

Study of Fauna Diversity in Ujung Kulon National Park Banten Indonesia

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Abstract

National parks are natural conservation areas that have native ecosystems, managed with a zoning system that is used for research, science, education, tourism, cultivation and recreation purposes. Ujung Kulon National Park (TNUK) is one of Indonesia's national parks, located on the western tip of Java Island, Pandeglang Regency, Banten Province. The various kinds of ecosystems in Ujung Kulon National Park are a habitat for various endemic animals or those with a protected and endangered conservation status. However, climate change and poaching that have occurred over the years, land transfers, and climate change have created distinct threats to the preservation of fauna in this region. One of the efforts to preserve the environment in and around TNUK is to carry out in-depth research on habitat conditions and the diversity of species present inside the area. This research aims to obtain information on the diversity of fauna in the TNUK and identify the various types of fauna found in the TNUK area. Fauna's diversity information was carried out in September 2022 by exploring areas in Cilintang to Legon Pakis with a total distance of 9.7 km. The study found the diversity of fauna, and there are nine species of large mammals, seven species of herpetofauna (amphibian reptiles), 13 species of butterflies, and 30 species of avifauna (aves).

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Introduction

Biodiversity is the variation among living organisms from different sources, millions of plants, animals and microorganisms, the genes they contain, and the ecosystems in which they live (Kurniasih, 2018). Biodiversity is the diversity of species, genetics, and ecosystems in an area and the abiotic components present in it, such as landscape features, drainage systems, and climate (Swingland, 2013). Indonesia is one of the countries which is the centre of world biodiversity and is known as a mega biodiversity country (Anggraini, 2018; Kurniasih, 2018; Hartoto et al., 2006., Rintelen et al., 2017). Indonesia has an enormous diversity of fauna, as proven by Indonesia's position in second place in the world for diversity of mammals, third in the world for diversity of freshwater fish, fourth in the world for diversity of reptiles, fifth in the world for diversity of birds, and sixth in the world for amphibians diversity (Supriatna, 2008).

A national park is a nature conservation area that has native ecosystems, managed by a zoning system that is used for research, science, education, tourism, cultivation and recreation purposes (Ministry of Forestry, 2006; Kosmaryandi et al., 2012). National Park areas can be in the form of land or water, which acts as a life support system, biodiversity conservation, and sustainable utilization of natural resources (Ministry of Forestry, 2006).

Ujung Kulon National Park (TNUK) is one of the national parks in Indonesia which is located on the western tip of Java Island, Pandeglang Regency, Banten Province ([Abdurrachman & Annisa, 2018](#); [Milto & Lukin, 2020](#)). The area has special characteristics both in terms of location, land cover and types of vegetation that are different from other areas. It is known that differences soil type and vegetation types and land cover types have a significant effect on the types of fauna that live in an area ([Korboulewsky, N., Perez, G., & Chauvat, M., 2016](#); [Zhu, X., & Zhu, B., 2015](#)). Ujung Kulon National Park is divided into four regions: the Ujung Kulon Peninsula, Peucang Island, Panaitan Island, and Mount Honje ([Milto & Lukin, 2020](#)). Ujung Kulon National Park is one of the oldest and most important national parks in Indonesia, with a wealth of biodiversity. Therefore, UNESCO designated Ujung Kulon National Park as a *Natural World Heritage Site* ([Larasati in Puwaningsih & Atikah, 2018](#); [Suparyana et al., 2022](#)).

