Integrated Science Learning with Peatland Ecosystem Knowledge

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Abstract. Science learning associated with Socio Scientific Issues has the potential to increase scientific and environmental literacy. This research is a qualitative study with a survey method to analyze the impact of socio-scientific issues on the peat environment through the frequency of its implementation in science learning, students' initial knowledge and opinions about peat, and the types of media for peat recognition. This research is a preliminary study to develop science learning media that can improve scientific and environmental literacy about peat in Central Kalimantan.[U1] Subyek of this research were 83 junior high school students at SMPN 5 Palangka Raya and SMPN 7 Cempaga, Central Kalimantan. The results showed that as many as 29.8% of students had never studied peat. Their knowledge was limited to a general knowledge of peat from the internet. The needs analysis results show that almost all students (99%) need peat introduction media, 65% choose video media, 23% choose educational games, and the rest choose electronic books. The type of media needed by these students is a reference for developing interactive learning media to introduce peatland.

Key words: peatlands ecosystem; science learning; socio-scientific issues.

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INTRODUCTION

The COVID-19 pandemic has limited human mobility and impacts the world of education, among others. Students must carry out learning from home boldly according to their lesson schedule. Students still have time to explore the surrounding environment so that students' knowledge is contextual. Learning like socio-scientific issues (SSI), especially environmental problems, is more attractive to students, so it is appropriate to apply it to science learning. (Nida et al., 2020).

The area of peatlands in Indonesia reaches 27 million hectares spread across Sumatra, Kalimantan, and Papua (Husson et al., 2018). The scope of peatlands is estimated to decrease every year due to conversion and degradation. It causes environmental impacts in floods, forest, and land fires that result in smog, global warming, and the loss of asylum for endemic living creatures. Students' environmental literacy overcome the increasingly massive peat damage and increase awareness of the importance of protecting nature and the environment to survive living things.

Science learning media in the three areas should ideally be associated with peatlands. High school students need to be encouraged to recognize and understand the problems around them to have sufficient provisions to provide solutions according to their level of education. SSI's approach to science learning can use the peat theme to improve scientific and environmental literacy so that students have the opportunity to find collaborative solutions from an early age.

The collaborative solutions in question are arguments and opinions from the point of view of junior high school students regarding how to restore the degradation of peatlands that are prone to fires. Peatland fires are a source of greenhouse gases and smog that occur almost every year (Genisa et al., 2020; Puspitaloka et al., 2020).

The way to implement SSI with the theme of Peat is to use interactive learning media that introduces Peat through interesting images, sounds, and animations. The development of multimedia helps students and teachers in the learning process, the delivery of learning materials develops students' interactive responses and assists students in the learning process independently so that students can construct their knowledge independently (Kurniawan et al., 2019; Ramdiah et al., 2020; Rusilowati & Widiyatmoko, 2015; Way, 2016).

Aims of this research to determine: (1) Students' knowledge related to Peat. (3) Students' understanding of Peat. (2) Students' opinions on the correct type of media used in learning peat material.

METHOD

This research method uses a qualitative approach with an instrument in the form of a questionnaire. It consists of three aspects,

namely: (1) a Science learning questionnaire, (2) students' knowledge related to peat, (3) Media for peat introduction (Table 1). Respondents were 83 people who were students of class VII, VIII and IX at SMPN 5 Palangka Raya and SMPN 7 Cempaga, Central Kalimantan.

Questionnaire learning natural science aims to look at the frequency of implementing science in a school associated with knowledge of social science fields and forest peat issues, including eight questions (Table 1).

Table 1. Questionnaire Grid

Aspect	Indicator
Science Learning related to Peat	Integrated learning materials to the peat ecosystem
	Science material related to peat environmental issues
Student Knowledge of Peat	Knowledge of the characteristics of the peat ecosystem
	The role of peat for life
	Environmental issues and peat conservation
Peat Media	Relevant learning media used in peat introduction

RESULT AND DISCUSSION

Science Learning Interated to Peatland

Based on respondents' answers, as many as 33% of students have never studied peat (Figure 1). The lessons related to peat are the characteristics of peat, plants, and animals typical of the peat ecosystem. Science learning in standard competence and materials relevant to ecosystems and the environment is not integrating with knowledge of peat which is the environment around students.

