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Needs Analysis of Mangrove Ecosystem Matter in Junior High School Science Learning in Yogyakarta Special Region

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ABSTRACT
This study aims to determine the need for mangrove ecosystem matter in teaching science at junior high schools in Yogyakarta. This study uses a survey method. Data collection was carried out using questionnaires, interviews, and observations in the Baros mangrove ecosystems. Besides, literature studies were also carried out on various sources related to the mangrove ecosystem. The research sample for the needs analysis questionnaire was 119 science teachers in Yogyakarta Special Region. Sample selection is made by random sampling. Online interviews were conducted with six science teachers to confirm the data. The questionnaire was analyzed quantitatively with TCR analysis, while the results of the interview were analyzed qualitatively. The questionnaire analysis result showed that 80.68% of the teachers responded well to the statement items given. The results of the interview also received a good response from the teachers. Mangrove ecosystem material packaged in manual or electronic books can be used as an enrichment material that increases insight, skills and supports affective aspects, especially environmental care.

Keywords: *Needs analysis, Mangrove ecosystem, Science learning*

1. INTRODUCTION

The mangrove ecosystem is one of Indonesia's natural resources found in the tidal area of seawater [1] [2]. Research in 2011 placed Indonesia as the first country with the largest mangrove area in the world. The region reaches 3.1 million ha or 22.6% of the global area [3]. Another study in 2014 noted that Indonesia has the largest mangrove area, which is 30% of the world's total mangroves [1]. The structure and variety of mangrove plant diversity in Indonesia are also the highest among other countries [4]. The mangrove ecosystem is spread across almost all coastal areas, both on large and small islands [3].

Mangrove ecosystems have an essential role in the life of living things in waters and land ecologically, biologically, and socio-economically [3], [5]. Ecologically, the mangrove ecosystem plays a role in protecting the coastal area from sea waves. Its robust root system can play a role in breaking ocean waves so that the settlements behind it can avoid the pressure of waves and storms [6]. Its biological function is as an area for fish, shrimp cultivation and the habitat for various other marine biotas. The economic function of the mangrove ecosystem is as a source of wood and a source fuel for the surrounding community [7]. Mangroves are also the richest store of carbon stocks, especially in the tropics [8], [9].

Since the last two decades, many cases of damage to mangrove ecosystems in Indonesia have caused the benefits of the ecosystem to not be optimally felt. One reason is the existence of anthropogenic activities such as the conversion of mangrove land to aquaculture and agriculture [10]. The existence of land conversion activities is caused by the low-income level of people in coastal areas [11]. A study in the coastal area of Semarang City noted that the damage to the mangrove ecosystem caused a decrease in the environmental quality of the coastal area. Various wastes from human activities on land lead to river estuaries and beaches, thus damaging the mangrove ecosystem [2]. Damage to mangrove ecosystems can be caused by direct

mechanical action, such as cutting, dismantling and indirect causes such as changes in water salinity, water pollution, due to erosion, and so on [12].

This condition of damage needs to be the concern of many parties, one of which is the educational environment [12]. Learning-related, in this case, is learning science in science subjects (Natural Sciences). Through the educational process in science learning, planting knowledge about the condition of the mangrove ecosystem can be carried out so that it can have a positive impact on students' attitudes towards the surrounding environment [11]. The Ministry of Education Regulation No. 22 of 2006 that education aims to produce graduates by demanding the potential-based needs of Indonesia's Natural Resources (SDA) [13]. The Minister of Environment and the Minister of National Education's policies in 2010 also state that education is directed to foster knowledge, values, and environmental care for students and society [14]. Low levels of education, lack of public understanding of mangrove ecosystems' role, and low-income cause damage to mangrove ecosystems [4]. This condition triggers the community to log mangrove trees illegally and divert land functions without realizing the consequences [11]. Disseminating correct and accurate information and providing various examples of activities that can help reduce environmental disasters and plant mangrove forests are believed to be very effective through schools [15].

The application of mangrove ecosystem matter in science learning needs to be studied more widely by conducting a needs analysis. It is intended that the issue is presented by the needs of teachers and students in schools. Based on this, this research can serve as a description of a preliminary study of the need to apply mangrove ecosystem matters in science learning in junior high schools.

