forest (Nuraini, 2018). The individual density of the Javanese gibbon in the Sokokembang forest was also found to be higher than that of the gibbon in other Petungkriyono woods, including Tlogohendro (Salmah Widyastuti & Siti Nurleily Marlina, 2016). This gibbon density was 5.15/km². One possible explanation for this could be because the habitat structure of the Sokokembang forest in Kayupuring Village is more adapted to the requirements of Javan gibbons. Soko Kembang is a lowland tropical rain forest with a more complex forest composition than other villages in Petungkriyono. Its density is relatively high and continuous, and its altitude is appropriate for the environment (Nofiyani & Nugroho, 2016). The height of the trees that make up Sokokembang's vegetation is ideal for sleeping trees and cover trees for the Javanese Owa, as evidenced by the huge diameter trees that were discovered there (Damayanti et al., 2021a).

The intricate natural resources found in the Petungkriyono forest are a gift from Almighty God that need to be protected. Needless to say, achieving sustainability requires addressing a number of opportunities and difficulties. The following is a summary of these opportunities and challenges.

Poaching is a problem that the people in the Petungkriyono area face, particularly with regard to the aves class. This includes poaching of birds that are endangered, like *Lonchura oryzivora* and *Fregata andrewsi*, as well as several wild animal species that are protected under government regulations Number 106 of 2018 and Number 20 of 2018 and Number 7 of 1999 concerning the preservation of plant and animal species, like mongooses, pangolins, langurs, squirrels, and Javan gibbons (Hendriati et al., 2019). One of the challenges lies in the fact that Indonesia's rapid pyramidal population growth (BPS Pekalongan Regency, 2023) raises the likelihood of increased strain on forest regions due to land use changes, particularly in the Petungkriyono forest. This poses a threat to the sustainability of current species.

Two important opportunities that can be used to the fullest in attempts to protect endemic and endangered flora and wildlife are the possibility of ecotourism as a substitute for stopping unlawful hunting or poaching, and local wisdom. Planning for conservation can be made more sustainable and effective by incorporating indigenous knowledge, such as that of the nyadran gebyog culture (Ahmad & Soeprabowati, 2022). Local communities can have a significant impact on the preservation of nature and enabling coexistence with it by making use of their knowledge of the local environment.

Reducing unlawful hunting and poaching activities is another benefit of ecotourism. An industry of tourism known as "ecotourism" is one that places an emphasis on pleasurable and environmentally friendly encounters with the natural world. When done responsibly,

ecotourism may give local communities an additional source of income without harming natural environments or jeopardizing threatened plant and animal populations. While making money to help environmental protection, ecotourism offers visitors the chance to witness endangered creatures in their natural habitat. According to (Andriyani et al., 2022; M. Anam Rahardyan et al., 2021; T. A. Setiawan et al., 2020; Yusron et al., 2020), Petungkriyono offers a variety of ODTWA, including water-based tourism, butterfly gardens, and monkey and bird watching.

Two effective strategies for promoting conservation include making use of local knowledge and growing ecotourism that is sustainable. In addition to safeguarding native and threatened plant and animal species, this also offers prosperous business prospects to the surrounding community, which may inspire them to preserve the environment. This approach can preserve both human wellbeing and natural biodiversity at the same time.

4 Conclusion

Numerous species of Indonesian plants and animals can be found in the Petungkriyono forest area. Because of its close proximity to the village, it will always be impacted by the different ways that the locals engage with the Petungkriyono forest, which will have both positive and bad effects on the sustainability of the current flora and fauna.

It was noted that the Petungkriyono forest area was home to 204 species of plants and 168 species of animals. According to the IUCN, six of these flora are classified as vulnerable (VU) species, while four are classified as endangered (EN). A total of 35 species are listed in the CITES 2023 Appendix (Appendix II), of which 8 are endemic. Regarding the fauna, eight species are classified as Vulnerable (VU), six as Endangered (EN), and three as Critically Endangered (CR). Six of the 56 indigenous species in the fauna are included in the CITES Appendix (Appendice I, II) for 2023. It is imperative that conservative measures be taken right away in order to preserve the biodiversity that currently exists. This can be done by maximizing possibilities and overcoming obstacles.

