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Bektiharjo Natural Bath as a Source of Biology Learning

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Abstract

Background: Bektiharjo tourism object is a natural tourism object with abundant potential for biodiversity, unspoiled environmental conditions, and diverse socio-economic interactions of the community. This study aims to describe the use of Bektiharjo tourism objects as a source of learning through studies on the abundance of biodiversity, environmental feasibility conditions, and socio-economic conditions in Bektiharjo tourism objects. **Methods:** This study uses a quantitative descriptive. The instruments used in this study were observation sheets and questionnaires. Observation sheets can use to obtain data on biodiversity abundance and tourism objects' environmental feasibility conditions. Questionnaires were used to obtain data on the socio-economic conditions of the community. Data is collected with analysis descriptively. **Results:** The results showed that Bektiharjo tourism object has an abundance of biodiversity in the category of high diversity, high evenness, stable community, and relatively moderate species dominance, Environmental feasibility conditions are categorized as excellent, and socio-economic conditions are categorized as excellent. **Conclusion:** Bektiharjo tourism objects can be a learning resource for biology education students. From the results of this study, it is hoped that it can be an alternative to using tourist objects as a source of learning that various levels of education can use.

Keywords: biology; tourism objects; learning resources.

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Introduction

Tuban is one of the regencies in East Java Province located on the North Coast of Java. Tuban Regency has the potential for tourist attraction because of the statehood of beautiful geographical landscapes such as beaches, waterfalls, karsts, limestone mountains, and springs (Setia, 2015; Pralebda, 2020). The high public interest in tourism has caused various tourism potentials to have been built in the region (Rahayu, 2018). Beach attractions include Kelapa Beach, Sowan Beach, and Boom Beach. Waterfall attractions include Putri Nglirip Waterfall, Banyulangseh Waterfall, and Wukiharjo Waterfall. Karst attractions include Akbar Cave, Ngerong Cave, and Putri Asih Cave. At the same time, the interests of the spring area include Bektiharjo natural baths and krawak springs (Nugroho, 2018).

Tourist interest in tourism has shifted a lot; in the past, mass tourism was in great demand by tourists, but now alternative tourism tends to have more enthusiasts (Andriani & Murtini, 2018; Wafiqni & Nurani, 2018). Alternative tourism is a tourist attraction that prioritizes and is synonymous with natural tourism, culture, and characteristics of regional local wisdom (Widyatmaja, 2015).

Alternative tourism in the form of natural attractions is a concern not only as a place to visit in the context of vacation, business, or other purposes but also tourist attractions as a place of social, natural, cultural, educational, and economic interaction (Hanapi et al., 2006; Hotimah et al., 2021) so that this complex environment can use as a learning resource.

Learning sources are information in the form of teaching materials that can stimulate student interest, motivation, and focus on learning activities to achieve learning objectives (Surata et al., 2020; Far & Pattiasina, 2021). According to Adinugraha (2018), applying learning resources around the student learning environment will make it easier for students to understand the subject matter and make learning enjoyable.

The results of the research conducted by Efendi (2017) explained that socio-cultural, natural, and artificial environments can be used as learning sources. The socio-cultural environment as a source of learning is related to community interactions, customs, culture, and social sciences. The natural environment is everything formed naturally, such as geographical conditions, natural resources, plants, animals, climate, etc. The results of Anwas (2011), which also utilizes the environment as a learning source, suggest that the environment is effectively used as a learning medium because it can directly increase analytical competence and stimulate students to learn. The results of different studies that utilize the tourist environment as a source of learning were also conducted by Nafisah (2018), who explained that the knowledge obtained through nature tourism would encourage students to develop thinking competencies, learn from direct experience, create a sense of care, empathy for the environment and responsibility for other surrounding communities.

Research on utilizing the tourist attraction environment as a learning resource was also carried out by Anyau (2018); the results showed that the use of tourist objects in learning increases student interest in learning and learning outcomes because students can directly observe the things studied and increase student concern for the environment. In this case, the use of the tourism object environment as a source of biological learning is the same as in Permendiknas No. 22 of 2006, that learning resources can be used by utilizing natural, social, and cultural conditions and regional potential to achieve learning objectives. Not only that, the use of natural tourism objects as learning media is the same as the principle of Edu-ecotourism, which presents not only natural destinations but also local science and philosophy, or ecosystem and socio-system philosophy (Sutisno & Afendi, 2018).