Ujung Kulon National Park has abundant biodiversity, such as the diversity of flora and fauna and the ecosystems in it. The ecosystem in Ujung Kulon National Park consists of land, marine (marine) waters, and swamps ([Puwaningsih & Atikah, 2018](#); [TNUK, 2015](#); [Suparyana et al., 2022](#)). Ujung Kulon National Park is home to 700 species of plants and 608 species of endemic animals, and several species of animals with protected and rare status ([Ministry of Environment and Forestry, 2022](#)). Some species of flora species found in Ujung Kulon National Park is the abundance of rhino provender plants such as Kiara (*Ficus hirta*), buah kondang (*Ficus variegata*), tepus (*Ammomum cocciceum*), and sulangkar (*Leea sambucina*) ([Surahman, 2014](#)). In addition, Ujung Kulon National Park also has various types of fauna. Fauna is a type of animal that lives in nature and has a vital role in preserving the environment, as well as being a determinant of environmental quality and the existence of an ecosystem ([Rahadian et al., 2020](#)). Ujung Kulon National Park is a habitat for endemic and endangered animals such as the Javan rhinoceros (*Rhinoceros sondaicus*), Javan gibbon (*Hylobates moloch*), and surili (*Presbytis comota*) ([Derajat et al., 2022](#); [Rohman et al., 2021](#)). In addition to endemic fauna and endangered status, there are also various other types of fauna in Ujung Kulon National Park, such as crab-eating macaque (*Macaca fascicularis*), common tree frogs (*Polypedates leucomystax*), black eagle (*Ictinaetus malayensis*), cave swiftlet (*Collocalia linchi*), butterflies, and others ([Surahman, 2014](#)).

The diversity of fauna in Ujung Kulon National Park is fascinating. Various types of fauna need to be known, maintained, and conserved so their existence does not become extinct. One type of endemic animal in Ujung Kulon National Park with endangered conservation status is the Javan rhinoceros (*Rhinoceros sondaicus*). The Javan rhinoceros (*Rhinoceros sondaicus*) is the rarest of the five rhino species worldwide and it is only habitat in Ujung Kulon National Park, Indonesia ([Rahmat et al., 2008](#); [Setiawan et al., 2018](#)). Ujung Kulon National Park is a specific habitat that provides the necessities for the Javan rhinoceros (*Rhinoceros sondaicus*), such as food, water, clean air, minerals, shelter, wallowing grounds, breeding grounds and child-rearing ([Rahmat et al., 2008](#)). This habitat needs to be preserved to protect the Javan rhinoceros and all endemic species related to the areas. management management of the use of buffer areas, providing information and increasing understanding of conservation, can support integrated management for the continuity of natural life ([Amori, G. & Mazzei, 2021](#)).

This study aims to identify various species of fauna by survey to provide updated information on the diversity of fauna species in the Ujung Kulon National Park area, especially in the buffer area which is adjacent to residential areas.

Methods

This research is descriptive qualitative research to explain fauna diversity data that comes from photographic documentation and records of animal sounds described in written words. The selection of the descriptive method itself is carried out to reveal the facts of a subject without any manipulation of variables. Meanwhile, the method of collecting data on the diversity of fauna in Ujung Kulon National Park is carried out using *cruise methods*.

This research was conducted from Tuesday to Thursday, 27-29 September 2022, in Ujung Kulon National Park. Specifically, these locations are in Sumur and Cimanggu Districts, Pandeglang Regency, Banten Province ([Figure 1](#)). The research location itself is a buffer zone in Ujung Kulon National Park. The area takes place outside the TNUK area either as another forest area, free state land, or land encumbered with the necessary rights and can maintain the integrity of the TNUK. The buffer zone of TNUK includes Sumur and Cimanggu Districts, Pandeglang Regency.

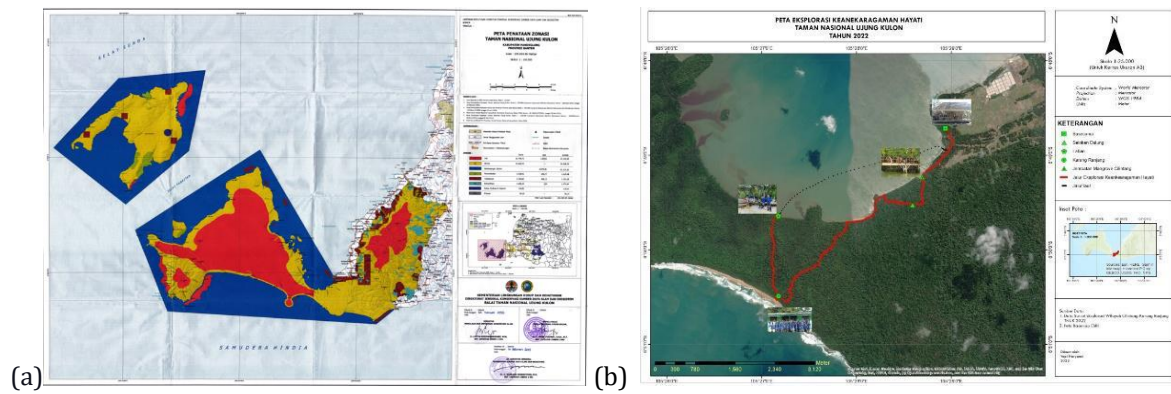


Figure 1. Research Locations (a); Ujung Kulon National Park (b) Research Exploration Route

