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Empowering Peat Lands as a Resource of Learning Natural Science to Strengthening Environment Care

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ABSTRACT
Peatland management by the people of South Kalimantan has not been optimal and tends to be wrong in its implementation. Negative phenomena are still found, such as waste disposal, which causes water pollution and forest fires to smog, causing damage to swamp ecosystems. Among the reasons is that love for the environment has not yet flourished so that people are reluctant to recognize the characteristics and dangers of mistaken management of peatlands. In light of this, it is essential to carry out sustainable research to introduce peatlands' natural characteristics and their use to the community, especially students in schools. Later, they can give the best treatment in managing peatlands when they are involved in the community. This writing's initial stage is to conduct a literature study by examining various theories and results of previous research to then emerge as a complete initial hypothesis or idea. The analysis technique used in this paper is descriptive qualitative. The results of the literature study obtained were the empowerment of peatlands as a source of science learning on acid and alkaline materials, which is a learning design to introduce environment-based learning from an early age to foster a love for nature and the surrounding environment in students.
Keywords: *Natural resources, peatlands, learning resources natural sciences, environmental care.*

1. INTRODUCTION

Peat is a type of soil formed from the accumulation of plant debris that is almost decomposed so that the organic content in the soil is high. Peat can store large amounts of water resources and maintain a wet environment in the long term [1,2,3]. Peatlands are formed when parts of the plant are slowed down or blocked in the decomposition process. This condition usually occurs in watery lands (swamps) due to high acidity or anaerobic conditions in the aquatic Environment [4,5]. Most of the peat soil is composed of chips and pieces of plant remains, leaves, branches, and even large logs piled up on each other and have not entirely rotted.

Under certain conditions, in peatlands, decomposition is inhibited due to lack of oxygen [6] Marfuah (2012), so that the remains of animal and insect carcasses are also preserved in the layers of peatlands. In general, an area is referred to as peatland when the organic matter content in the soil exceeds 30% [6][7]. Meanwhile, peat swamp forests in Indonesia generally contain organic matter above 65% and a depth of more than 50 cm [8].

South Kalimantan Province is an area that has a large number of peatlands. According to the Indonesian National Carbon Accounting System (2011), peatland in South Kalimantan is 0.1 million hectares. With the enormous potential to be in an environment close to the provincial capital. So that most people will come in direct contact with peatlands in their daily activities. In the context of the environment, there is a general phenomenon that occurs in the peatlands of South Kalimantan province, namely the disposal of garbage or household / industrial waste into the environment that causes water and soil pollution and smoke haze caused by burning peatlands. This phenomenon, if examined further, is a result of the mismanagement of peatlands due to a lack of awareness of the importance of protecting the Environment [9,10,11]. Mistakes in this management result in disruption of the ecosystem's stability and the environment so that the chemical cycle of matter does not run well.

Management of the natural resources of peatlands is currently not being implemented as expected by the government. Based on the regulations of Law Number 5 of 1990 concerning Conservation of Living Natural Resources and their Ecosystems, the government hopes that natural resources can be managed as best as possible from several aspects (BB Litbang SDLP, 2008). According to Law Number 5 of 1990, natural resource management expects that natural resources such as peatlands must be managed by taking into account the potential continuity, carrying capacity of the diversity of wild plant and animal species, nature preservation, and capability of supporting community welfare.

Awareness of the importance of protecting the environment is essential to be grown in society from an early age. Since school age, the community must continue to understand the importance of protecting the surrounding environment from various damages and making the surrounding environment an object of learning and living life [12].

Without learning actions taken to the public in general and students specifically included in the learning curriculum [13]. Among the best ways to do this is to include the peatland environment as local natural wealth in school lessons. With their abundant water composition, peatlands can be a source of Natural Science (IPA) learning at the Junior High School (SMP) level on acidic and alkaline materials.

In general, acid is a chemical compound that, when dissolved in water, will solve with a pH of less than 7. In this context, the peatlands' water content tends to be acidic, with an average pH level below the number 7. Bases are chemical compounds that absorb hydronium ion when dissolved in water. Bases have a pH greater than 7, which can be found in limestone in peatlands.

Seeing these characteristics, it is possible to teach acid and alkaline materials based on the peatland environment to improve the environment in students. With this understanding, the management of peatlands will be better so that the impact of natural awareness will be less.

2. METHOD

This writing method is a literature study by examining various theories and results of previous research to then emerge as a complete initial hypothesis or idea. The type of data used is secondary data. The data collection method is a literature study. The data obtained were then compiled, analyzed, and concluded with qualitative descriptive analysis techniques [14].

3. RESULTS AND DISCUSSION

The first thing to do in this writing is to collect library sources in journals, proceedings, final assignments (theses and dissertations), books, and other free sources that still meet the requirements to be called scientific sources or works. Theory studies, data analysis, and research findings from these various sources are collected and analyzed in an integrated manner to produce a general concept of peatlands and a learning design that is suitable for the impact that can foster a love for the natural environment.

The study results indicate that the empowerment of peatlands as a source of learning science for junior high school students is an ideal thing to be realized, especially in acid and alkaline materials. In acidic and alkaline matter, the main component of that material is acidic compounds, which are very easy to obtain in abundance in peatlands.

