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The potential of jangka beaches as a natural laboratory for learning the concept of biodiversity

A Abdullah, L Fitriana, M Ali Sarong and C Nurmaliah
Syiah Kuala University, Jl. Teuku Nyak Arief Darussalam, Banda Aceh 23111, Indonesia
E-mail: abdullah@unsyiah.ac.id

Abstract. Utilizing the surrounding environment as a laboratory will be more impressive for passive learners to be active in learning. This study aimed to analyze the ecological criteria that include bird species diversity, richness of flora and fauna found in the area and the response of teachers to the suitability Jangka coastal areas as a natural laboratory. Data collection for the diversity of bird species was conducted using observation line transect techniques. The data have been analyzed using the formula Shannon-Weaver diversity index. Bird diversity index is \( H = 3.6913 \). Data collection for the wealth of flora and fauna was conducted by observation. The percentage obtained for the rich flora and fauna, which is 62%. The conclusion of this study is that there is bird diversity in the area of Jangka Beach Alue Ue high with \( H = 3.6913 \) and for the wealth of flora and fauna are also included in the high category with the percentage obtained by up to 62%. The survey results revealed that the majority (83%) of teachers answer (YES) for a potential Jangka coastal areas as a natural laboratory for materials biodiversity, while the teacher's response stating (NO) is obtained (17%).

1. Introduction

The learning process is the interaction between teachers and students through reciprocal communication that takes place in a situation effectively to achieve the learning objectives. Teaching and learning process, teachers and learners are involved in an interaction with learning materials as a medium. The interaction in the learning process demanded more active learners rather than teachers. The interaction is said to be maximal, in case between teachers and learners, between learners and teachers, the learners to the learners, learners with learning materials and media, but remain within the framework of achieving the goals set together.

According to student learning activities is a thing done to achieve the learning outcomes obtained from observation, the experience of working as well as discussions with colleagues. Teaching in schools should involve students in learning, both mentally, physically, and socially. Learning emphasis should be focused on training skills, attitudes, and understanding of the concept. The phenomenon of teaching less directly involve students in learning activities causing psychomotor and cognitive abilities of students lacking. Students rarely discuss and cooperate with other students that lead students to become passive so that students do not develop [3].

The results of observation the of the existing schools in the districts of Bireuen show student learning outcomes are still low. Not maximal learning process is carried out as the lack of laboratories and experiments to reinforce the concepts learned. Other information indicates that teachers are only emphasis on students' mastery of concepts and give less to the learning exercise directly or practice.
Matter of biodiversity is one of the materials that are difficult to understand by students at a school in Bireuen district. Due to students only get an understanding of material from books, was a teacher has not been able to put the students as a whole to understand what actually happens in the real environment. This resulted in learners decreased interest because of lack of understanding of the material, thereby adversely affects the student learning outcomes.

The results of interviews with 30 biology teachers of class XI SMA in Bireuen, obtained a description and explanation that the mastery of learning outcomes on the concept of biodiversity has not reached the maximum completeness criteria (KKM) the process of learning biology in schools that matches the nature of science in ideal conditions cannot be fully implemented. Teachers are still a source of learning, students are not involved in the process of finding the concept. Teachers rarely apply direct media in the learning process. Several observations have been made, it was found that among the students with the other students in the process of activeness learning activities they have not been seen clearly, the interaction between student one with other students has not happened dynamically. Students have less discussion with other students which results in students being passive so that learning outcomes are low.

The way to overcome this gap will require a learning process in the form of direct media and interactive learning models and can assist students in understanding the learning materials greater emphasis on the search process of knowledge rather than knowledge transfer. One such study is by exploiting the natural surroundings as a medium of learning as a natural laboratory, especially for materials biodiversity. Utilizing the surrounding environment as a laboratory would be more memorable for learners who are passive to active learning, independent also able to come up with ideas and creative ideas and be able to interact in asking questions to teachers and peers which in turn can improve student learning outcomes [5].

[6] States that media-based learning is a learning environment that uses learning objects like a real experience, observe directly, obtaining data accurately and be able to learn independently or in groups. In the school environment is a source of useful learning, especially in the biodiversity study material.

Based on preliminary observations in the area of Jangka Beach in Bireuen district, it appears that the Coastal Region suitable for use as a media person or a natural laboratory in the learning process materials biodiversity. Because of the diversity of flora and fauna found in the coastal region was found with a number of very varied and can be used as a learning resource optimally. Jangka Alue Ue Territory has an area that is still very beautiful and beautiful, away from the noise of vehicles and other disturbances. Thus, it is suitable as a learning media in the form of a natural laboratory for the students because the atmosphere is calm and support the learning process takes place. In addition, its strategic location and easy to reach into its own added value for the region as a natural laboratory location for students to use as a medium in the learning process.

Biodiversity in the area Jangka Alue Ue, if used as a natural laboratory, will have a positive impact. Students will be easier to understand the subject matter by linking the learning materials are being studied to real life that they get in a natural laboratory. In addition, to generate awareness and a sense of community awareness of conservation efforts for the species of birds, flora, and fauna found in the region. The public will be aware that nature's biodiversity besides giving beauty also supports education. So it is necessary to examine more deeply about the potential of Jangka Alue Ue Beach neighborhood Jangka District of Bireuen District as Laboratorium term nature.

