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**FLORA AND FAUNA POTENTIAL OF BUKIT BATU ECOTOURISM,
DUSUN SUNGAI LUAR, TIWINGAN BARU VILLAGE OF SOUTH KALIMANTAN
PROVINCE, INDONESIA**

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ABSTRACT

The potential of Bukit Batu ecotourism includes biotic potential such as flora and fauna. However, the study about the potential of Bukit Batu Ecotourism is still minimal, so research aimed at analyzing the potential of flora and fauna diversity in Bukit Batu Ecotourism needs to be done. Data collection on flora diversity used the transect and importance index value methods, while fauna data collection used the index point of abundance method. Flora and fauna data that have been obtained from the field, then categorized into the quality criteria of flora and fauna diversity. The results of the research on the potential diversity of flora at the seedling level amounted to nine species (poor criteria), the sapling level amounted to eleven species (moderate criteria), the pole level amounted to two species (very poor criteria), the tree level amounted to 21 species (good criteria), and the bush level amounted to 25 species with good criteria. The potential for fauna diversity in Bukit Batu Ecotourism was very good with a total of 44 species of fauna. Bird species occupied the largest amount of diversity, namely 28 species, of which 9 species were protected fauna.

KEY WORDS

Ecotourism, Bukit Batu, diversity, flora, fauna.

Facing the phenomenon of the global environmental crisis, environmental tourism or ecotourism is becoming increasingly popular as an alternative approach that is expected to provide conservation and economic benefits in a sustainable manner. Ecotourism is basically a combination of various interests that grow out of environmental, economic and social concerns. Ecotourism cannot be separated from conservation, and therefore ecotourism is also referred to as a form of responsible and environmentally friendly travel.

Sungai Luar Dusun/Hamlet, Tiwingan Baru Village, Aranio Subdistrict, Banjar District is an area included in the Tahura Sultan Adam area, where in this area there is a wealth of natural resources that are very abundant. One of the potential natural resources that adheres to the principle of sustainability is Ecotourism Potential. Bukit Batu's ecotourism potential includes biotic potential such as flora and fauna which certainly has an attraction for tourists. Bukit Batu is a leading ecotourism in Sungai Luar Hamlet. For people who love nature, they may have known for a long time about this Bukit Batu ecotourism. At first, access to Bukit Batu could only be reached by motorboat (kelotok) from Tiwingan Aranio port. But since 2019, the South Kalimantan Provincial Government has begun construction of a freeway whose access crosses Sungai Luar Hamlet, so that the construction of the freeway certainly opens access for the general public to be able to go to Bukit Batu Ecotourism.



However, the great potential of Bukit Batu ecotourism still lacks study data on the potential diversity of flora and fauna. For this reason, a more in-depth study is needed to find out the potential diversity of flora and fauna that can be developed, so that the great potential that exists in Sungai Luar Hamlet can be of maximum benefit to the surrounding community, and more importantly to improve environmental sustainability and conservation in a sustainable manner.

METHODS OF RESEARCH

Vegetation data collection in the field was carried out using the Inventory System. This method is carried out with the aim of morphologically recognizing species. This method is carried out by exploring an area. The types found are immediately recorded for the types that have been recognized by the name of the species, or identification is carried out with the help of a plant atlas book or herbarium that has been identified. The inventory system is also carried out by photographing as many plants as possible, then juxtaposed with literature or encyclopedias about fauna in accordance with the type, scientific name, genus and family, while for the identification of plants that are not known, but have been recognized by the world of science, several tools are available, among others (1) asking the identity of unknown plants to local plant taxonomists, (2) matching with herbarium specimens that have been identified, (3) matching with images in the flora or monographs, and (4) using a species identification sheet, which is a picture of a plant species accompanied by the name and classification of the species concerned.

After the initial inventory, the next analysis is to analyze the vegetation with measuring plots using the Path or Transect method as shown in Figure 1. This method can be applied appropriately to analyze the vegetation of a large area and the state of the community is not yet known, and at research locations that vary in altitude, soil and topography. In addition, by applying this method, changes in vegetation in an area will be known due to changes in soil, climate and topography factors. The starting point was set perpendicular to the coastal base line. From the baseline, a 10 m wide path is made as a path for laying tree plots, and then plots can be made on the path as shown in Figure 1.