Results and Discussion

This Exploration activities carried out along the observation route of the Cilintang-Karang Ranjang Area of Ujung Kulon National Park showed the area's fauna diversity. The data is curated by doing a literature review of several literatures related to the area's identification and diversity of fauna. The data we obtained are presented in [table 1](#).

Table 1. The Fauna diversity in TNUK area

No	Family	Scientific name	Local Name
Insects			
1	Lycaenidae	<i>Jamides celeno</i>	-
2	Lycaenidae	<i>Jamides parasaturatus</i>	-
3	Nymphalidae	<i>Cupha erymanthis</i>	-
4	Nymphalidae	<i>Euploea mulciber</i>	-
5	Nymphalidae	<i>Iasonian idea</i>	-
6	Nymphalidae	<i>Ideopsis juvena</i>	-
7	Nymphalidae	<i>Junonia hedonia</i>	-
8	Nymphalidae	<i>Junonia iphita</i>	-
9	Nymphalidae	<i>Junonia atlites</i>	-
10	Nymphalidae	<i>Mycalesis fuscum</i>	-
11	Nymphalidae	<i>Mycalesis horsfieldi</i>	-
12	Pieridae	<i>Catopsilia pamona alcmeone</i>	-
13	Pieridae	<i>Eurema hecabe</i>	-
Herpetofauna			
1	Rhacophoridae	<i>Polypedates leucomystax</i>	Common Tree Frog
2	Crocodylidae	<i>Crocodylus porosus</i>	Saltwater Crocodile
3	Agamidae	<i>Draco volans</i>	Gliding Lizard
4	Scincidae	<i>Carlia isostracantha</i>	Bengkarung Tanah
5	Gekkonidae	<i>Gecko gecko</i>	House Gecko
6	Elapidae	<i>Naja sputatrix</i>	Javanese Cobra
Aves			
1	Aegithinidae	<i>Aegithina typhia</i>	Common Iora
2	Alcedinidae	<i>Todyramphus chloris</i>	Collared kingfisher
		<i>Alcedo coerulescens</i>	Cerulean kingfisher
3	<u>Apodidae</u>	<i>Collocalia linchi</i>	Cave swiftlet
4	Campephagidae	<i>Pericrocotus cinnamomeus</i>	Small minivet
		<i>Orthotomus sepium</i>	Javan tailorbird
5	Cisticolidae	<i>Orthotomus sutorius</i>	Cinenen pisang
		<i>Prinia familiaris</i>	Perenjak jawa
		<i>Cacomantis merulinus</i>	Wiwik kelabu
6	Cuculidae	<i>Surniculus lugubris</i>	Square-tailed drongo-cuckoo
		<i>Cocomantis sonneratii</i>	Wiwik Lurik
		<i>Centropus nigrorufus</i>	Bubut jawa

