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Evaluation of Wetland Environmental Awareness Among Biology Students

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Abstract

Environmental awareness refers to the importance of maintaining a clean and healthy environment. This awareness is reflected in an individual's attitudes and actions, especially when they act voluntarily without external pressure. The Biology Education program at Universitas Lambung Mangkurat (ULM) envisions becoming a leading and competitive study program that produces graduates with expertise as educators who possess an in-depth understanding of wetland environments. This vision aims to produce graduates who not only have educational skills but also understand environmental issues, especially in wetland management and preservation, and have a high level of environmental awareness to support the sustainability of ecosystems. This study aims to describe the wetland environmental awareness of the Biology Education students at ULM. The method used is a quantitative survey conducted among active Biology Education students at ULM, consisting of students from the 2022, 2023, and 2024 academic years. The research results show that the students' environmental awareness is categorized into high (15.48%) and moderate (84.52%) criteria. The moderate environmental awareness level suggests a decline in environmental consciousness among students, which could affect the next generation's awareness if not balanced with environmental awareness.

Keywords: environment; environmental awareness; environmental behavior

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INTRODUCTION

Wetlands refer to large bodies of water that significantly influence their surrounding ecosystems and mechanisms. Wetlands are characterized by a high water content, being flooded with water all year round (Davidson et al., 2018; Maltby, 1986). Wetlands are standing or flowing water areas with terrestrial and aquatic features (Gopal, 2016; Harianto & Bainah, 2017). Wetlands are a significant environment for the South Kalimantan community, with examples such as swamps, mangroves, brackish areas, and flooded regions. Wetlands provide essential ecological functions such as flood control, preventing seawater intrusion, erosion, pollution, and regulating global climate (Lu & Xiao, 2024; Mooway et al., 2018; Nurtyawan & Hendarna, 2020). These environments offer numerous benefits, including providing vital life resources. However, in the current era, many individuals are damaging the environment by exploiting its resources, leading to depletion and environmental destruction.

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Wetlands offer numerous benefits as habitats for various organisms and serve vital ecological functions such as flood control, erosion prevention, and climate regulation. Wetlands can be permanently or temporarily wet, formed naturally or artificially, and consist of freshwater, brackish, or saline water, including shallow sea areas with depths of less than six meters (Siregar et al., 2021). Field observations show that forest fires in Indonesia occur on dry land and frequently affect wetlands. For instance, in Kalimantan, dry and wetlands are affected by these fires, differing in characteristics, soil chemical composition, and land accessibility. When fires start on the surface, peatland fires can spread to the peat layers below the ground (Rianawati & Asyári, 2016).

Indonesia faces environmental degradation due to industrial and economic activities, including pollution, global warming, and climate change (Rachmatullah et al., 2020). Across many countries, industrial demands and illegal logging lead to environmental destruction. Moreover, during the dry season, forest fires are common in many countries, including Indonesia. Forest fires occur in tropical forests and peat swamps in Kalimantan almost every year, worsening air quality and contributing to health problems (Sulaeman et al., 2020).

One of the more frequent environmental damages is peatland fires, easily ignited in tropical peat swamp forests. South Kalimantan has experienced large-scale flooding caused by peatland fires that serve as the region's largest water absorption area. This disaster has caused anxiety among the South Kalimantan community (Harahap, 2016). Given these facts, the South Kalimantan community must increase awareness of preserving the environment to avoid disasters and ensure a better quality of life. Actions such as proper waste disposal, water conservation, and energy saving are part of environmental awareness behaviour.

The main challenge in wetland management is the lack of public knowledge and the limited support for sustainable policies. Environmental-based education involving young generations is crucial in fostering awareness and ecological responsibility. Community-based management supported by research and educational programs can increase public understanding and engagement in protecting wetland ecosystems (Soendjoto et al., 2015).