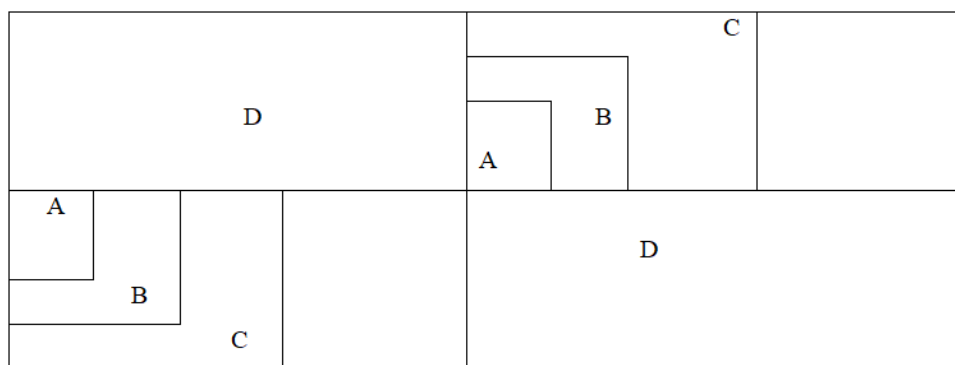


Figure 1 – Vegetation analysis method:

- Plot A = Seedlings (2 m x 2 m). Seedling: ≤ 1.5 m in height;
- Plot B = Saplings (5 m x 5 m). Sapling: > 1.5 m high until < 10 cm in diameter;
- Plot C = Poles (10 m x 10 m). Pole: $\varnothing 10$ cm - $\varnothing 35$ cm;
- Plot D = Trees (20 m x 20 m). Tree: $> \varnothing 35$ cm.

Flora analysis aims to obtain quantitative data on the type or composition and structure of vegetation and obtain quantitative data on the role of species in the ecosystem. The role of each species is usually reflected in several patterns, namely (1) distribution patterns (presented in the form of frequencies or frequency values), (2) patterns of suitability for the combined influence of existing environmental factors (presented in the form of density values), and (3) patterns of the degree of mastery or control over existing environmental factors (presented in the form of dominance values). The next step is to categorize the



quality of flora diversity. According to Fandeli (2008), flora environmental quality criteria can be categorized as in Table 1.

Table 1 – Flora Environmental Quality Criteria

Scale	Number of Flora Species	Useful Flora Species	Protected Flora Species	Criteria
1	< 6	< 3	0	Very bad
2	6 -10	3 – 5	1 – 2	Bad
3	11 – 15	6 – 10	-	Moderate
4	21 – 30	11 – 15	-	Good
5	> 30	> 15	> 10	Very good

Source: Soerjani (1989) dikutip Fandeli (2008).

Inventory methods can be applied in two ways, namely: by direct means (encountering directly in the field) and indirect ways. In accordance with the mobile nature of animals, the more suitable inventory method is the indirect inventory system. Some parameters that can be recorded indirectly include: tracks, droppings, parts, animal sounds, habitat signs, odors left behind and the presence of nests. The bird identifier in this study was a person from the South Borneo Biodiversity Community. For the inventory of fish species, the interview method was used with people who have cages, as well as anglers who use the services of community boats to fishing locations in the Apuai, Kalaan and Paau areas.

According to Fandeli (2001), fauna analysis can be processed with the Index Point of Abundance (IPA) method which aims to record animal populations and is usually used for birds in a semi-quantitative manner. The method begins with determining places to record animal populations randomly in each habitat. The selected places are IPA numbers that become observation points in the observation area. The observation area can be in the forest, rice fields, and residential areas. At a certain IPA number, animals were recorded for 20 minutes. Every type of animal that can be seen or heard for 20 minutes is recorded. After the 20 minutes are up, the recording moves to the next place or IPA number, by doing the same thing, namely recording the types of animals seen or heard for 20 minutes. And so on how to record the types of animals in each IPA number. According to Fandeli (2008), the quality criteria of the fauna environment can be categorized as in Table 2.

Table 2 – Fauna Environment Quality Criteria

Scale	Number of Fauna Species	Useful Fauna Species	Protected Fauna Species	Criteria
1	< 3	0	0	Very bad
2	3 – 5	1 – 2	1 - 2	Bad
3	6 – 10	3 – 5	-	Moderate
4	11 – 15	6 – 10	-	Good
5	> 15	> 10	> 2	Very good

Source: Soerjani (1989) dikutip Fandeli (2008).

