ISSN 2964-4291
https://proceeding.unnes.ac.id/index.php/iset

Utilization of Mangrove Forest as a Source of Zoology Learning with a Stem Approach

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Abstract. The purpose of this article is to present a study of mangrove forest function as a source of zoology learning with a STEM approach. Basically the use of the environment can create something active and effective in the implementation of teaching and learning. Mangrove forest have a variety information related to zoology so that it becomes one way to produce creative learning resources. The presentation of the article is based on 3 aspects, namely (1) Mangrove Forest, (2) Learning Resources, (3) STEM. Literature review or literature study is used as a method of this study, by reviewing scientific journal articles from various reputable publishers. Zoology learning with a STEM approach is one solution in improving the quality of the teaching and learning process, so as to be able to overcome problems that arise from students. STEM is useful for activating student motivation and making students able to think at higher levels. The application of learning involving mangrove forest that have zoological diversity and using the STEM approach can answer obstacles in special zoology learning.

Key words: mangrove forest; learning resources; stem.

How to Cite: M, R. D., Sarwi, S., Marwoto, P., Rahayu, E. S., Indriyanti, D. R. (2021). Utilization of Mangrove Forest as a Source of Zoology Learning with a Stem Approach. *ISET: International Conference on Science, Education and Technology, 7*(1), 506-510.

INTRODUCTION

Mangrove forest is a forest that is widespread in Indonesian waters which has a function to protect from abrasion processes and to protect against the threat of a tsunami. Mangrove forests are a place for various habitats of marine organisms. At a glance, the population of mangrove forests is decreasing due to the conversion of their functions, even cutting down and one of them being oil palm plantations. Community-based reforestation of mangrove forests can help restore mangrove forests in Myanmar [1]. Restoration of mangrove forests can be carried out as early as possible with an understanding and knowledge of the benefits and functions of mangrove forests. Mangrove forests have a wealth of species in the form of plant species and zoological species. In mitigating global climate change, is necessary to conserve mangrove forests [2]. The diversity of mangrove forest ecosystem habitats makes mangrove forests rich in all kinds of diversity so that mangrove forests are useful for the sustainability of the life cycle. Zoological diversity, such as diverse fish species, can be the main attraction for maintaining the mangrove ecosystem. An ecosystem approach to conservation needs to be considered so that the diversity of habitats associated with fish species will be maintained [3].

Mangrove forests have various benefits and functions, in addition to producing various animals and plants and their respective charms. Carbon stored in mangrove forests affects the stability of the ecosystem. The carbon content stored in the Bengkulu City Coastal mangrove ecosystem stands is 18.53 tons/ha[4].Carbon accumulation in biomass and carbon sequestration in sediments was best in mangrove forests where various mixed species of 50% S. caseolaris were grown; 50% S. apetala [5].Mangrove forests function as tourist attractions, ecology, educational facilities, conservation and research resources. As a means of education, there are several things that can affect the continuity of its activities. Among them is in the form of a structure of student interrelationships so that the character cares for the environment. In addition, the learning process is able to explore the understanding of students in order to realize an understanding of mangrove forests. Environmental care can be realized by learning that is carried out directly in the mangrove forest so that students' understanding increases directly [6]. Furthermore, this is related to ethnoscience which involves local culture concerning the local wisdom of the mangrove forest which is used as a means of education, [7]discusses the results of understanding of integrated science concepts based on ethnoscience, which has a significant increase in students' life skills.

Learning that is only oriented to the material understanding is proven to be successful only in short-term memory competitions[8]. Biology learning is identical to direct modeling or the structure that can be seen directly, so that it is easier for students to understand the context of their learning. Several ways to help the learning process are needed besides students having to go directly to the field, one of which is using electronic modules that can help clearly and effectively for learning facilities that involve mangrove forests.[9].The ability of students in the context of critical thinking and caring for the environment can be increased by using the Inquiry handout learning tool that involves the local potential of the mangrove forest[10].In relations with that, learning that is required to achieve all aspects of knowledge requires various creative and active attemps, such as learning resources with a STEM approach (Science, Technology, Engineering, and Mathematics) which is one of the educational curricula centered on the subjects of Science, Technology, Engineering. and Mathematics. STEM can be collaborated with various learning models so as to make an effective and creative learning system. As research results [11] STEM approach learning using the PjBL (Project Based Learning) model produces products based on students' opportunities to learn contextually through complex processes by exploring planning the learning process, projects carried out collaboratively.

LITERATURE REVIEW

The following describes the results of a review of several international and national articles published by qualified journals.