No	Family	Scientific name	Local Name
7	Dicaeidae	<i>Dicaeum trigonostigma</i>	Cabai bunga-api
8	Dicruridae	<i>Dicrurus leucophaeus</i>	Ashy drongo
9	Estrildidae	<i>Longura punctulata</i>	Elanh Bondol
		<i>Anthracoceros albirostris</i>	Oriental pied hornbill
10	Megalaimidae	<i>Psilopogon australis</i>	Yellow-eared barbet
11	Nectariniidae	<i>Anthreptes malacensis</i>	Brown-throated sunbird
12	Pachycephalidae	<i>Pachycephala cinerea</i>	Kancilan bakau
13	Passeridae	<i>Passer montanus</i>	Eurasian tree sparrow
14	Pellomeidae	<i>Pellorneum capistratum</i>	Javan black-capped babbler
16	Phasianids	<i>Gallus varius</i>	Green junglefowl
		<i>Pycnonotus aurigaster</i>	Sooty-headed bulbul
		<i>Alophoixus bres</i>	Brown-cheeked bulbul
		<i>Pycnonotus plumosus</i>	Olive-winged bulbul
17	Ramphastidae	<i>Megalaima javensis</i>	Takur tulung tumpuk
18	Sturnidae	<i>Gracula religiosa</i>	Common hill myna
19	Timaliidae	<i>Cyanoderma melanothorax</i>	Crescent-chested babbler
Mammals			
1	Rhinocerotidae	<i>Rhinoceros sondaicus</i>	Javanese rhino
2	Cervidae	<i>Muntiacus vomited</i>	Deer
3	Hylobatidae	<i>Hylobates moloch</i>	Java gibbon
4	Cercopithecidae	<i>Presbytis comate</i>	surili
5	Cercopithecidae	<i>Macaca fascicularis</i>	Crab-eating macaque
6	Sutidae	<i>Sus scrofa</i>	Wild boar
7	Tragulidae	<i>Tagulus javanicus</i>	Pelanduk Jawa
8	Cervidae	<i>Cervus timorensis</i>	Javanese deer
9	Cercopithecidae	<i>Trachypitecus auratus</i>	Lutung

(Source: Research data, 2022)

Insects diversity in Ujung Kulon National Park

Based on [table 1](#), it was known that the dominating butterfly family found in the Cilintang-Karang Panjang area of Ujung Kulon National Park was the Nymphalidae family. The food plants for the types of butterflies in the Nymphalidae family found in the study area were the *Asteraceae*, *Moraceae*, and *Rubiaceae* tribes. Plants that were a food source for the Nymphalidae family are plants from the *Annonaceae*, *Asteraceae*, *Moraceae*, *Rubiaceae* and *Anacardiaceae* tribes.

Butterflies in TNUK area were commonly found in an edge river for water. Butterflies are also found in some specific areas of plant cover. These habitats have the optimal condition due to the nature of the butterfly, which is poikilothermic. This trait makes butterflies rely on sunlight to regulate body temperature. Area cover affects the intensity of sunlight and the ambient temperature explicitly needed for butterflies to stabilize their body temperature ([Gonggoli et al., 2021](#)).

Most of these butterflies live in secondary forests, open forests, plantations, settlements, river banks and grass, which were exposed to much sunlight at an altitude of 0 - 2000 meters above sea level. Water sources, sunlight, temperature and humidity all played an essential role in supporting butterfly life. The optimal temperature for butterflies is 28-35 C, and the humidity is less than 85%. Butterflies have close relationships with the plants in their habitat. The role of plants was divided into food plants and host plants. Butterflies are classified as herbivores. As larvae, they eat plant parts (vegetation); as adults, they eat flower nectar ([Andrianto & Ginoga, 2020](#)).

According to the IUCN Red list for the species *Junonia hedonia*, *Junonia iphita*, *Catopsilia pamona alcmeone*, *Eurema hecabe*, *Jamides celeno*, *Mycalesis fuscum*, *Mycalesis horsfieldi*, *Junonia atlites*, *Ideopsis juvena* had a conservation status *least concern (LC)* or species that have been evaluated but not face the risk of extinction. Furthermore, the *Euploea mulciber* species had a *vulnerable (VU)* conservation status as a species that faces a high risk of extinction in the wild and is considered to meet one of the five criteria for extinction. *Cupha erymanthis* and *Jamides parasaturatus* got data deficient (DD) conservation status as the species whose extinction data or information is unclear due to limited information. The last species was *Idea iasonia* which had a *near threatened (NR)* conservation status or a species at high risk of extinction. Most butterfly species described above are known to have a distribution of habitat in Sumatra, Java, Kalimantan, China, Cambodia, Nias, the Malay Peninsula, and Malaysia ([Andrianto & Ginoga, 2020](#)).

Butterflies has been a part of the biodiversity that must be protected from extinction and decay. In TNUK, butterflies had significant values, such as ecological, endemism, conservation, educational, cultural, aesthetic and economic values. As pollinators, butterflies contributed to biodiversity conservation and the balance of life and ecosystems, especially in TNUK areas. Therefore, to preserve butterfly diversity, socialization must be held to educate the public about the importance of conservation education. Recommendations that focus on improving conservation science and management (lists of protected species, identification of high priority areas for protection, use of butterfly species, more explicit regulations for butterfly collections), better land management such as agricultural areas, urban areas, forest ([Wang et al., 2020](#)).