RESULTS AND DISCUSSION

There were 14 species of flora identified. The flora of the observation plot consists of seedling, sapling, pole, and tree levels. There were 9 seedling level species, namely: kilayu (*Erioglossum rubiginosum*), jambu skati (*Syzygium* sp.), alaban tulang (*Vitex pubescens*), mandurian, lemongrass mareh (*Decaspermum* sp.), putat (*Planchonia valida*), jualing kijang (*Aglaia* sp.), birik (*Albizia procera*), and mahang (*Macaranga hypoleuca* sp.). For the number of sapling-level species there were 5 species, namely: jualing kijang (*Aglaia* sp.), birik (*Albizia procera*), mandurian, rengas (*Gluta rengas*) and bengkirai (*Shorea laevis*). For pole-level species there were two species, namely: jambu skati (*Syzygium* sp.) and tampang (*Ficus* sp.), while the number of tree-level species was seven species, namely: alaban tulang (*Vitex pubescens*), jambu skati (*Syzygium* sp.), mandurian, putat (*Planchonia valida*), bungur (*Lagerstroemea floribunda*), bayuan and birik (*Albizia procera*). Muhadjir *et al.* (2022) found that in the protected forest area of Gunung Keramaian, Ujung Batu Village, Pelaihari



Subdistrict, Tanah Laut District, South Kalimantan Province, at the seedling and sapling levels were dominated by mali-mali, the pole level was dominated by mahang, and the tree level was dominated by luwa, while in this study, Rathomy *et al.* (2022) found that in Gunung Batu ecotourism, Sungai Luar Hamlet, Tiwingan Baru Village, Aranio District, Banjar Regency, South Kalimantan Province, at the seedling level was dominated by jambu skati (*Syzygium* sp. and putat (*Planchonia valida*), at the sapling level was dominated by mandurian, at the pole level was dominated by jambu skati, and at the tree level was dominated by bungur (*Lagerstroemea floribunda*), mandurian, and alaban tulang (*Vitex pubescens*). The difference in dominance of these species may be due to differences in the place of growth and the status factor of the research area.

To develop ecotourism of Matang Keladan in Sultan Adam Grand Forest Park in South Kalimantan Province, the potential of flora is a strength factor. The forest around the peak of Matang Keladan is overgrown with various floran vegetation which is dominated by keruing/keladan. However, there was a visible threat that was the existence of illegal loggers/illegal logging in that place. The loggers belong to the community, which were only used to make stalls, but this was very contrary to the principles of Conservation Forest set in the Tahura area of Sultan Adam. For this reason, it is necessary to conduct socialization to the public so that they do not exploit vegetation to protect their diversity (Fajarwati *et al.*, 2019). So to develop Gunung Batu ecotourism, it is necessary to preserve and develop the species of flora that was growing at the Gunung Batu ecotourism site. The complete species of flora in Gunung Batu ecotourism can be seen in Table 3.

Table 3 – Plant species at the research site

No	Species	Scientific Name	Number
Number of Seedling Level Vegetation			
1	Kilayu	<i>Erioglossum rubiginosum</i>	1
2	Jambu skati	<i>Syzygium</i> sp.	18
3	Alaban tulang	<i>Vitex pubescens</i>	1
4	Mandurian	-	1
5	Serai merah	<i>Decaspermum</i> sp.	1
6	Putat	<i>Planchonia valida</i>	5
7	Jualing kijang	<i>Aglaia</i> sp.	1
8	Birik	<i>Albizia procera</i>	1
9	Mahang	<i>Macaranga hypoleuca</i> sp.	1
TOTAL			30
Number of Sapling Level Vegetation			
1	Jualing kijang	<i>Aglaia</i> sp.	3
2	Birik	<i>Albizia procera</i>	1
3	Mandurian	-	4
4	Rengas	<i>Gluta</i>	1
5	Bengkirai	<i>Shorea laevis</i>	2
TOTAL			11
Number of Pole Level Vegetation			
1	Jambu skati	<i>Syzygium</i> sp.	5
2	Tampang	<i>Ficus</i> sp.	1
TOTAL			6
Number of Tree Level Vegetation			
1	Alaban tulang	<i>Vitex pubescens</i>	3
2	Jambu skati	<i>Syzygium</i> sp.	2
3	Mandurian	-	4
4	Putat	<i>Planchonia valida</i>	1
5	Bungur	<i>Lagerstroemea floribunda</i>	5
6	Bayuan	-	1
7	Birik	<i>Albizia procera</i>	1
TOTAL			17

Source: Primary Data, 2022.