Considering that Indonesia has the second-largest wetland area in the world, after Brazil, it is crucial to foster a sense of environmental care for the conservation of wetlands in this country (Croft-Cusworth, 2016). South Kalimantan, dominated by wetlands, includes rivers, swamp forests, mangroves, estuaries, rice fields, and lakes (Afifah et al., 2023). South Kalimantan is one of Indonesia's regions with the largest wetland potential. Geographically, the region has vast lowland areas, categorized as wetlands, which include freshwater, brackish water, rivers, swamps, and other environments that remain flooded throughout the year, including shallow sea areas with depths of less than six meters. These wetlands are connected to natural ecosystems, flora, fauna, and human activities (Sya'ban et al., 2017).

Environmental damage in this region is undoubtedly due to the lack of environmental awareness in certain areas. Nugroho (2022) states that awareness of the importance of a clean and healthy environment can be seen in an individual's actions when they feel free from external pressure. This is something that everyone living in harmony with the environment needs to recognize. Environmental care awareness must be instilled in every person. Environmental awareness aims to minimize the negative impacts of human activities on nature and improve environmental conditions, both directly and indirectly (Kollmuss & Agyeman, 2002; Misbah et al., 2024). One of the actions that cause damage to wetlands is land conversion and the opening of new areas, especially involving deforestation and the construction of drainage canals, which can trigger forest and peatland fires.

The Biology Education program at ULM envisions producing excellent and competitive graduates with deep knowledge of wetland environments. This vision aims to produce graduates with educational skills, an understanding of the environment, particularly wetland management and preservation, and a high level of environmental awareness to support ecosystem sustainability. The program seeks to instil strong environmental awareness among students, particularly regarding wetlands.

The first step in character development is deepening one's understanding of the character being developed. Students with knowledge and concern for wetland environments are more likely to show greater care for nature. Repeated behaviours eventually become part of one's personality, reflecting the development of environmental care attitudes (Lickona, 2012). Thus, as environmental knowledge grows, so does environmental behaviour, ultimately contributing to the reduction of environmental degradation (Hidayah et al., 2016).

Previous studies by Pane (2013) concluded that students' environmental awareness was below expectations or considered low. Research on student environmental awareness and behavior in Indonesia has been limited. Most environmental studies are explanatory, focusing on research variables rather than exploring the environmental awareness and behaviour level among university students.

A study by Widiyastuti et al. (2024) concluded that an 18% improvement in environmental literacy shows that students have relatively good environmental awareness, especially after being exposed to problem-based learning involving real issues around them. This highlights the importance of interactive learning approaches relevant to local contexts in improving environmental awareness and literacy. Nugroho (2022) also concluded that instilling environmental awareness in students from an early age significantly influences their ability to protect the environment. Teacher guidance also plays a key role in fostering environmentally conscious behaviour in students. The study found that environmental education successfully instils important values such as concern for the environment, pride, appreciation, cooperation, responsibility, and discipline.

A preliminary study by Nasruddin (2022) on environmental awareness in wetland areas explored school participation in creating disaster-resilient learning communities. This study also contributed to the awareness of wetland environments. Wetlands play an essential ecological role, such as maintaining biodiversity and preventing fires and floods. Peatlands are especially vulnerable to fires during dry seasons, but human activities and environmental changes can increase the likelihood of fires. Schools must actively participate in environmental education and disaster mitigation programs to foster a more caring community in protecting wetlands and halting further destruction. This research aims to evaluate students' environmental awareness on campus, focusing on their awareness of wetlands among Biology Education students at ULM.

METHOD

This study is a quantitative research using a descriptive method. The research was conducted using a survey method regarding environmental awareness, distributed based on the daily behaviours of respondents, with a focus on the indicators (Table 1). The data collected from this study comes from a population that provides an overview of the wetland environment as perceived by students in the Biology Education program at ULM. The sample for this study consists of Biology Education students in the odd semesters. Data on students' environmental awareness regarding wetlands was obtained through a questionnaire using pre-established aspects. The scientific attitude aspects defined in this study include recycling, energy conservation, vicarious social behaviours toward conservation, consumerism, and waste avoidance.