Peatlands have a relatively high level of acidity. Peatlands in South Kalimantan have acidity levels up to pH <4.0. According to Prayoga [10] in his research results, the acidity level of peatlands in South Kalimantan from various indicators of tree plants such as purun rat (*Eleocharis dulcis*) which indicates very acidic conditions and water swearing conditions (*waterlogging*), Galam tree (*melaleuca leucadendron*) which indicates acid conditions, excess drainage, and karamunting (*melastoma malabatricum*) as well as pink flowers (*rhododendron Singapore*) which shows a symptom that the soil has high acidity.

Figure 1 Peat Swamp water in South Kalimantan

The results of Supriyo's [15] research show that the high level of acidity in peatlands makes it difficult for them to be utilized and cultivated on their surface. Under these conditions, the discussion of bases is critical to get a neutralization reaction, which can reduce the soil's acidity or swamp. Acid soil or swamp conditions to cultivable land [16].

Acid and alkaline subject matter is part of the learning material in Natural Science (IPA) subjects in grade VII SMP. Acid and base material includes the introduction of examples of substances including compounds and solutions of acids and bases and how to measure pH, with two objectives, namely: (1) To provide understanding to students so that they can classify the properties of acidic and alkaline solutions, through tools and indicators appropriate, (2) To make students able to do simple experiments with materials obtained from their Environment [17].

In the learning process at school, acid and alkaline materials are usually accompanied by direct practice or demonstration. In the learning process, the teacher can take samples from peatlands in the form of swampy water and soil as a direct source of acid from nature by first doing a pH acidity test. Measurement of acidity can use a pH indicator or litmus paper to determine the exact number of acidity degrees of a substance. If it is known based on the test results, the dangers of excess acid levels in the Environment [18].

The higher the acid level of an environment, mostly solutions or those dissolved in water, the more H + ions produced by the solution's acidic compounds [19]. The nature of acids causes corrosive effects, which causes most living things (plants and animals) to be unable to survive in their environment. By explaining the nature of acidic compounds in peatlands for students and the impacts they cause, the teacher can teach a neutralization reaction that involves natural alkaline compounds (soil/limestone) to neutralize acid levels in peatlands.

Figure 2 Soil/Limestone (alkaline sources from nature)

Neutralization reactions can be carried out by adding alkaline compounds in the environment such as lime to acidic compounds to produce salt and water with the following reaction conditions:

$$\text{Acid} + \text{Base} \rightarrow \text{Salt} + \text{Water}$$

In this reaction, a structural change occurs, which causes new compounds in a chemical process. When swamp water on peatlands reacts with alkaline (limestone), the tendency is the water's pH increases so that the acidity decreases, and the water can then be used.

Acid-base learning with the peatland environment results as a source of learning is very suitable then combined with contextual-based learning strategies in science learning or often called Contextual Teaching and Learning (CTL). The use of contextual learning strategies (CTL) is a solution to linking teaching materials and students' real Environment [13]. This is because CTL's philosophical foundation is constructivism, which is a learning philosophy that emphasizes that learning is not just memorizing, but constructing or building new knowledge and skills through the facts or prepositions they experience in their lives [19,20]. Meanwhile, the essence of contextual learning is inquiry (finding). So,

In the context of peatlands as a learning resource, contextual learning (CTL) as a learning strategy impacts the full direct involvement of students in the learning process. Students are encouraged to study material following the topics they will study Rubini & Permanasari [22] and make the environment a source of learning.

Learning with the CTL strategy is not just listening and taking notes, but learning is a process of direct experience in interaction with the Environment [23]. Through this process, it is hoped that feelings of love for the environment will grow in students to desire and action to protect and preserve the environment. Students can find out that peatlands have a high acidity level with the knowledge that students get during the acid and alkaline learning process. From this knowledge, students can understand that peatland is a less fertile land for planting plants for plantation and agricultural purposes.

Additional alkaline substances are needed to reduce acid levels in peatlands, but not by burning the land to produce alkaline compounds. Soil and water neutralization in peatlands can be done by mixing soil / fine limestone, which in quantity is also very abundant in the province of South Kalimantan. The combination of lime (alkaline) and peat (acid) land becomes natural inorganic fertilizers that can boost land productivity.

If this knowledge is applied, land burning and limestone mining in South Kalimantan province can be reduced so that natural damage can be minimized. This emerges as a result of growing love for the environment due to contextual-based Natural Science (IPA) learning where the source of learning is the natural environment around students.

4. CONCLUSION

Peatland management by the community, which still tends to be wrong, impacts the destruction of nature and the ecosystem. This happens because of a lack of awareness of the importance of protecting the environment, due to feelings of love for the environment that has not yet appeared in the community. In light of this, it is imperative to carry out sustainable research to introduce peatlands' natural characteristics and their use to the community, especially students in schools. Later, they can give the best treatment in managing peatlands when they are involved in the community. The literature study results are the empowerment of peatlands as a source of science learning on acid and alkaline materials, which is a learning plan to introduce environment -based learning from an early age.

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