Identification of shrub flora species in the ecotourism site there were 25 species, namely belaran tapah (*Merremia peltata*), nipon/kirinyu (*Eupatorium odoratum*), gelagah (*Saccharum spontaneum*), katu gunung (*Sauropus androgynus*), urang aring babi



(*Chromolaena* sp.), tapus (*Elingera* sp.), alalang minyak (*Graminae*), alalang biasa (*Imperata cylindrica*), tempukas (*Etilingera* sp.), litu (*Lygodium scandens*), sembilikan (*Caesalpinia* sp.), banglai warik, kekucingan, kakacangan, karamunting (*Melastoma affine*), rumput patimah (*Labisia pumila*), paku lumut, belaran kusan/kelambut, bandotan (*Ageratum conyzoides*), tali gasing dangkak-dangkak, kait-kait (*Uncaria acida*), anggrek tanah (*Spathoglottis*), tadung-tadung and pancar matahari.

In detail the diversity of species and types of beneficial flora of shrubs can be seen in Table 4.

Table 4 – Species of shrub flora in the Gunung Batu ecotourism site

No	Species	Botanical Name	Usage/Benefit
1	Belaran tapah	<i>Merremia peltate</i>	Traditional medicine
2	Terinyu	<i>Eupatorium odoratum</i>	Cough and diarrhea medicine
3	Gelagah	<i>Saccharum spontaneum</i>	Livestock feed
4	Katu gunung	<i>Sauropus androgynus</i>	-
5	Urang aring babi	<i>Chromolaena sp</i>	-
6	Tapus	<i>Elingera sp</i>	Blood Diarrhea Medicine
7	Alalang minyak	<i>Graminae</i>	Herbal supplements, anti-inflammatory drugs
8	Alalang biasa	<i>Imperata cylindrica</i>	Herbal supplements, anti-inflammatory drugs
9	Tempukas	<i>Etilingera sp</i>	-
10	Litu	<i>Lygodium scandens</i>	-
11	Sembilikan	<i>Caesalpinia sp</i>	Eye medicine
12	Banglai warik	<i>belum teridentifikasi</i>	-
13	Kekucingan	<i>belum teridentifikasi</i>	-
14	Kakacangan	<i>belum teridentifikasi</i>	-
15	Karamunting	<i>Melastoma affine</i>	Diabetes Medicine and Wound Medicine
16	Rumput patimah	<i>Labisia pumila</i>	Medication to relieve menstrual pain
17	Paku lumut	<i>belum teridentifikasi</i>	-
18	Belaran kusan	<i>belum teridentifikasi</i>	-
19	Bandotan	<i>Ageratum conyzoides</i>	Wound medication and eye drops
20	Tali gasing	<i>belum teridentifikasi</i>	-
21	Dangkak-dangkak	<i>belum teridentifikasi</i>	-
22	Kait-kait	<i>Uncaria acida</i>	Traditional medicine
23	Anggrek tanah	<i>Spathoglottis</i>	Houseplants
24	Tadung-tadung	<i>belum teridentifikasi</i>	-
25	Pancar matahari	<i>belum teridentifikasi</i>	-

Source: Primary data, 2022.

There are 9 species of beneficial flora in Bukit Batu ecotourism, including jawaling kijang (*Aglaia* sp.), birik (*Albizia procera*), alaban tulang (*Vitex pubescens*), putat (*Planchonia valida*), bungur (*Lagerstroemia floribunda*), lemongrass marah (*Decaspermum*), rengas (*Gluta*), mahang (*Macaranga hypoleuca*), bengkirai (*Shorea laevis*). Details of the beneficial flora can be seen in Table 5.