Based on several studies on the use of the tourist attraction environment as a source of learning, it is necessary to research one of the tourist attractions in Tuban Regency, namely the Bektiharjo natural bathing tourist attraction. Bektiharjo natural bath is a spring bathing tour in Bektiharjo Village, Semanding Tuban District. This natural tourist attraction has swimming pool facilities and natural saltang surrounded by many large lush plants (Farnadayanti & Mustofa, 2021). The location of Bektiharjo baths around the forest that is awake makes this natural tourist attraction have diverse flora and fauna that allow it to be used as a source of learning about biodiversity. According to Wijaya et al. (2019), natural tourism areas must have a diversity of flora and fauna and be protected by their population. In Bektiharjo baths, fauna and flora are maintained by people, such as goldfish, long-tailed monkeys, banyan trees, ferns, cypress trees, and cape trees. The surrounding community also uses Bektiharjo bathing attractions as a place to carry out traditional rituals that are still believed by the surrounding community, such as earth alms and langen tayub artist flushes which are held every Suro month (Farnadayanti & Mustofa, 2021). This condition can be used as a source of socio-cultural learning.

Based on the description above, the problem arises with using Bektiharjo natural bathing attractions as a learning resource for biology education students. This study aims to describe the abundance of biodiversity present in Bektiharjo tourist attractions, to tell the environmental feasibility conditions in Bektiharjo tourist attractions, and to describe the socio-economic conditions of the people in Bektiharjo tourist attractions.

Method

This Location and time of study

This research was conducted in the Bektiharjo natural bathing tourist attraction area, Semanding district, Tuban Regency. In February 2022, observations were made, and in

March 2022, data collection was carried out. the map of the research location is shown in Figure 1.

Figure 1. Map of Bektiharjo bathing attraction

Research Design

This research uses descriptive research methods with a quantitative approach. This study will describe the use of Bektiharjo tourism objects as a source of learning for biology education students in terms of the abundance of biodiversity, environmental feasibility conditions, and infrastructure, as well as the socio-economic conditions of the people in Bektiharjo tourist attractions (Arikunto, 2013; Herrera, 2019; Sugiono, 2019).

Research procedure

The research preparation stage is carried out before the research begins, while the steps include reviewing the literature (textbooks, journals, and other reading sources) related to the investigation. In addition, observations are made to the research site for data-related matters to be collected as research data. Furthermore, researchers completed research instruments, observation sheets, and questionnaires. And the implementation stage is research conducted by observing the natural and social environmental conditions of Bektiharjo bathing attractions. The observation process follows the abundance of biodiversity, ecological feasibility conditions, and infrastructure in Bektiharjo bathing attractions. Then questionnaires were distributed to obtain the socio-economic conditions of the community regarding the existence of Bektiharjo bathing attractions. The results of the observation sheet and questionnaire will be processed data. Furthermore, researchers will present the research results in the form of Tables and draw conclusions from the study results.

Collection and Analysis of Research Data

Data collection techniques are carried out by observation and distribution of questionnaires. Observation sheets are used to obtain data on biodiversity using inventory or counting the types found in the field and the feasibility conditions of the environment and infrastructure at Bektiharjo tourist attractions.

Data on the socio-economic condition of the community in Bektiharjo tourist attraction were collected using a questionnaire with answers to each instrument item using the Likert scale with a scale of 1-5, starting with strongly disagreeing and ending strongly agreeing. The respondents used to obtain data on socio-economic conditions in Bektiharjo tourist attractions were Bektiharjo tourist attraction traders. Sampling uses the technique of anyone

who meets with researchers and is in the tourist attraction under study (Accidental sample) (Andriani & Murtini, 2018).

Data analysis of this study used quantitative descriptive analysis. Data on biodiversity abundance analysis by calculating the species diversity index (H'), species evenness index (E), and type dominance index (C) with the following formulation:

a. Species Diversity Index (H') (Shannon, 1949).