Table 1 Indicators of the environmental awareness questionnaire

Variable	Indicator	Description
Environmental Awareness Behavior	Recycling	Behaviour focused on utilizing waste and unused items to create new beneficial items, such as recycling and reusing goods.
	Energy Conservation	Behaviour focused on saving energy, using energy efficiently, and switching to renewable energy sources.
	Vicarious, Social Behaviors Toward Conservation	Behaviour emphasises active involvement in managing the environment at the community level and efforts to raise awareness so that people become more environmentally conscious.
	Consumerism	Behaviour focused on choosing products that have an environmentally friendly impact on consumption.
	Waste Avoidance	Behaviour that prioritizes the use of old items that can be reused and reduces the use of unnecessary items.

The questionnaire explains environmental awareness through five indicators, with frequencies divided into five categories: always, often, sometimes, rarely, and never. Each frequency category is translated into numbers using a Likert scale: always (5), often (4), sometimes (3), rarely (2), and never (1). After obtaining the questionnaire results from each respondent, the data were analyzed using empirical, hypothetical, and descriptive analysis methods.

After obtaining the results from the data description, the environmental awareness scores can be categorized. The data is analyzed by categorizing each student's score. The steps are as follows: (1) Assign scores to each item, (2) Sum all aspects and indicators, (3) Create frequency for each category using a formula, (4) Analyze criteria with 3 categories, and (5) Conclude the results of the research. The categorization calculation is presented in Table 2.

Table 2 Environmental awareness level categorization intervals

Category	Criteria
Very Low	< 28
Low	28 - 39
Moderate	40 - 61
High	62 – 74
Very High	74<

RESULTS AND DISCUSSION

After distributing the questionnaire, 84 respondents were collected, including students from the Biology Education ULM class of 2022, 2023, and 2024. The hypothetical data table below shows the percentage of each environmental awareness aspect based on the questionnaire analysis results. Hypothetical data refers to data that uses measuring instruments as a reference. A subject's high or low score depends on its position within the score range achievable by the measuring tool (Widhiarso, 2010). Based on the responses from 84 respondents, the hypothetical data is presented in Table 3.

Table 3 Environmental awareness category results

Category	Criteria	Frequency	Percentage
Very Low	< 28	0	0.00
Low	28 - 39	0	0.00
Moderate	40 - 61	62	73.81
High	62 - 74	22	26.19
Very High	74 <	0	0.00
Total		84	100.00

Based on the Table 3, the percentage results show that no respondents fall into the low or very low categories. In the moderate category, the percentage is 73.81%, while in the high category, the percentage is 26.19%. If broken down by year (2022, 2023, and 2024) from the 84 respondents, hypothetical data diagrams for each year are presented in Figure 1.