Herpetofauna diversity in Ujung Kulon National Park

Herpetofauna diversity has played a role in ecosystems and has been used as a parameter of environmental quality. As ectothermic animals, reptiles were scattered in various habitats. These reptiles could live in the sea, freshwater, deserts, and mountains. There are approximately 7900 species of reptiles that live today and inhabit various temperate and tropical habitats, including deserts, forests, freshwater wetlands, mangroves and the open ocean ([Klappenbach, 2013](#)). Data collection was held in morning and afternoon sessions to get more variety because it was important to consider the different active times of each species in the herpetofauna group. The results showed seven species of herpetofauna, namely: *Polypedates leucomystax* (common tree frog), *Crocodylus porosus* (saltwater crocodile), *Draco Volans* (gliding gecko), *Gekko gekko* (house gecko), *Naja sputatrix* (Javanese Cobra), *Eutropis rudi* (garden lizard). The Ujung Kulon National Park area has a diverse microhabitat composition ranging from litter, shrubs and fallen trees suitable for living and foraging for reptiles.

Lizards have lived in various habitats like trees, on the ground, and even in the ground—lizards like moist places with lots of litter, trees and bushes. One of the lizard species we encountered was *Eutropis rudis* or Litter Brown Lizard. The *E. rudis* lizard was a common species widely distributed in most terrestrial habitats. The range of this lizard was broad, covering gardens and forests. Lizards (*Eutropis*) prey on various invertebrate animals and can associate with human habitation ([Faz et al., 2020](#)). *Eutropis rudis* has a conservation status of *least concern (LC)* which was at low risk of extinction ([Amarasinghe, 2021](#)).

Amphibian species were also found in the Ujung Kulon National Park area. Common Tree Frog (*Polypedates leucomystax*) was one of the amphibians found. *Polypedates leucomystax* was also known as the striped tree frog because of the stripes on its back. This species was widespread from 200-1400 meters above sea level. The *P. leucomystax* tree frog has been lived in several Asian countries, in Indonesia, its habitats spread across the islands of Sumatra, Java, Kalimantan and Sulawesi ([Addaha et al., 2015](#)). These frogs from the Anura order had habitats in forests, bushes, grasslands, wetlands (inland), and coastal/supratidal seas. This frog's conservation status was the *least concern*, which is at low risk of extinction ([Sanguila et al., 2016](#)).

Aves diversity in Ujung Kulon National Park

Aves is a living creature that belongs to the kingdom Animalia with the Chordata phylum. Its body is hairy and includes animals that can fly. Birds have an essential role in life in research, learning facilities, recreation and tourism ([Maulidah, 2022](#)). In addition, Aves can be considered as useful biological indicators because they are ecologically versatile and can live in various habitats as herbivorous or carnivorous animals ([Kumar, 2015](#)). Therefore, the existence of birds in an area needs to be preserved.

In research in Ujung Kulon National Park, 29 species of aves were found in 19 families. Several species have conservation status with the categories *Endanger (En)*, *Vulnerable (Vu)*, *Near Threatened (NT)*, and *Least Concern (LC)*. Species in the *Endanger category*, *calles as Empuloh Janggut (Alophoixus bres)*, habitat of the species was a primary forest, secondary forest and bushes. When observations were made, this species was found in a ditch location. *Alophoixus bres* has a melodious voice chirping (Pratiwi, 2021). The Java Lathe (*Centropus nigrorufus*) species was included in the *Vulnerable category*. The *Centropus nigrorufus* species was one of the endemic animals of Java because of its limited distribution and narrow habitat tolerance. The bird could be found in areas with wetlands and coastal areas ([Faradlina, 2011](#)). Species in the *Near Threatened category* are *Prinia familiaris* and *Megalaima javensis*. Meanwhile, other species are included in the *Least Concern category*.

Mammals diversity in Ujung Kulon National park

Mammals found in the Cilintang-Karang Ranjang area in the Ujung Kulon National Park area were nine species of mammals, concluded in six families: Rhinocerotidae, Cervidae, Hylobatidae, Cercopithecidae, Sutidae, and Tragulidae. ([Melsasail, 2022](#)).