$H' = -\sum pi \ln pi$

Information:

H' = Species diversity index
pi = 1st type proposition (Pi = ni/N)
ni = Number of individuals in each species
N = Total number of individuals
ln = Natural logarithm

The criteria for the species diversity index, according to Shannon & Weaver (1949), are:

H' = low diversity
1 = moderate diversity
H'3 = high diversity

b. Type Evenness Index (E) (Magurran, 1988) are:

$E = \frac{H'}{\ln S}$

Information:

E = Type evenness index
H' = Species diversity index
S = Number of types
ln = Natural logarithm

The criteria for the type evenness index, according to Magurran (1988), are:

00.4 = small equity, distressed community
00.6 = moderate evenness, labile community
01 = high equity, stable community

c. Type Dominance Index (C) (Simpson, 1949)

$C = \sum(pi)^2$

Information:

C = Type dominance index
Pi = 1st type proposition (Pi = ni/N)

The criteria for the type dominance index, according to Simpson (1949), are:

00.5 = low dominance
00.75 = medium dominance
01 = high dominance

Data on environmental and infrastructure feasibility conditions are analyzed by scoring 1-4, then calculating the average percentage. With criteria of 0%-24%, eligibility conditions are poor, 25%-49% are sufficient, 50%-74%, eligibility conditions are good, and 75%-100% are excellent. Data on the socio-economic condition of the community were analyzed using assessments according to assessment criteria with Likert scales. The answer to each instrument item has a score of one to five (Cheng et al., 2021). The following are the ideal score criteria in Table 1. and the Rating scale in Table 2.

Table 1. Score criteria for socio-economic conditions of society

Formula	Total Score	Scale
5 x 50 respondents	250	SS/SB
4 x 50 respondents	200	S/B
3 x 50 respondents	150	N/CB
2 x 50 respondents	100	TS/TB
1 x 50 respondents	50	STS/STB

Table 2. Scale rating

Total Score Interval	Scale
201-250	SS/SB
151-200	S/B
101-150	N/CB
51-100	TS/TB
0-50	STS/STB

In this case, the processed data will be presented in the form of Tables, which will describe the use of Bektiharjo tourist attractions as a source of learning for biology education students in terms of biodiversity, environmental feasibility conditions, and infrastructure, as well as socio-economic conditions.

Tools and materials

In field research, the tools and materials used are Nikon DSLR cameras, notebooks, stationery, and books identifying the diversity of flora and fauna.

Result

Based on observations, identification, and inventory of biodiversity in the Bektiharjo tourist attraction area, a diversity of plant species (Table 3.) and animal species were shown in Table 4. The results of the recapitulation of the species diversity index, species richness index, species evenness index, and species dominance index on biodiversity abundance in Bektiharjo tourist attractions are presented in Table 5.

Table 3. Plant diversity in Bektiharjo tourist attraction

Family Name	Species Name	Abudance
Moraceae	*Ficus benjamina*	26
Myrtaceae	*Syzygium aqueum*	28
Myrtaceae	*Eucalyptus globulus*	17
Arecaceae	*Cocos nucifera*	26
Rubiaceae	*Morinda citrifolia*	20
Meliaceae	*Azadirachta indica*	31
Sapotaceae	*Manilkara kauki*	8
Sapotaceae	*Mimusops elengi*	24
Poaceae	*Bambusoideae*	60
Muntingiaceae	*Muntingia calabura*	30
Pteridaceae	*Adiantum capillus-veneris*	25
Fabaceae	*Cassia Siamea*	28
Musaceae	*Musa paradisiaca*	35
Annonaceae	*Polyalthia longifolia Sonn*	23
Arecaceae	*Caladium bicolor*	15
Arecaceae	*Colocasia esculenta L.*	32
Malpighiaceae	*Banisteriopsis caapi*	13
Malpighiaceae	*Diplopterys cabrerana*	15
Sapotaceae	*Chrysophyllum cainito*	12
Asparagaceae	*Dracaena fragrans*	9
Nephrolepidaceae	*Nephrolepis exaltata*	32
Pteridaceae	*Maidenhair fern*	22
Myrtaceae	*Psidium guajava*	17
Caricaceae	*Carica papaya L.*	10
Nacardiaceae	*Mangifera indica*	12
Total		**570**

Table 4. Animal diversity in Bektiharjo tourist attraction

Family Name	Genus/Species Name	Abudance
Cercopithecidae	*Macaca fascicularis*	16
Carangidae	*Parastromateus niger*	17
Cyprinidae	*Cyprinus carpio*	84
Total		**117**

Table 5. Diversity index

Biodiversity	N	S	H'	E	C
Flora	570	25	3,11	0,96	0,04
Fauna	117	3	0,79	0,71	0,55

The research results on public perceptions related to socio-economic conditions in Bektiharjo tourist attractions are presented in Table 6.