2. RESEARCH METHOD

This study uses a survey method. They collected data using a needs analysis questionnaire, interviews with junior high school science teachers, and observations of the Baros mangrove ecosystems. Besides, literature studies were also carried out on various sources related to the mangrove ecosystem. The questionnaire for the analysis of mangrove ecosystem matter needs consists of 15 questions divided into three aspects: students' knowledge of mangrove ecosystems, the relationship between mangrove ecosystem matter, and the junior high school science curriculum matter benefits. The questionnaire sample was 119 science teachers spread across five districts in YOGYAKARTA SPECIAL REGION, namely Sleman, Wonosari, Kulon Progo, Yogyakarta City, and Bantul. Online interviews were also conducted with six science teachers to obtain supporting data from the questionnaire results. The technique of analyzing the questionnaire data used descriptive quantitative analysis, while the results of the interviews were analyzed using qualitative descriptive.

The data that has been obtained through a questionnaire is then analyzed quantitatively. The trick is to set a score, as shown below:

Table 1. Likert scale

Approval Level	Score
Very Agree	5
Agree	4
Doubtful	3
Disagree less	2
Disagree	1

Furthermore, the Respondent Achievement Level (TCR) analysis was conducted to see the respondents' answers to the statements given. The formula used is as follows:

$$TCR = \frac{\text{Average Score}}{\text{Maximum Score}} \times 100\% \quad (2)$$

The TCR categorization is as follows:

Table 2. TCR category

Approval Level	Category
85 % - 100 %	Very Good
66 % - 84 %	Good
51% – 65 %	Enough
36 % - 50 %	Good less
0 % - 35 %	Not Good

3. DISCUSSION

Three aspects can identify the analysis of mangrove ecosystem matter in junior high school science learning. These aspects are students' knowledge of the mangrove ecosystem matter, the relationship between the mangrove ecosystem matter and the SMP science learning curriculum, and the benefits of the subject for students and the surrounding environment. Teacher responses to aspects of student knowledge are seen in Figures 1, 2, and 3.

The first aspect is students' knowledge of mangrove ecosystem matter. This aspect is used to get information from the teacher about the level of students' understanding of the mangrove ecosystem and its relation to preserving this ecosystem. There are

five statement items in this aspect, namely (a) learning facilities about mangrove ecosystems; (b) students' understanding of the matter; (c) the relationship between students' knowledge and mangrove ecosystem damage; (d) student access to point; and (e) there is no linkage of experience with ecosystem damage.

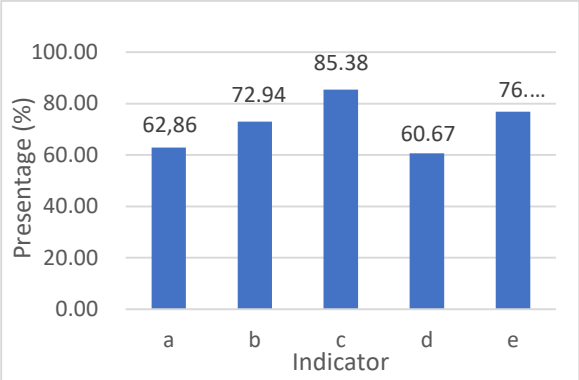

Figure 1 The results of the analysis of aspects of student knowledge about the mangrove ecosystem

Learning resources are an essential factor in supporting the success of science learning in schools. Learning resources contain various information that can help the transfer of knowledge to students [16]. In this regard, 62.86% of science teachers thought that there were sufficient learning resources available for students to study mangrove ecosystems. However, students' understanding of the mangrove ecosystem and its role is still not right. It is shown in Figure b, where 72, 94% of teachers think that many students are not familiar with the mangrove ecosystem. The interviews with six science teachers also showed that the majority of schools did not yet have manual learning resources about mangrove ecosystems. Textbooks used in science learning also do not provide examples of mangrove ecosystems. Models often listed in books include rice fields, ponds, fields, forests, beaches, and forests. The introduction of mangrove ecosystems is still limited to display facilities on general ecosystems and marine ecosystems. This condition positively affects the level of students' understanding of the mangrove ecosystem.