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References

1. Abdurrahman, I., Mujiyanto, M., Dewi, A. E., & Fahmi, A. A. (2021). *Melestarikan Petungkriyono* Reportase hasil studi eksploratif dan assessment awal Pengembangan ekonomi hijau. Relung Indonesia. Agustin, D., & Widowati, H. (2015). Inventarisasi Keanekaragaman Anggrek (Orchidaceae) Di Hutan Resort Way Kanan Balai Aman Nasional Way Kambas Sebagai Sumber Informasi Dalam Melestarikan Plasma Nutfah.

- BIOEDUKASI (Jurnal Pendidikan Biologi), 6(1). <https://doi.org/10.24127/bioedukasi.v6i1.156>
2. Ahmad, H., & Soeprabowati, T. R. (2022). Kearifan Tradisi Budaya Sebagai Sarana Pelestarian Lingkungan Serta Potensi Ekowisata Pada Komunitas Masyarakat Di Sekitar Hutan Lindung Petungkriyono (Studi Kasus Nyadran Gebyog). 03(02).
3. Ahmadin, K. (2016). Petungkriyono Forest Sub-District Petungkriyono, Pekalongan Regency, Central Java.
4. Andriyani, S. D., Sifa, M., & Rif, R. A. (2022). Kajian Pengelolaan Potensi Ekowisata Petungkriyono, Kabupaten Pekalongan. Journal of Environmental Science Sustainable, 3(1), Article 1. <https://doi.org/10.31331/envoist.v3i1.2250>
5. Apriliyani, E. (2017). Ekologi Burung Julang Emas (*Rhyticeros undulatus* Shaw, 1881) di Hutan Sokokembang Pekalongan Jawa Tengah: Vol. Skripsi. Universitas Islam Negeri Syarif Hidayatullah.
6. Arrisaldi, T. (2018). Pemetaan Risiko Gerakan Tanah Di Kecamatan Petungkriyono. Kajian: Jurnal Penelitian Dan Pengembangan Pembangunan, 2. <https://doi.org/10.54687/jurnalkajenv02i01.1>
7. BPS Pekalongan Regency. (2023). BPS Pekalongan Regency. <https://pekalongankab.bps.go.id/publication.html>
8. Cooper, H. M. (1998). Synthesizing research: A guide for literature reviews: Vol. (Vol. 2). Sage Publications, Inc.
9. Damayanti, I., Bambang, A. N., & Soeprabowati, T. R. (2021a). Carbon stocks of Petungkriyono mixed forest as climate change mitigation. IOP Conference Series: Earth and Environmental Science, 724(1), 012064. <https://doi.org/10.1088/1755-1315/724/1/012064>
10. Damayanti, I., Bambang, A. N., & Soeprabowati, T. R. (2021b). Plant diversity of Petungkriyono Forest of Dieng Plateau, Central Java, Indonesia. Biodiversitas Journal of Biological Diversity, 22(8). <https://doi.org/10.13057/biodiv/d220849>
11. Damayanti, I., Nur Bambang, A., & Soeprabowati, T. (2020). The Analyze of Collaborative Management Perspective of Petungkriyono Forest. E3S Web of Conferences, 202, 05014. <https://doi.org/10.1051/e3sconf/202020205014>
12. Damayanti, I., Nur Bambang, A., & Soeprabowati, T. R. (2018). Extended benefit cost analysis as an instrument of economic valuated in Petungkriyono forest ecosystem services. Journal of Physics: Conference Series, 1025, 012034. <https://doi.org/10.1088/1742-6596/1025/1/012034>
13. Desiana, ., Roslinda, E., & Kartikawati, S. M. (2019). Jasa Lingkungan Taman Keanekaragaman Hayati (Kehati) Badan Lingkungan Hidup Di Kabupaten Sekadau Tahun 2017. Jurnal Hutan Lestari, 7(1). <https://doi.org/10.26418/jhl.v7i1.32168>
14. Eprilurahman, R., Qurniawan, T. F., & Kusuma, K. I. (2010). Studi Awal Keanekaragaman