Table 6. Recapitulation of public perception scores related to socio-economic conditions in Bektiharjo tourist attractions

Statement	Average	Total Score
The development of Bektiharjo tourism objects can move the wheels of the community's economy	4,42	221
Development of Bektiharjo tourist attraction can increase community income	4,44	222
The development of the Bektiharjo tourist attraction can open job opportunities for the community	4,58	229
The development of the Bektiharjo tourist attraction can open opportunities for people to trade	4,3	215
The development of Bektiharjo tourist attractions can attract investors to build restaurants and hotels around tourist attractions	3,8	190

Discussion

The abundance of biodiversity in Bektiharjo tourist attraction

Bektiharjo tourist attraction is a natural spring bathing area that has long been known to the public. The environment of tourist attractions in forest areas and springs becomes a habitat for various plants and animals. The preservation of nature in the Bektiharjo tourist attraction environment is still maintained today, and this is evidenced in Tables 3. and Tables 4; the diversity of biological species found in the Bektiharjo tourist attraction environment consists of plants as many as 15 families with 570 individuals and animals as many as three families with 117 individuals.

Based on Table 5., the plant species diversity index in Bektiharjo tourism objects obtained a high diversity category, where the value of the species diversity index ranged from H '3, while the animal diversity index obtained a low diversity category, where the value of the animal diversity index ranged from around H'. Bektiharjo tourist attraction has a relatively high level of plant diversity due to natural environmental conditions that are suitable as a habitat for high to low-level plants, and conservation efforts continue to be carried out so that plant populations are maintained. Still, the level of animal diversity is relatively low, according to the results of interviews with tourism object managers; this is due to animal migration factors, Javanese macaques in tourist attractions often migrate to the Petilasan Gembul area which is about 1 km from the tourist attraction. Magurran (1988); Ismaini et al. (2015) explained that the value of the Diversity Index (H′) is related to species richness in a particular location but is also influenced by the distribution of species abundance. The higher the H′ index value, the higher the species diversity, ecosystem productivity, pressure on ecosystems, and stability.

Based on the formula for the type evenness index proposed by Magurran (1988), the results of the recapitulation of the type evenness index (E) on flora and fauna in Bektiharjo

tourist attractions obtained the category of high evenness and stable communities. It gets a type evenness index value ranging from 0.6 to 1. The data shows that the habitat of flora and fauna in the Bektiharjo tourist attraction area has a high evenness due to the distribution of individuals of each species being the same or almost the same found. Prabaningrum et al. (2018) stated that if species in a community have the same or nearly the same number of individuals in each species, then the evenness of the community will be high.

The type dominance index value is in the medium dominance category found in fauna, with the type dominance index value ranging from 00.75, and the low dominance category found in flora, with the type dominance index value ranging from 00.5. According to Marhento & Alamsyah (2020), the smaller the dominance index value, the greater the dominant species; on the contrary, the greater the degree of dominance, certain species are dominant.

The diversity of plants and animals found in Bektiharjo tourist attractions can be used to learn biology, especially about living things. By the statement of Khanifah et al. (2012), the environment with an abundance of diverse natural resources of plants and animals can contribute as a source of learning about the classification of living things and efforts to use the environment. According to Ajidayanti & Abbas (2019) and Irwandi & Fajeriadi (2020), environments with natural resource potential, interactions between living things and abiotic components can be used as learning sources and create authentic learning experiences for students.

Environmental eligibility conditions in Bektiharjo tourist attraction

Bektiharjo tourist attraction has long been used for tourism activities by locals and people outside the Tuban area. This tourist attraction is visited by many visitors every day, and this affects the feasibility conditions of the environment and infrastructure. The feasibility condition of the environment and infrastructure at the Bektiharjo tourist attraction is excellent. This aspect of condition assessment is based on environmental feasibility, infrastructure feasibility, and the liveability of animals and plants in the tourist attraction environment. The ecological feasibility of tourism objects, including environmental cleanliness, solar lighting conditions, air conditions, air temperature, air humidity, water quality, drainage, and waste processing, obtained an average score of 3.62 with a percentage reaching 90%, this means that the environmental feasibility of tourist attractions tends to be very good. Then the feasibility of infrastructure facilities obtained an excellent feasibility category, and this is because it got an average score of 3.7 with a percentage reaching 92.5%. The liveability of animals and plants obtained an excellent feasibility category, and this is because it got an average score of 3.71, with a rate reaching 92.75%.