Table 5 – Useful flora at Bukit Batu ecotourism site

No	Species	Scientific Name	Usage/Benefit
1	Kilayu	<i>Erioglossum rubiginosum</i>	-
2	jambu sekati	<i>Syzygium sp</i>	-
3	jualing kijang	<i>Aglaia sp</i>	High Blood Pressure, Headache & Toothache Remedy
4	Birik	<i>Albizia procera</i>	Stomach Pain Remedy, Shade & Animal Feed
5	alaban tulang	<i>Vitex pubescens</i>	Charcoal Raw Material, Tonsil & Waist Pain Medicine
6	mandurian	<i>belum teridentifikasi</i>	-
7	Putat	<i>Planchonia valida</i>	Herbal medicine
8	Bungur	<i>Lagerstroemia floribunda</i>	Diabetes, Anti-obesity, Gout, & Diarrhea Remedy
9	Bayuan	<i>belum teridentifikasi</i>	-
10	serai merah	<i>Decaspermum sp</i>	Prevents cancer and lowers blood pressure
11	Rengas	<i>Gluta</i>	Furnitur Kayu
12	Tampang	<i>Ficus sp</i>	-
13	Mahang	<i>Macaranga hypoleuca sp</i>	Fever Medicine
14	Bengkirai	<i>Shorea laevis</i>	Strong Wood Building Materials (class I & II)

Source: Primary data, 2022.



For the species of useful shrub flora in Table 5, it was explained that there were twelve species of useful shrub flora, namely belaran tapah (*Merremia peltata*), nipon/kirinyu (*Eupatorium odoratum*), gelagah (*Saccharum spontaneum*), tapus (*Elingera* sp.), alalang minyak (*Graminae*), alalang biasa (*Imperata cylindrica*), sembilang (*Caesalpinia* sp.), karamunting (*Melastoma affine*), patimah grass (*Labisia pumila*), bandotan (*Ageratum conyzoides*), kait-kait (*Uncaria acida*), and ground orchid (*Spathoglottis*).

Based on the Regulation of the Minister of Environment and Forestry Number: P106/MENLHK/SETJEN/KUM.1/12/2018 concerning the Second Amendment to the Regulation of the Minister of Environment and Forestry Number P.20/MENLHK/SETJEN/KUM.1/6/2018 concerning Protected Plant and Satway Species at the Bukit Batu ecotourism site, no protected plant species were found.

Based on the determination of environmental quality according to Soerjani (1989), taking into account the diversity of flora species, useful flora species and flora protection status, it can be described as follows.

Flora:

- Species diversity amounted to fourteen, medium criteria (scale 3);
- Useful species amounted to nine, medium criteria (scale 3);
- Protected species amounted to zero, very poor criteria (scale 1).

Shrub flora:

- Twenty-five species diversity, good criteria (scale 4);
- Twelve useful species, good criteria (scale 4);
- Protected species number zero, very poor criteria (scale 1).

Bukit Batu Ecotourism Site is an open natural tourism area overgrown by various species of shrubs, saplings and trees. Its location which is directly adjacent to Riam Kanan Lake makes this location the center of an ecosystem that supports life for various types of fauna. In this study, fauna analysis is needed to determine the quality and potential of Bukit Batu ecotourism. The parameters used were the number of species and diversity of fauna, the level of fauna rarity, and the usefulness and usefulness of the fauna.

The results of fauna identification obtained five groups of fauna, namely birds totaling 28 species, fish totaling 5 species, reptiles totaling 3 species, wildlife totaling 6 species, and insects totaling 2 species. In detail the diversity of species and types of fauna identified at the Bukit Batu ecotourism site can be seen in Table 6.

Especially for bird species, Rahman *et al.* (2021) found several bird species in Artain Village, Aranio District, Banjar Regency, South Kalimantan Province, including bondol peking (*Lonchura punctulata*), kutilang (*Pycnonotus aurigaster*), walet sarang-hitam (*Collocalia maxima*), merbah belukar (*Pycnonotus plumosus*), bentet kelabu (*Lanius schach*), kirik-kirik biru (*Merops viridis*), and kareo padi (*Amaurornis phoenicurus*), while Rathomy *et al.* (2023) found 28 bird species in the open research site including elang perut putih (*Haliaeetus leucogaster*), alap-alap kawah (*Falco peregrinus*), jelak kerbau (*Acridotheres javanicus*), burung madu sipahraja (*Aethopyga siparaja*), burung madu kelapa (*Anthreptes malacensis*), cabai jawa (*Red-headed flowerpecker*), perling kumbang (*Aplonis panayensis*), falcone alap-alap capung/Black-thighed falconet (*Microhierax fringillarius*), cinenen merah (*Orthotomus sericeus*), paok hijau (*Pitta sordida*), tukun-tukun takur warna warni (*Psilopogon mystacophanos*), cekakak sungai (*Todiramphus chloris*), kipasan belang (*Rhipidura javanica*), punai gading (*Treron vernans*), bambangan cokelat (*Cinamon bittern*, *Ixobrychus eurhythmus*), raja udang meninting (*Blue-eared kingfisher*), remetuk laut (*Gerygone sulphurea*), cipoh kacat (*Aegithina tiphia*), tepekong jambul (*Hemiprocne longipennis*), layang-layang rumah (*Delichon dasypus*), tinjau (*Longtile shrike*), apung tanah (*Anthus novaeseelandiae*), cucak kuricang (*Pycnonotus aurigaster*), tekukur biasa (*Spilopelia chinensis*), elang tiram (*Osprey pandion haliaetus*), bondol Kalimantan (*Lonchura fuscans*), bondol peking (*Lonchura punctulate*), and merbah cerucuk (*Yellow vented bulbul*).