2. Method
The method used in this research is descriptive qualitative with ecological criterion view and observe using observation sheet. The parameters of this study are ecological criteria (diversity of bird species, a wealth of flora and fauna). Data collection to determine ecological criteria (diversity of bird species) from coastal areas of Jangka Alue Ue of Bireuen District using observation method with transect line technique. The transect line is used to observe the birds at the time of movement from one point to the next counting point [8].
The next step was the researcher who conducted the data collection methods of documentation about the conditions actually existing in the study, as proof of valid supporting the research that has been done [1].

Data from observation in this study were analyzed by using the formula diversity index Shannon-Wiener:

$$H = - \sum p_i \ln p_i$$

Where:

$H$: Diversity Index Species

$p_i$: The Importance of Species All $i = \frac{n_i}{N}$

$n_i$: Number of Individuals Species All $i$

$N$: Total Individuals entire Species

With Conditions:

$H > 3$ high diversity index

$H 2-3$ diversity index was

$H < 2$ low diversity index

Analysis of the data used in processing this data is descriptive analysis using observation sheets filled by observers (researchers). The data have been taken subsequently collected, and to describe the contents of each of the elements of ecological criteria coastal area Jangka Alue Ue. Analysis of data from observation using percentage analysis. The scores obtained by each ecological criteria were summed and the result is called the total score. Furthermore, the percentage of the average value by dividing the total score by the maximum score is taken from the total number of statements and then multiplied by 100%.

Table 1. Categories observed values ecological criteria.

| Assessment Score | Category    |
|------------------|-------------|
| 81-100%          | Very High   |
| 61-80%           | High        |
| 41-60%           | Medium      |
| 21-40%           | Low         |
| 0-20%            | Very Low    |

Data analysis to determine the response of 30 teachers to the conformity of the conservation area as a laboratory Jangka nature by using a questionnaire in the form of statements on the level of biodiversity possessed by the region. Determination of scores for positive and negative statements as in the following table:

Table 2. Determination of score questionnaire.

| Alternative answers | Score | Expressions of the positive | Expressions negative |
|---------------------|-------|----------------------------|----------------------|
| Yes                 | 1     | 1                          | 0                    |
| No                  | 0     | 0                          | 1                    |

Data were analyzed by percentage.
Category responses of teachers based on Table 3.4 below:

| No. | Score       | Category |
|-----|-------------|----------|
| 1   | $77 \leq q \leq 100$ | High     |
| 2   | $51 \leq q \leq 76$ | Medium   |
| 3   | $25 \leq q \leq 50$ | Low      |

3. Results and discussion

Observations were made on 19 January to 18 February 2018, obtained by bird species found in the Jangka Alue Ue Jangka Subdistrict Bireuen District 45 species of birds from 21 families in the neighborhood of Jangka Alue Ue Beach Bireuen District. Most species are the families Nectariniidae and Ploceidae, while the least species are from the families Apodidae, Campephagidae, Dicaeidae, Hirundinidae, Paridae, Pittidae, ralliidae, Silviidae, Sturnidae, Turdidae, and Turnicidae.

Data analysis has been done, it is known bird species diversity index in Region Jangka Alue Ue Jangka Subdistrict of Bireuen District is high with $H = 3.6913$. Index of bird species diversity in Region District of Jangka Alue Ue can be seen more clearly in Table 4.1:

| No. | Station | $H$ | Level Biodiversity |
|-----|---------|-----|-------------------|
| 1   | I       | 2.9095 | Medium            |
| 2   | II      | 2.5498 | Average           |
| 3   | III     | 3.0844 | Height            |
| 4   | Overall | 3.6913 | High              |

Data analysis results obtained in the diversity index of birds Jangka Alue Ue overall contained in the study site is $H = 3.6913$. This suggests that the presence of birds with high levels of diversity. Bird species that are easy to find means the population is quite high in the area, this is due to the ability of birds to interact with vegetation and food. The Columbidae family has a large rate that is widespread throughout the world, especially fruit and grain eaters with a slightly plump body, solid, high forehead, and a distinctive short beak. It sounds rattling repeatedly. The Nectarinid family is a very many-membered bird, widespread in the world. These birds are very diverse in color patterns but are generally of medium size, round heads, rather short legs, pointed beaks and wide wings. These birds feed on insects, often in places filled with fertile flowers and fruits. Many of these family members have a sweet voice. In line with the study [4] that the extent of the existence of different bird species in a place depends on how well the area fits as a nest and as a place where they depend for life.

Tourist area Jangka Alue Ue District of Jangka Bireuen district comprised mostly of farms population, residential and farm/plantation residents are allowed to be used as a suitable habitat for various species of birds. The high vegetation in a place is also a matter that affects the presence of bird species in an area. The existence of such diverse vegetation Jangka Alue Ue Regional District of Jangka very conducive to bird life, both to get food, rest and breed so that the birds do not migrate again to find a new habitat.