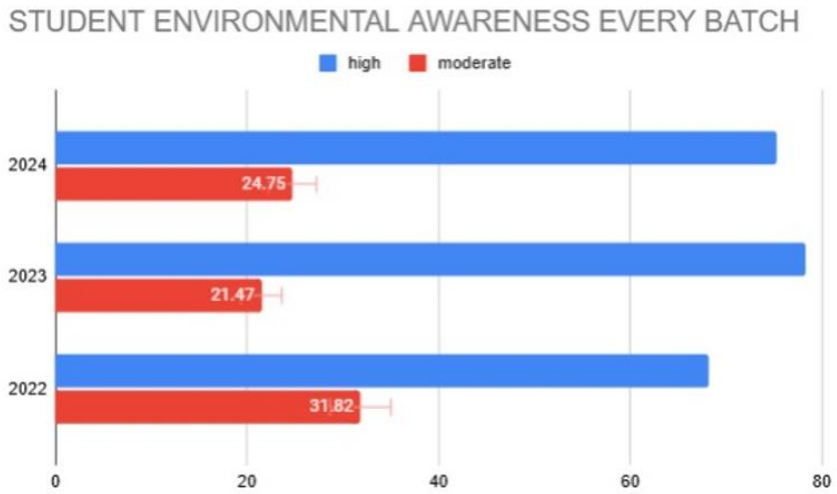

Figure 1 Students' environmental awareness every batch

Figure 1 shows the environmental awareness levels of students at ULM based on their cohort over the last three years, namely 2022, 2023, and 2024. The environmental awareness level is divided into two categories: moderate and high. In 2022, the percentage of students with high environmental awareness reached 68.18%, while 31.82% were in the moderate category. In 2023, the high awareness level reached 78.26%, while the moderate category was 21.47%. In 2024, the high environmental awareness category reached 75.25%, and the moderate category was 24.75%.

Based on the results of this diagram, there is a preliminary study by Sugiarto and Gabriella (2020) that states that the differences in students' environmental awareness levels are influenced by two main factors: knowledge and attitude. In terms of knowledge, students with a good understanding of environmental issues tend to have higher awareness. However, this awareness level varies depending on the student's ability to know and understand environmental concepts and apply them directly. Students' attitudes toward environmental issues also play an important role. Students who have a positive attitude and take responsibility for environmental impacts generally show higher levels of awareness. On the other hand, passive or indifferent attitudes can hinder the development of environmentally friendly behaviour, even if their knowledge is sufficient (Sugiarto & Gabriella, 2020). Although students understand the environment well, the application of real actions is still lacking, especially in using sustainable transportation. Factors influencing environmentally friendly behaviour include knowledge, positive attitudes, and the influence of the social environment (Purba et al., 2024).

This phenomenon is in line with the results of this research, which indicates that the environmental awareness level of the Biology Education students from the 2022 cohort is higher compared to the 2023 and 2024 cohorts. This is influenced by both knowledge and attitude. In terms of knowledge, students have a good understanding of the environment,

but their ability to apply this knowledge to real actions is still lacking. This can be seen from the responses to questions regarding separating inorganic waste from organic waste in daily life, bringing their lunchbox to reduce food waste, bringing their drinking bottle to reduce waste from bottles or cans, and the question, "If there is no trash bin, I will throw trash anywhere." Survey respondents mostly selected "sometimes." This indicates that although students know what should be done to protect the environment, other factors, such as motivation, awareness of individual responsibility, or the availability of supporting facilities, still become barriers to translating knowledge into real action.

Terms of attitude are influenced by the readiness to accept, respond to, appreciate, and take responsibility for environmental issues. Students generally have a high level of acceptance, meaning they agree that environmental awareness is important, but they are less responsive in taking action or encouraging others. This can be seen from the responses to the questions "I scold my friend for throwing trash in the wrong place" and "I stay silent when I see a friend throwing trash carelessly," where respondents mostly answered "sometimes." This shows that although students have a high acceptance attitude toward environmental awareness, they are still less responsive in supporting the environment, such as scolding a friend for littering or not staying silent when seeing violations of environmentally friendly habits. The "sometimes" response in the survey reflects a gap between positive attitudes toward environmental issues and the real actions expected.

Next, the results are shown in Figure 2 when described by gender based on two categories: male and female.