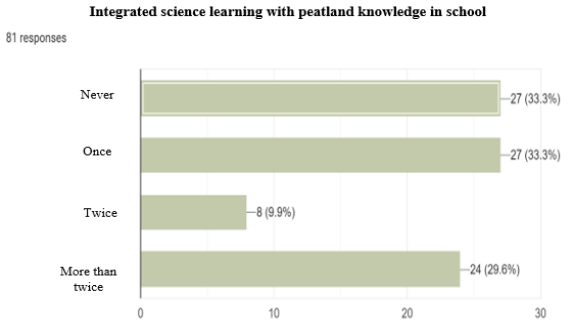

Figure 1. Respondents' Answers

Knowledge of peat ecosystems is closely related to environmental learning. Deforestation, forest, and peatland fires have an impact on global warming and climate change on earth. As many as 21% of students stated that they had never studied environmental issues related to peat forests in Central Kalimantan. Learning environmental issues around students makes a contextual learning experience for students. Contextual learning can facilitate learning in the classroom with actual conditions in the background (Presley et al., 2013).

Peat has an essential function as a carbon sink, water buffer, unique flora and fauna living place, and a source of livelihood for the surrounding community (Ramdhan & Siregar, 2018). As many as 80% of students have at least once learned about conservation efforts to protect the environment, especially peat. Environmental knowledge is expected to increase student participation to protect the environment, peat ecosystem, and biodiversity in the community (Purwani et al., 2018; Schönfelder & Bogner, 2017).

Student Knowledge Regarding Peatlands

Aspects of students' knowledge of peat there are three indicators (Table 1). Students' responses to each question are general definitions sourced from the internet. A small number of students responded based on direct observation of the surrounding environment (Figure 2). The material in science learning is integrated with peatlands that have never been studied. Education about peat to students can be integrated with ecological knowledge, global warming and climate change, environmentally friendly technology and materials on ecosystems, and the diversity of living things (Putri, 2017; Suwondo et al., 2018; Zulkarnaini et al., 2020).

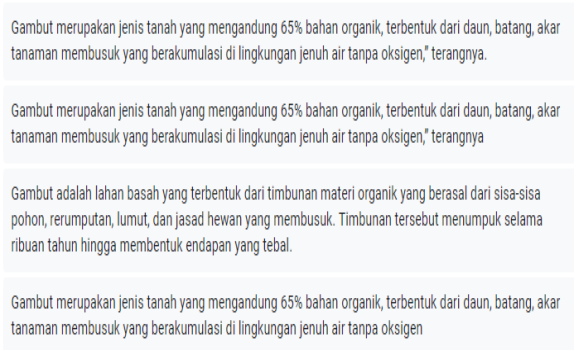

Figure 2. Example of student answers

Students' knowledge of the biodiversity of peat ecosystems is knowledge of animals and plants. Student responses varied, including crocodiles, orangutans, ramin, meranti, jelutung swamp. Student responses are very general and are direct observations on easy-to-find types of plants and animals. The majority of students are not aware of the role and potential of peat for environmental sustainability and living things.

Peat has a role as a regulator of hydrology, a means of conservation of biodiversity, a place for cultivation and a source of energy, and controlling the world's climate (Putri, 2017).

The social scientific issue related to peat is converting forest/peatland into agricultural land, which reaps many pros and cons. Students think that this transfer of function is very detrimental and does not agree. It can damage the ecosystem, damage the habitat of endemic flora and fauna, cause floods and forest fires, and decrease environmental quality. Some students answered that they usually supported this because it provided residential land for the community and supported the economy, such as oil palm plantations, rice fields, and fish cultivation (Figure 3). Student responses show that students care about the surrounding peat environment. Knowledge of the environment becomes the basis for behaving and acting on environmental and community problems with a caring attitude (Taufiq et al., 2014; Laksmi, 2015) .