In line with the research [7] which states that the process of adaptation of a species habitat is intended to preserve the life of an individual in a given environment. Similarly, the birds, the presence of a residence with the availability of sufficient feed will maintain a bird species to inhabit a location in the long term. The success of a species of bird defends itself strongly influenced by its success in choosing a suitable habitat and special for it. In the process of obtaining a suitable habitat depends on the ability of the bird species interactions with habitat and vegetation that inhabit the region. The observation that obtained from observation directly, encountered several species of flora and fauna contained in the Jangka Beach area Alue Ue. Species that are along the beach area Jangka Alue Ue

Table 3. Guidelines score questionnaire criteria.

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namely Bamboo yellow (*Bambusa vulgaris*), of palm (*Arenga pinnata*), *Pinus* (*Cupressus lusitanica*), coconut (*Cocos nucifera*), banana (*Musa paradisiaca*) and tree fig (*Ficus carica*) is a species of plant like many species of birds.

The fauna species seen along the Jangka Alue Ue area are several types of animals including family crustacea such as *Ocypoda* sp, some insects such as *Delias fruhstorferi*, *Aesha* sp, *Cantharis*, and *Leptocorisa acuta*. One of the bird species refers to rare animals namely *Haliastur indus* and *Heliacetus leticogaster* as well as some small birds, and reptiles such as the green snake *Timenesurus albolarbis* and *Lacerta agilis* and amphibians such as *Fejervarya cancrivora*. This is in line with the study [9] which states that the tourist attraction has the potential to have high value if it has a high diversity of flora and fauna in the region.

In the development potential of coastal areas as a natural laboratory response, Jangka of teachers is absolutely necessary. To optimize it, keep in mind also the public opinion against the development potential of Jangka Beach as a natural laboratory that has been implemented by filling out the questionnaire. The results can be seen in Table 4.2 below:

| No | Object                              | Answer | Persentase |
|----|-------------------------------------|--------|------------|
| 1  | Perceptions of neighborhood         | 1. Yes | 18 %       |
|    |                                     | 2. No  | 2 %        |
| 2  | bird species diversity              | 1. Yes | 22 %       |
|    |                                     | 2. No  | 0 %        |
| 3  | Diversity of flora and fauna        | 1. Yes | 17 %       |
|    |                                     | 2. No  | 2 %        |
| 4  | The public perception               | 1. Yes | 13 %       |
|    |                                     | 2. No  | 8 %        |
| 5  | Learning                            | 1. Yes | 13 %       |
|    |                                     | 2. No  | 5 %        |

The survey results show that the majority (83%) of teachers answered (YES) to the Jangka Alue Ue area as a suitable coastal area as a natural laboratory for the concept of biodiversity. Much of the flora and fauna diversity found in the region and the air environment is very natural from cold air without pollution, thus bringing a comfortable feeling for students to study in the region. The teacher's response stating (NO) is obtained (17%), from a questionnaire distributed to teachers can know the things that make them do not agree with the term coastal areas as a natural laboratory that is due to lack of time in school student study hours as well as the absence of a special school transportation to bring children into a natural laboratory for the study. Although a small percentage of responses (NO) is, but it should be a serious concern and can be addressed. This is in line with research [2] which states that to assess the potential of a region to assess three important indicators of the type of object area, the amount of biodiversity in it, the traditions and attitudes of the local community.

4. Conclusions
Jangka Alue Ue beach area District of Bireuen based on ecological criteria that include (bird species diversity, richness of flora and fauna) have high levels of bird diversity, richness of flora and fauna are also obtained in the high category. The Alue Ue area has the potential to serve as a natural laboratory as a learning medium for students.

References
[1] Arikunto S 2006 *Research Procedures A Practice Approach* (Jakarta: Rineka Copyright)
[2] Dhayita T 2014 Potential Development of community based area in Semawa Rawa Pening area. *Journal of Engineering* 3 146

[3] Fathurrohman P 2007 *Teaching and Learning Strategy* (Bandung: PT Rafika aditama)

[4] Iskandar S 2004 Study of Water Type Utilization in North Beach Indramayu West Java *Journal of Biology* 10 354

[5] Istikomah A 2010 The use of group investigation learning model to foster students' scientific attitude. *Journal of Physics Education Indonesia* 2 242

[6] Juairiah 2014 Environmental Based Learning To Improve Student Learning Outcomes In Biodiversity Concepts. *Journal of Education Biology Edition* 13 178

[7] Priyono Yesser 2012 Development of Bukit Tinggi Ecotourism Area. *Journal of Architectural Perspectives* Yogyakarta Faculty of Forestry Universitas Gadjah Mada 21 567

[8] Tang Y 2017 Protecting the biodiversity in the fast urbanization age anecotourism zone in Hainan China. *Journal Procedia Engineering* 198 419

[9] Yosevita L 2007 Study on Regional Potential and Ecotourism Development in Tual Kabupaten Maluku Tenggara. *Journal of Agroforestry* 2 444