- Herpetofauna Dipetungkriyono, Kabupaten Pekalongan, Provinsi Jawa Tengah ...
15. Fatmasari, D., Nugroho, A. S., & Kaswinarni, F. (2017). Struktur Umur dan Rasio Jenis Kelamin Lutung Budeng (*Trachypithecus Auratus*) di Hutan Lindung Sokokembang Petungkriyono Pekalongan Jawa Tengah.
 16. Fikri, M. K., & Adinugraha, H. H. (2021). Pendampingan Regenerasi Penderes Nira Aren Desa Kayupuring Kecamatan Petungkriyono.
 17. Hendriati, I. T., Abdoellah, O. S., & Parikesit, P. (2019). SEMINAR MENYONGSONG SATU ABAD INDONESIA.
 18. Kusmana, C., & Hikmat, A. (2015). Keanekaragaman Hayati Flora Di Indonesia. *Jurnal Pengelolaan Sumberdaya Alam Dan Lingkungan (Journal of Natural Resources and Environmental Management)*, 5(2), 187.
<https://doi.org/10.29244/jpsl.5.2.187>
 19. Lestari, I. (2019). Keanekaragaman jenis tumbuhan paku epifit di Hutan Petungkriyono Kabupaten Pekalongan, Jawa Tengah.
 20. M. Anam Rahardyan, Loekman Mohamadi, & Wawan Destiawan. (2021). Perancangan Kawasan Wisata Telaga Mangunan di Petungkriyono Kabupaten Pekalongan. *SARGA: Journal of Architecture and Urbanism*, 15(2), 28–38.
<https://doi.org/10.56444/sarga.v15i2.151>
 21. Mardiyana, M., Murningsih, M., & Utami, S. (2019). Inventarisasi Anggrek (*Orchidaceae*) Epifit di Kawasan Hutan Petungkriyono Pekalongan Jawa Tengah. *Jurnal Akademika Biologi*, 8(2), Article 2.
 22. Nafisah, N. A., & Soesilohadi, R. C. H. (2021). Community Structure of Dragonfly (*Ordo: Odonata*) in Natural Forest and Tourist Sites Petungkriyono Forest, Central Java, Indonesia. *Journal of Tropical Biodiversity and Biotechnology*, 6(3), 67328.
<https://doi.org/10.22146/jtbb.67328>
 23. Nijman, V. J., & Setiawan, I. (2000). Penilaian sepintas keragaman fauna di Pegunungan Dieng. Yayasan Pribumi Alam Lestari.
 24. Nofiyani, T., & Nugroho, A. S. (2016). Aktivitas Harian Owa Jawa (*Hylobates moloch*) di Hutan Lindung Petungkriyono Kabupaten Pekalongan Jawa Tengah. *Prosiding Seminar Nasional Sains dan Entrepreneurship III Tahun 2016*.
 25. Nugrahaningrum, A., & Soesilohadi, R. C. H. (2021). Variations of Movement, Dispersal, and Morphometrics among Subpopulations of Javan Endemic Damselfly, *Drepanosticta spatulifera* (*Odonata: Platystictidae*) in Petungkriyono Forest. *Journal of Tropical Biodiversity and Biotechnology*, 6(3), 65612.
<https://doi.org/10.22146/jtbb.65612>
 26. Nuraini, S. (2018). Komunitas Kupu-Kupu (*Lepidoptera: Rhopalocera*) Di Hutan Sokokembang Pekalongan, Jawa Tengah.
 27. Peggie, D. (2018). KAJIAN DIVERSITAS KUPU-KUPU (*Lepidoptera: Papilionoidea & Hesperioidea*) DAN POTENSI PEMANFAATANNYA. 02(02).
 28. Pradana, B., Ariani, N. M., & Pugara, A. (2020). Pengaruh Penggunaan Lahan terhadap Suhu Permukaan di Kabupaten Pekalongan Tahun 2020. *Kajen: Jurnal Penelitian dan Pengembangan Pembangunan*, 4(02), 92–100.
<https://doi.org/10.54687/jurnalkajenv4i02.1>
 29. Prapitasari, B., Kurniawan, A. P., & Muharam, D. H. (2020). Keanekaragaman dan Kemelimpahan Jenis Anggrek (*Orchidaceae*) di Resort Selabintana Taman Nasional Gunung Gede Pangrango (TNGGP) Jawa Barat. *Biosfer : Jurnal Biologi Dan Pendidikan Biologi*, 5(1), Article 1.
<https://doi.org/10.23969/biosfer.v5i1.2569>
 30. Rachmawati, Y., Pramudya, M., & Setiawan, A. (2022). Distribution of the critically endangered javan blue-banded kingfisher *Alcedo euryzona* along the Welo River flow in the Petungkriyono forest. *IOP Conference Series: Earth and Environmental Science*, 976(1), 012004.
<https://doi.org/10.1088/1755-1315/976/1/012004>
 31. Randolph, J. (2009). A guide to writing the dissertation literature review. *Practical Assessment, Research, and Evaluation*, Vol. 14(1), 13.
 32. Rasyid, F. (2014). Permasalahan dan Dampak Kebakaran Hutan. 4.
 33. Relung Indonesia. (2023). Analisis Spasial Multi Kriteria (SCMA). Relung Indonesia.
 34. Salmah Widyastuti, & Siti Nurleily Marliana. (2016). Densitas Dan Distribusi Populasi Owa Jawa (*Hylobates Moloch Audebert, 1798*) Di Hutan Tlogohendro, Petungkriyono, Pekalongan, Jawa Tengah.
<https://doi.org/10.13140/RG.2.2.28194.45760>
 35. Setiawan, A. (2022). Keanekaragaman Hayati Indonesia: Masalah dan Upaya Konservasinya. *Indonesian Journal of Conservation*, 11(1).
<https://doi.org/DOI.10.15294/ijc.v11i1.34532>
 36. Setiawan, A., Nugroho, T. S., Wibisono, Y., Ikawati, V., & Sugardjito, J. (2012). Population density and distribution of Javan gibbon (*Hylobates moloch*) in Central Java, Indonesia. *Biodiversitas Journal of Biological Diversity*, 13(1).
<https://doi.org/10.13057/biodiv/d130105>
 37. Setiawan, T. A., Ilyas, A., & Binabar, S. W. (2020). Pemetaan Potensi Pariwisata Petungkriyono Berbasis Web Geographical Information System (Gis) Sebagai Cultural Techno Forestry Park Kabupaten Pekalongan. I.
 38. Tanguay, L. (2020). How Preserving Biodiversity Mitigates the Impacts of Small-scale Land Grab on Livelihoods and Agricultural Production in Central Java. 35(1).
 39. Wibowo, D. E., Jannah, K. D., & Permanasari, P. (2022). Pengembangan Rural Tourism Melalui Pemberdayaan Pokdarwis Menggunakan Life Skill di Kecamatan Petungkriyono Kabupaten Pekalongan. *Ruang Cendekia : Jurnal Pengabdian Kepada Masyarakat*, 1(2), 121–131.
<https://doi.org/10.55904/ruangcendekia.v1i2.68>
 40. Widhiono, I. (2009, October 6). “Konservasi Keanekaragaman Hayati Hutan Petungkriyono Melalui Ekoswisata” (“Biodiversity Conservation