According to Rahman *et al.* (2021), the existence of a bird species is influenced by other bird species, which may be a nuisance or even a predator for other bird species or disturbance of other living things. As is the case in the field/ladang habitat, which has the



lowest diversity value due to the rampant human activity in the field/ladang area for farming, thus disturbing the existence of some bird species. Furthermore, Achmad and Faisal (2023) stated that the existence of honey bee colonies is highly determined by the presence of nectar as a food source in that place. This is in line with the existence of birds, which also depends on the presence of food in certain places.

Table 6 – Fauna species in the Bukit Batu ecotourism site

NO.	Local Name	Scientific Name	Supporting Data	Government Regulation of Environment and Forestry Ministry P106/12/2018
Birds/Aves				
1	Elang perut putih	<i>Haliaeetus leucogaster</i>	Photo & Nest	Scarce 178
2	Alap-alap kawah	<i>Falco peregrinus</i>	Photo	Scarce 343
3	Jelak kerbau	<i>Acridotheres javanicus</i>	Photo	-
4	Burung madu siparaja	<i>Aethopyga siparaja</i>	Photo	Scarce 424
5	Burung madu kelapa	<i>Anthreptes malacensis</i>	Photo	-
6	Cabai jawa	<i>Red-headed flowerpecker</i>	Photo	-
7	Perling kumbang	<i>Aplonis panayensis</i>	Photo	-
8	Falcone alap-alap capung	<i>Black-thighed falconet</i> <i>microhierax fringillarius</i>	Photo	Scarce 347
9	Cinenen merah	<i>Orthotomus sericeus</i>	Visual	-
10	Paok hijau	<i>Pitta sordida</i>	Sound	Scarce 500
11	Tukun-tukun takur warna warni	<i>Psilopogon mystacophanus</i>	Sound	Scarce 272
12	Cekakak sungai	<i>Todiramphus chloris</i>	Photo and Nest	-
13	Kipasan belang	<i>Rhipidura javanica</i>	Visual	Scarce 623
14	Punai gading	<i>Treron vernans I</i>	Visual	-
15	Bambangan cokelat	<i>Cinamon bittern</i> <i>ixobrychus eurhythmus</i>	Sound	Scarce 236
16	Raja udang meninting	<i>Blue-eared kingfisher</i>	Visual	-
17	Remetuk laut	<i>Gerygone sulphurea</i>	Visual	-
18	Cipoh kacat	<i>Aegithina tiphia</i>	Photo	-
19	Tepekong jambul	<i>Hemiprocne longipennis</i>	Photo	-
20	Layang-layang rumah	<i>Delichon dasypus</i>	Photo	-
21	Tinjau	<i>Longtile shrike</i>	Photo	-
22	Apung tanah	<i>Anthus novaeseelandiae</i>	Photo	-
23	Cucak kuricang	<i>Pycnonotus aurigaster</i>	Photo	-
24	Tekukur biasa	<i>Spilopelia chinensis</i>	Visual	-
25	Elang tiram	<i>Osprey pandion haliaetus</i>	Photo	Scarce 198
26	Bondol Kalimantan	<i>Lonchura fuscans</i>	Visual	-
27	Bondol peking	<i>Lonchura punctulate</i>	Visual	-
28	Merbah cerukcuk	<i>Yellow vented bulbul</i>	Photo	-
Fish				
29	Mas	<i>Cypro carpio</i>	Visual	-
30	Nila	<i>Oreochromis niloticus</i>	Visual	-
31	Hampala adungan	<i>Hampala macrolepidota</i>	Interview	-
32	Gurame kalui	<i>Osphronemus goramy</i>	Interview	-
33	Bawal	<i>Bramidae</i>	Interview	-
Reptiles				
34	Biawak air	<i>Varanus salvator</i>	Visual	-
35	Katak	<i>Fejervarya cancrivora</i>	Visual	-
36	Kadal	<i>Eutropis multifasciata</i>	Visual	-
Wildlife				
37	Hirangan/lutung	<i>Trachypithecus auratus</i>	Visual	-
38	Kera ekor Panjang	<i>Macaca fascicularis</i>	Photo	-
39	Bangkuy/kera ekor babi	<i>Simias concolor</i>	Interview	-
40	Babi	<i>Sus scrofa domesticus</i>	Interview	-
41	Tupai kelapa	<i>Callosciurus notatus</i>	Photo	-
42	Kelelawar	<i>Hipposideros doriae</i>	Visual	-
Insect				
43	Kupu-kupu ekor layang	<i>Papilio machaon</i>	Photo	-
44	Tawon/lebah madu	<i>Apis koschevnikovi</i>	Visual	-