Few types of mammals were found in the research location because the nature of these animals was still susceptible to humans. In general, large mammals were distributed in locations far from human activities and lived in different habitats in the research location. The most dominant species were the long-tailed monkey (*Macaca fascicularis*), and wild boar (*Sus scrofa*) ([Sulistiyadi, 2016](#)).

Habitat conditions for crab-eating macaques needed a specific characterist: shelterer, space, water, food availability, and vegetation ([Nidya et al., 2019](#)). The monkeys found in TNUK was Crab-eating macaque (*Macaca fascicularis*), which lived in areas near waters because those areas have warm temperatures. Monkeys was came down from trees to carry out activities, one of which were looking for food. One of the trees abundant in TNUK was a laurel tree which is food for the monkeys. Crab-eating Macaque is active in the morning. The fact was reinforced by the appearance of monkeys seen more in the morning. ([Arrum et al., 2018](#)).

According to [Nasution et al. \(2014\)](#), crab-eating macaque started their daily activities from 05.30 to 18.00 in the afternoon. When doing their activities, the monkeys were in a tree as a place to rest until 07.00. Monkey activity would be started to increase from 07.00-10.00. These activities were foraging, walking, climbing, running, and moving from one branch to another. When viewed from the behavior patterns of long-tailed monkeys that are flexible towards habitat conditions and the presence of humans, there are indications that the potential for extinction is pressuring the existence of these primates due to land use conversion and hunting ([Arrum et al., 2018](#)).

Meanwhile, the distribution of the Javan rhinoceros in TNUK is dominated by the 0–1000 m class from the coast, there were 108 encounter points, 44 encounter points in the 1000–2000 m class and 28 encounter points in the >2000 m class ([Ilham, 2016](#)). Many of these encounters are thought to be due to the Javan rhino's need for mineral salts, abundant food, and wallowing in flat to gently sloping areas. Herbivorous animals need mineral salts for ionic balance in the body. Herbivorous wildlife, including the Javan rhinoceros, need mineral salts, especially sodium (Na), to digest their food. Mineral salts in coastal and surrounding habitats have a reasonably high availability ([Ilham, 2016](#)).

The pig found in Ujung Kulon National Park is a type of wild boar (*Suscrofa vitalus*). Wild boars were omnivore animals and highly adaptable to live in various habitats. Therefore it was not surprising that wild boars were large wild mammals that were relatively easy to find and the densely populated island of Java. The wild boar population in TNUK was the least in number compared to deer and monkeys. It was suspected that pigs were more active in the late afternoon. Following Giffin in Albert, et al (2014), the timing of daily activity patterns is related to the selection of relatively more excellent weather conditions, wild boars are rarely active during the day due to relatively hot weather conditions and start to be active in the late evening until early morning. The activities carried out by the pigs from night to morning are looking for food, and the pigs will wallow before they go to their nests ([Graves in Albert et al., 2014](#)). It is known that the ambient temperature in the morning is 25°C and the soil temperature is 27°C. In addition, the morning is the final time of the wild boar's daily activity pattern (Arrum Nurjanah, et al., 2018).

The type of deer found in TNUK is (*Muntiacus muncak*). According to [Nurjanah \(2018\)](#), deer are animals that eat plants (herbivores), including young leaves, grass, seeds and fruits that fall in the area of Peucang Island TNUK, where there are plant species that support deer survival. Deer can also be used as agents to disperse seeds, helping their habitat's carrying capacity ([Arrum et al., 2018](#)).

Conclusions and Recommendations

The Ujung Kulon National Park area acts as a conservation area having endemic and endangered animals such as the Javan rhinoceros (*Rhinoceros sondaicus*), Javan gibbon (*Hylobates moloch*), and surili (*Presbytis comota*). In addition to endemic fauna and protected status, there are various other types of fauna in Ujung Kulon National Park. Based on the research results in Ujung Kulon National Park, there are nine large mammals, seven species of herpetofauna (amphibian reptiles), 13 species of butterflies, and 30 species of avifauna (aves). Conservation of nature in the TNUK environment and its surroundings can help maintain the life of protected species so that they remain sustainable.

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