Of Petungkriyono Forest Remnant With Ecotourism”). Dr. Rer.Nat. IMAM WIDHIONO MZ, MS.

<https://widhiono.wordpress.com/2009/10/06/%e2%80%9c-konservasi-keanekaragaman-hayati-hutan-petungkriyono-melalui-ekoswisata%e2%80%9d-%e2%80%9cbiodiversity-conservation-of-petungkriyono-forest-remnant-with-ecotourism%e2%80%9d/>

41. Widodo, W. (2021). Perbandingan Komunitas Burung di Lahan Perkebunan Kopi dengan Naungan Pohon Alami. *BIOEDUSAINS:Jurnal Pendidikan Biologi dan Sains*, 4(2), 336–345. <https://doi.org/10.31539/bioedusains.v4i2.2414>
42. Wulandari, Y., Nugroho, A. S., & Ulfah, M. (2016). Karakteristik Pohon Tidur dan Pohon Cover Owa Jawa (*Hylobates moloch*) di Hutan Lindung Petungkriyono Jawa Tengah. *SNSE III* 2016.
43. Yulia, N. D., & Yanti, R. M. (2010). Anggrek Epifit Dan Pohon Inangnya Di Kawasan Gunung Penanggungan, Pasuruan – Jawa Timur. *Berk. Penel. Hayati Edisi Khusus*, 4A (37–40).
44. Yusron, A., Rosyadi, I., & Handayani, H. (2020). Sistem Informasi Wisata Petungkriyono Berbasis Android (Studi Kasus Telaga Mangunan). Vol ., 1.