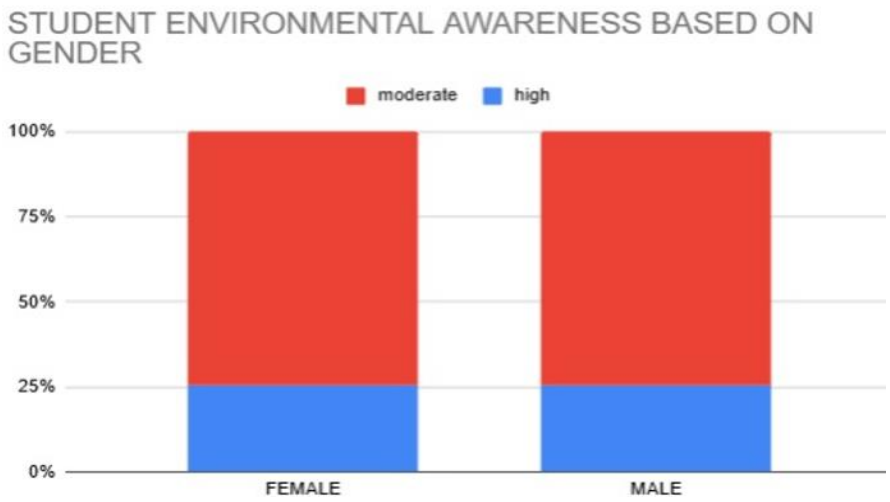

Figure 2 Environmental awareness level based on genders

Figure 2 illustrates the level of environmental awareness based on gender, namely male and female. The results show that for males, 74.39% fall into the moderate environmental awareness category, while 25.61% fall into the high awareness category. Meanwhile, for females, 74.63% have a moderate level of environmental awareness, and 25.37% have a high level of awareness. This indicates that gender is not the primary factor distinguishing environmental awareness levels. It suggests that environmental awareness is more influenced by other factors, such as education, attitude, and actions, rather than gender. In this case, males and females have equal potential in understanding and caring about environmental issues, so efforts to raise awareness can be carried out regardless of gender. This aligns with the statement that there are three awareness indicators, each representing

a stage that leads to the next and points to a specific level of awareness, ranging from the lowest to the highest: knowledge, attitude, and behaviour patterns (actions) (Wibowo, 2011).

Environmental awareness allows individuals to make wise and environmentally friendly decisions (Olgyaiová, 2005). Four factors influence environmental awareness. First is ignorance, which is related to the desire to know. Amos (2008) states that awareness means having knowledge, while ignorance indicates a lack of environmental understanding. Therefore, ignorance can affect the level of an individual's environmental awareness. Second is the factor of poverty: a person is considered poor when they cannot meet their basic needs. Poverty often causes stress due to growth imbalance. One source of social problems is poverty, which focuses on fulfilling basic needs rather than paying attention to environmental issues. Third is the factor of humanity. Humanity refers to human qualities, and humans, as rational beings, can choose between right and wrong. Individuals with a high sense of humanity tend to care more about things that can save many people rather than harm others. Therefore, they are more likely to care about the environment for the common good. Fourth, the factor of lifestyle: how someone lives their life can influence their awareness of the environment. Individuals with an environmentally friendly lifestyle will be more conscious of their actions toward nature and have an interest and perspective on environmental issues (Amos, 2008). Environmental awareness can be improved through educational activities, which align with studies showing that education and training related to conservation can increase public understanding and awareness of the importance of environmental preservation. Greening activities provide significant benefits, including maintaining ecosystem balance, reducing pollution, and enhancing responsibility for environmental conservation (Reifani & Utami, 2021).

CONCLUSION

The research shows that the environmental awareness level of Biology Education students at Lambung Mangkurat University is generally in the moderate category, with the largest percentage (73.81%) of respondents in this category, while 26.19% are in the high category. No respondents fell into the low or very low categories. Specifically, the 2022 cohort showed higher awareness levels than the 2023 and 2024 cohorts. Although students have a fairly good understanding of the environment, the implementation of environmentally friendly actions is still relatively low. Environmental awareness based on gender shows that both males and females have almost the same level of awareness, with gender not being a primary factor. Awareness is more influenced by other aspects such as education, attitude, and experience.

The study results indicate that students' awareness levels are moderate. This suggests that although students understand the importance of environmentally friendly behaviour, in practice, they still exhibit behaviour that is considered moderate. Awareness of the importance of protecting the environment remains theoretical and has not been fully applied by all respondents. The author hopes this article can serve as a reference for understanding environmental awareness, especially regarding wetlands. Further research is needed to identify factors influencing students' environmental awareness attitudes and find more effective solutions to enhance awareness and environmentally friendly behaviour among students.

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