The feasibility conditions of a good tourist attraction environment show that the tourist attraction environment is comfortable and conducive to use as a learning resource and learning place. By Choiri's (2017) statement, environments with conducive, beautiful, and clean situations, such as parks, tourist attractions, mosques, and buildings, can be used as learning resources. The same thing was also stated by Neldawati (2020): a clean and beautiful environment is very supportive to be used as a source of learning, creating positive conditions during the learning process.

Socio-economic conditions of the community in Bektiharjo tourist attraction

The existence of the Bektiharjo tourist attraction has long been a field of income for residents around the tourist attraction. Some people depend on the results of trading food and renting swimming equipment at tourist attraction locations. The number of visitors who come to Bektiharjo tourist attractions influences socio-economic conditions. This is because every visitor who arrives will buy food and rent swimming equipment for swimming, which creates social interaction that generates profits. Based on the results of the calculation of public perception questionnaires related to socio-economic conditions in tourist attractions in Table 6. The calculation results said that of 50 respondents, at most 60% agreed that the

development of Bektiharjo tourist attractions could move the wheels of the community's economy, 26% of respondents agreed that the development of Bektiharjo tourist attractions could drive the wheels of the community's economy. The average of this item is 4.42. This means that respondents tend to agree that developing Bektiharjo tourist attractions can move the wheels of the community's economy.

Then of 50 respondents, at most 54% said they strongly agreed that developing Bektiharjo tourism objects could increase community income, 38% of respondents agreed that growing Bektiharjo tourist attractions could increase community income. The average of this item is 4.44. Respondents strongly agree that developing Bektiharjo tourist attractions can improve people's revenue.

Furthermore, of the 50 respondents, at most 64% agreed that the development of Bektiharjo tourism objects could open job opportunities for the community, 30% of respondents said they strongly agreed that the development of Bektiharjo tourist attractions could open up jobs for the community. The average of this item is 4.58. This means that respondents tend to agree that developing Bektiharjo tourist attractions can create jobs for the community. Then from 50 respondents, at most 46% said they strongly agreed that developing Bektiharjo tourism objects could open opportunities for people to trade, and 38% of respondents agreed that growing Bektiharjo tourist attractions could open opportunities for people to change. The average of this item is 4.3. This means that respondents tend to strongly agree that developing Bektiharjo tourist attractions can open options for people to trade.

Furthermore, of 50 respondents, at most 50% agreed that the development of Bektiharjo tourist attractions could attract investors to build restaurants and hotels around tourist attractions, 20% of respondents expressed strongly approved that the development of Bektiharjo attractions could attract investors to build restaurants, hotels around tourist attractions. The average of these statements is 3.8. This means that respondents tend to agree that developing Bektiharjo tourist attractions can attract investors to build restaurants and hotels around tourist attractions. With excellent socio-economic conditions in tourist attractions, the social environment and interactions formed in Bektiharjo tourist attractions can be a source of learning. The statement of Afryanti et al. (2021) that the social environment can be a source of knowledge by providing opportunities for students to interact directly with the social environment related to education, such as visits to markets, tourist attractions, village offices, parks, and other public places which then teachers associate real-world conditions with the material taught to encourage students to think critically in responding to a social phenomenon.

Conclusions

Bektiharjo tourist attraction has a high abundance of plant and animal biodiversity, with species diversity tending to be high, species evenness tends to be high, communities are stable, and species dominance tends to be low. Bektiharjo can be a learning resource for plant morphology, plant anatomy, common plant botany, high plant botany, vertebrate zoology, basics of ecology, plant physiology, plant physiology, and animal physiology courses. Bektiharjo tourist attraction also has an excellent level of environmental feasibility based on the environmental feasibility, feasibility of infrastructure, and liveability of animals and plants in the tourist attraction. The Bektiharjo tourist attraction environment can be a natural laboratory and a safe and comfortable learning place. Bektiharjo tourist attraction has good socio-economic conditions. Bektiharjo tourist attractions can be a source of learning for biology education students and other study programs related to the socio-economic conditions of the community and have significant benefits in growing the surrounding community's economy.

Declaration statement

The authors reported no potential conflict of interest.

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