The condition of Indonesia's mangrove ecosystem has been a concerned for the last two decades [10]. It is also supported by observations in the mangrove ecosystem of Baros Yogyakarta. The condition of the ecosystem is very apprehensive, where there is a lot of waste from the residual activities of the population that inundates the roots of mangrove plants. In addition to destroying the beauty of the ecosystem, this waste impacts mangrove plant damage. Various wastes from human activities on land lead to river estuaries and beaches, thus damaging the mangrove ecosystem [2].

The existence of an adequate understanding of the mangrove ecosystem can play a role in supporting ecosystem preservation. Efforts to conserve mangrove ecosystems can be carried out by integrating them in science learning environmental damage matters [17]. These efforts can facilitate students to apply the knowledge learned so that it is useful for protecting the surrounding environment. The learning process is for achieving cognitive aspects and forming good behavior from students, especially environmental care attitudes [18]. The majority of teachers, namely 85.38%, also strongly agreed that there was damage to the ecosystem due to the lack of knowledge of students and society. This was confirmed by the teacher's response to the opposite statement on the item statement e. Therefore it is necessary to have learning facilities that support students to learn about the mangrove ecosystem.

Another aspect that needs to be considered in determining the matter needs for mangrove ecosystems in science learning is its relationship with the science learning curriculum in junior high schools. In this aspect, there are five statement items, namely (a) the opinion of the science teacher regarding the relationship between mangrove ecosystem matter and the junior high school science curriculum; (b) the point that attracts students' interest in learning; (c) the lack of relevance of concern with the junior high school science curriculum; (d) mangrove ecosystem matter as a matter for student enrichment; and (e) matters that make science learning more contextual. The results of this aspect analysis are shown in Figure 2.

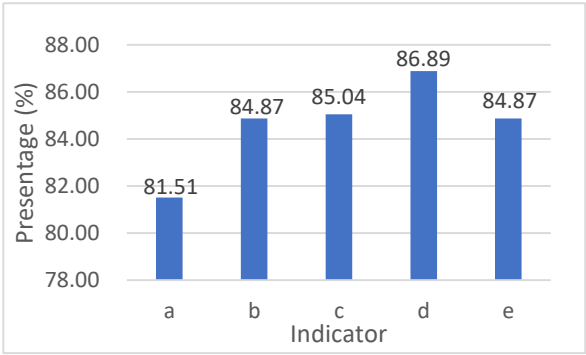

Figure 2 The results of the analysis of aspects of the relationship between mangrove ecosystem matter and the science curriculum

SMP Science Learning has a standard curriculum that all schools in Indonesia generally use. Currently, the curriculum that is still in effect is the 2013 curriculum. The 2013 curriculum is competency-based and character-based, which leads to the formation of noble character and morals in students [19]. Based on interviews with science teachers, in

practice, the teacher uses learning resources with the official curriculum standard as the primary reference, then adding additional learning resources that add insight to students. The analysis results in the picture above show that 81.51% of the teachers gave good responses that the mangrove ecosystem matter was relevant to the SMP science curriculum. This result is reinforced by the teacher's response to the negative item c, where 34, 96% of teachers disagree. It means that item e shows that 85, 04% of teachers strongly agree that the matter is relevant to the science learning curriculum. The interview results also added that the mangrove ecosystem matter is suitable for the essential competencies of the interaction of creatures with the environment and environmental pollution. The teacher can deliver the material directly or provide recommendations for students to learn it. An example of its application is presenting the ecosystem components and food chain of the mangrove ecosystem as additional information for students. Mangrove ecosystems have unique environmental characteristics with a variety of animals [20]. In the basic competence of environmental pollution, a description of the condition of the mangrove ecosystem, the causes of damage, the consequences, and how to overcome them can be given. One solution for preserving mangrove ecosystems is by planting an environmental care attitude towards mangrove ecosystems through learning science, especially matters for preventing environmental damage [17].