1. Mangrove Forest

Mangrove forests are one of the most important assets for Indonesia. Indonesia has a mangrove area of 3,112,989 ha and has 45 types of mangroves [12]. A variety of ecosystem services, including coastal protection, carbon sequestration and opportunities for biodiversity are available from mangrove ecosystems [13]. These services are being lost due to species decrease from mangrove ecosystems, with major ecological and economic implications for wildlife and the people who depend on them. [14]. The next is [15][16] the decrease in micro-habitats and above-ground biomass can cause a decrease in fauna species and biomass which in turn will affect the nutrient cycle and damage the function of nurseries in the area. Mangrove forests contain a variety of species diversity, both diverse mangrove plants and vertebrate and invertebrate animal species.

The mangrove ecosystem in the Bungus Bay Area is divided into 2 (two) faunal characteristics, namely vertebrates consisting of 5 (five) species, namely aves (birds), reptiles, amphibians, mammals and primates and fish vertebrates. While invertebrates consist of crustaceans or crabs, caridea or shrimp, molluscs, echinoderms, and polychaeta or worms [17]. The southwest region of Madagascar has a diversity of wetland bird species, namely the Ambondrolava [18]. The existence of mangrove forests can be used as a learning resource for students to apply the information obtained through books and other sources. Knowledge of science and ecology must be linked to evaluate how far the target of the science curriculum is achieved [19]. This is a link between ecological knowledge and scientific knowledge that creates concern for the environment and students can use the knowledge gained at school to be applied in the surrounding natural environment [9]. Various information about mangrove forests can be used as a starting point in order to create utilization as an optimal learning resource.

2. Learning Resources

Learning resources are one way to make the learning process effective and active. Learning resources are able to provide facilities that can make learning easy to understand so that the objectives of learning are achieved. Learning resources consist of various components, including learning that is designed not to be used for complex learning purposes but its benefits affect learning, namely learning resources by utilization. Examples of learning resources by utilization are zoos, national parks, markets, banks, supermarkets, wildlife reserves, forests and so on [20]. Natural learning resources can increase student character values, conservation character values improve high school students' scientific work skills by utilizing guided inquiry learning [21]. Students become active can be seen when students can provide input to group members, get the best answers during discussions and are able to explain the understanding gained when the value of conservation character is applied [21].

The development of student knowledge is a challenge for educators to create effective learning, these efforts can be used by optimizing learning resources from various aspects. Learning can also be realized by the realization of innovative learning oriented to student competencies in the 21st Century which is characterized by creativity and innovation, critical thinking and problem solving, communication skills and collaboration among other students [22]. This is also influenced by the teacher's ability to apply relevant knowledge as a professional form [23]. The efforts made by the teacher can create several learning resources or create their own learning resources, one of the efforts to create learning content. Progress in student learning can be influenced by the teacher's knowledge of content. There are three categories of content knowledge that have been used, namely, content knowledge, content pedagogical knowledge and curriculum knowledge [24]. In this regard, learning resources can be explored from how students' interests arise which depend on environmental or cultural factors [25]. Student interests have variations, namely in the learning environment in the form of a school environment, free time and enrichment [26], but there are some similarities between students' interest in science in the various study groups. This explains that learning resources can come from various contexts and consider several aspects, one of which is student interest in learning so that an interesting and effective learning process is achieved.

3. STEM (Science, Technology, Engineering, and Mathematics)

Education is expected to provide students with the ability to prepare for their lives in the future and be able to create students' attitudes towards science, mathematics, technology and 21st century skills [27]. The 21st century requires students' abilities which include communication skills, problem solving, critical thinking, creativity, innovation and collaboration. According to the statement [28] The problem solving ability of students can be significantly increased by applying distance learning based on a STEM approach. STEM can be integrated with various models and can take advantage of the natural surroundings as well, such as [29] The integration ethnoscience learning model with inquiry that uses online applications and google forms can be a way of understanding STEM because it makes students interested so that it fosters curiosity and high motivation. STEM can also be applied to the PjBL model so that it motivates students because it trains students to think critically, analytically and can train high-level thinking [30]. The use of STEM can solve problems in daily life because students have scientific and technological literacy who are equipped with reading, writing, observing and applying science skills.

CONCLUSION

This article describes the use of mangrove forests as a learning resource, specifically in the field of zoology with a STEM approach. The method used is the result of a literature review of various articles published by reputable journals. As for the aspects described, namely, the use of the Mangrove Forest, learning resources and STEM. Mangrove forest as a learning tool helps students to understand more about zoology learning, mangrove forest holds important benefits for animals and plants that survive in it. Utilization of mangrove forests is one way for teachers to become effective and creative learning resources so that students can interact directly with nature. In relation with that, the use of mangrove forests as a source of learning, especially in the field of zoology, makes students more understanding and can create environmental awareness so that the character of students who care about the environment is realized. This is due to the use of learning resources that are not confined to the classroom. Learning resources that utilize mangrove forests can also be integrated with STEM, which is one of the innovations in science learning. The STEM component makes students independent because they are required to seek knowledge in the environment and are able to utilize various learning resources and learning facilities. The components contained in STEM are science which is a study of natural phenomena that involves observation and then the measurement process so that it can objectively explain changing natural conditions.

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