Source: Primary data, 2022.

There were six species of beneficial fauna in the Bukit Batu ecotourism area, including gold fish (*Cypro carpio*), tilapia (*Oreochromis niloticus*), hampala adungan fish (*Hampala macrolepidota*), kalui carp (*Osphronemus goramy*), bawal fish (*Bramidae*), and honey bees (*Apis koschevnikovi*).



Based on the Regulation of the Minister of Environment and Forestry Number: P106/MENLHK/SETJEN/KUM.1/12/2018 concerning the Second Amendment to the Regulation of the Minister of Environment and Forestry Number: P.20/MENLHK/SETJEN/KUM.1/6/2018 concerning Protected Plant and Animal Species at Bukit Batu ecotourism site, there were 9 species of birds (aves) that are in protected status. The protected bird species included white-bellied eagle (*Haliaeetus leucogaster*), crater hawk (*Falcon peregrinus*), sipahraja honeybird (*Aethopyga siparaja*), falcone dragonfly (*Black-thighed falconet microhierax fringillarius*), green paok (*Pitta sordida*), colorful tukun-tukun takur (*Psilopogon mystacophanos*), striped kipasan (*Rhipidura javanica*), brown bambangan (*Cinamon bittern ixobrychus eurhythmus*), and oystercatcher (*Osprey pandion haliaetus*).

Based on the determination of environmental quality according to Soerjani (1989), taking into account the diversity of fauna species, beneficial fauna species, and protected fauna status, it can be described as follows:

- Diversity of fauna species amounted to 44; excellent criteria (scale 5);
- Useful fauna species amounted to six, good criteria (scale 4);
- Protected fauna species amounted to nine, excellent criteria (scale 5).

CONCLUSION

The diversity of flora and fauna is a potential natural resource owned by Bukit Batu Ecotourism. The variety of protected bird species and the many species of useful shrubs can be used as a distinctive feature for Bukit Batu Ecotourism so that it can be recognized by the wider community.

The potential diversity of flora from the results of identification at the seedling, sapling, pole and tree levels amounted to fourteen moderate criteria on a scale of 3, the number of useful flora amounted to nine moderate criteria on a scale of 3, and the number of protected flora amounted to zero very bad criteria on a scale of 1. As for shrubs, diversity amounted to twenty-five good criteria on a scale of 4, useful species amounted to twelve good criteria on a scale of 4, and protected species amounted to zero very bad criteria on a scale of 1.

The potential for fauna diversity in Bukit Batu Ecotourism is very good on a scale of 5 with a total of forty-four types of fauna consisting of birds, fish, reptiles, wildlife and insects. Bird species occupy the largest amount of diversity, totaling twenty-eight species, of which nine species are protected fauna. There are six types of beneficial fauna with good criteria on a scale of 4, and nine types of protected fauna with excellent criteria on a scale of 5.

Bukit Batu Ecotourism has excellent ecological potential, especially the diversity of bird species, so that in carrying out its development strategy planning, it must be in harmony with factors that maintain environmental sustainability. Plant planting in the Bukit Batu ecotourism area, which lacks fertile soil, requires innovation and further research in order to increase the success rate of plant growth. There needs to be synergy between all stakeholders in the development of Bukit Batu ecotourism in an integrated and sustainable manner, including Tahura Sultan Adam as the manager, the surrounding community as the affected object, as well as visitors and private parties who can invest in the Bukit Batu ecotourism area.

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