Mangrove ecosystem matter is outstanding to use as additional matter or enrichment for those who add to students' insight. As many as 86, 89% of science teachers agreed with this, as shown in item d. The enrichment program is carried out to help students gain broader insights and skills from the matter presented by the teacher [21]. Statement items b and e, with a percentage of 84, 87%, indicate that the mangrove ecosystem matter can attract students' interest to learn and make science learning more contextual. Mangrove ecosystem matters are not included much in student learning resources to attract more students to know about it. The introduction of mangrove ecosystems is perfect for making learning more contextual. Contextual learning is essential because everyday life is not related to knowledge but attitudes and skills to solve existing environmental problems [14]. Contextual understanding is an exciting focus in the 2013 curriculum [22]. The average analysis results in this aspect are 84.64%, which means the teacher gives a perfect response about the relationship between mangrove ecosystem matter and the curriculum. Based on the interview results, the teachers argued that the material about mangrove ecosystems could be packaged in manual or electronic form.

The third aspect is about the benefits of the mangrove ecosystem matters in science learning. The benefits of the matter presented in science learning are developing cognitive aspects and affective aspects [17]. The results of the analysis of the aspects of matter benefit are shown in Figure 3.

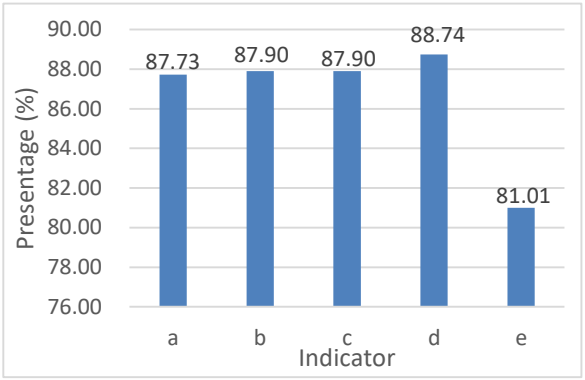

Figure 3 The results of the analysis of the matter benefit aspects of the mangrove ecosystem

The indicator items relate to the teacher's opinion about (a) the urgency of the matter to support environmental sustainability; (b) the benefits of the subject to improve students' conceptual understanding; (c) the issue motivates students to care about the preservation of the mangrove ecosystem, and (d) forming a caring attitude towards the surrounding environment. While item (e) is a negative statement that the mangrove ecosystem matter causes student saturation. All comments received excellent responses from respondents, namely more than 85%. Meaningful knowledge is the knowledge applied and can provide benefits to the surrounding environment [15]. While the percentage of item d is only 38, 99% indicates that mangrove ecosystems do not cause student saturation. The percentage of 81.01% indicates the opposite of the statement given. It shows that the majority of teachers give good responses about the benefits of mangrove ecosystem matters. The results of the average analysis of this aspect show that the teacher's response is excellent.

As one of the natural resources in coastal areas, Mangrove ecosystems have broad benefits from ecological, biological, and economic aspects [7]. The mangrove ecosystem's potential needs to be continuously preserved so that its benefits can be felt optimally. However, low levels of education, lack of public understanding of mangrove ecosystems' role, and low-income cause damage to mangrove ecosystems [4]. Based on interviews with several science teachers, the majority gave favorable responses about the benefits of the mangrove ecosystem in learning. They argue that the mangrove ecosystem matter besides being able to broaden students' insights. It can also motivate students to love

the surrounding environment and mangrove ecosystem and preserve the mangrove ecosystem. An attitude of caring for the environment must be instilled in students so that the knowledge provided can positively impact the preservation of the surrounding environment [17].

4. CONCLUSION

The teacher response analysis results to the mangrove ecosystem matter needs questionnaire in junior high school science learning showed that 80.68% of teachers gave good responses. The results of the interview also received a good response from the teachers. Mangrove ecosystem material can be used as an enrichment material that increases insight, skills and supports affective aspects, especially environmental care. Materials can be packaged in the form of manuals or electronic books. Thus it can be concluded that the mangrove ecosystem matter is needed in the learning process for various benefits for students, the environment, and the mangrove ecosystem.

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