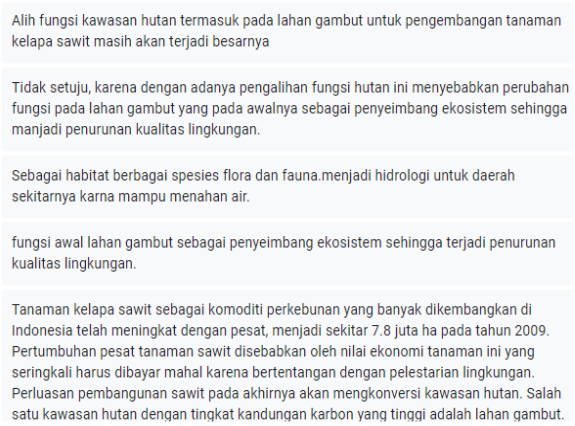

Figure 3. Student responses to peat issues

Peat damage due to forest fires and land conversion requires efforts to overcome it. Forest fires provide a positive aspect of soil fertility but provide significant carbon emissions for global warming (Suwondo et al., 2018). Students' opinions to overcome this include finding ways to clear more economical and practical land, not burning land, providing sanctions and fines for forest firefighters, and carrying out comprehensive reforestation, a hydrological approach by rewetting peatlands and revitalizing.

Indonesia's peatlands have experienced extensive deforestation and degradation due to logging, drainage, fires, and conversion to other land uses (Dohong et al., 2018), so a more in-depth study is needed so that students become more critical and argumentative in conveying the results of their thoughts and analyses on issues. - Controversial issues related to peat. The SSI method is suitable for integrating peat knowledge in science learning. The SSI method can improve students' scientific literacy, problem-solving skills, and creativity (Dawson & Carson, 2020; Genisa et al., 2020; Hadisaputra et al., 2020; Nida et al., 2020).

The dimensions of environmental knowledge and attitudes towards nature act as solid predictors of conservational performance and influence knowledge. Therefore, it is essential for teachers to focus on cognitive and affective (e.g., attitudes and values) learning issues to successfully promote community conservation performance related to peat and other environmental matters so that student learning becomes more holistic and contextual (Schönfelder & Bogner, 2017).

Media for the introduction of peat

The aspect of peat introduction media aims to see students' opinions about peat introduction media for students. Eighty respondents or 98.8% of students answered the need for media introduction to peat forests for students. The type of media they expect (figure 4).

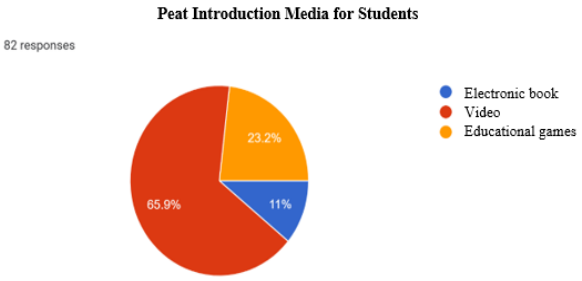

Figure 4. Response to the type of peat recognition media

Students who choose educational videos and games reach 66.8%, only a tiny percentage choose electronic books. Electronic books can contain more information than videos and educational games. Interactive learning media is appropriate to be used as an exciting medium for students to introduce peat.

Interactive media can contain information in the form of books containing audiovisual content in the form of videos, images, and animations, and educational games as a medium for introducing peat for students, so that students have control over the choice and use of media as well as the use of the internet and computers relevant to the topic of peat (Asih & Widyantoro, 2019; Chen & Kong, 2017; Prasetya et al., 2018;

Tsvyatkova & Storni, 2019; A. Y. P. Widodo et al., 2019; W. Widodo et al., 2020).

CONCLUSIONS

Based on the study results, it can conclude that students' knowledge of the peat ecosystem is very low. Students' understanding of the peat ecosystem is limited to general knowledge from internet sources and not direct observation. The type of media that can use in studying material about peat is interactive media that combines books, videos, and educational games in learning.

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