

Environmental Attitudes Among Undergraduate Students: Implications for Environmental Literacy

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Abstract: Understanding environmental attitudes (EA) is important in higher education because universities play a significant role in shaping students' environmental awareness and dispositions. Environmental attitudes are an important component of environmental literacy, which encompasses the knowledge, skills, and dispositions needed to understand and address environmental issues. Therefore, this study aimed to examine the environmental attitudes of undergraduate students from two universities in Labuhanbatu Regency, Indonesia (n = 312), and to analyze their association with selected demographic characteristics. A structured questionnaire was used to collect demographic information, while environmental attitudes were assessed using the 24-item Environmental Attitudes Inventory (EAI-24). The EAI-24 assesses 12 dimensions of environmental attitudes representing preservation- and utilization-oriented perspectives. The results showed that students' environmental attitudes tended to favor utilization-oriented perspectives over conservation-oriented perspectives. Significant differences in environmental attitudes were also found across demographic characteristics, particularly gender and ethnicity. These findings indicate a weakness in the affective dimension of environmental literacy and highlight the need for context-sensitive environmental education that considers students' demographic and cultural backgrounds. The findings have practical implications for developing targeted environmental education interventions to strengthen pro-environmental attitudes and behavior among university students.

Keywords: Environmental attitudes; Environmental behaviour; Ecology; Environmental literacy; Undergraduate students

Introduction

Human life cannot be separated from its interaction with the environment. The rapid development of technology in various fields has had a negative impact on the environment. One of these negative impacts is environmental degradation, which leads to a reduction in the quality of the environment (Khoiri et al., 2021). The responsibility to prevent and combat unsustainable human use of natural resources is a 21st century issue that must be addressed as a matter of priority (Nawrotzki & Pampel, 2013). Taking care of the

environment is essential to prevent pollution, ensure access to clean air and water, and protect ecosystems, which are vital for human health and survival (Saremi, 2020). One way to achieve this is through higher education, where environmental and sustainability literacy courses often rely on students' environmental attitudes (Evert et al., 2021). Environmental literacy extends beyond attitude to include factual knowledge, systems thinking, and behavioural competence (McBride et al., 2013). However, attitudes remain a critical predictor of pro-environmental behaviour and a key target for educational

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interventions. Universities can instill a caring attitude towards the environment by integrating social and environmental sustainability in education and enhancing social support among students, fostering pro-social and pro-environment attitudes (Bhattacharya, 2019; Heyl et al., 2014; Kennedy et al., 2002).

Research indicates that universities can significantly enhance students' environmental attitudes through targeted educational programs and curricula. Environmental education has been shown to foster positive environmental attitudes among students. For instance, a study in Nigeria revealed that students with higher environmental knowledge exhibited a positive attitude towards environmental issues, although the correlation was weak (Norris & Juliet, 2018). Amérigo et al., (2017) research shows that universities can enhance students' environmental attitudes by promoting strategies focused on energy saving, waste management, and green consumption, fostering a holistic view of economic growth and environmental preservation. The results of the investigation show that university students are highly receptive to new attitudes and views, and that current environmental issues will bring new environmental attitudes to their future communities and workplaces (Lozano et al., 2013) and will be the future environmental guardians, planners, policy makers and educators (Shafiei & Maleksaeidi, 2020).

Indonesia faces significant environmental challenges, including deforestation, increased oil palm cultivation, and the need for sustainable energy policies to balance energy security, climate goals, and energy poverty (Ardiansyah et al., 2012; Haryanto, 2020). According to the Environmental Performance Index (EPI) 2022 report, Indonesia ranks among the lower-performing countries in environmental sustainability. Annual forest loss and vulnerability to climate change, biodiversity loss, and pollution remain significant environmental concerns, particularly in Sumatra and Java (Chotimah et al., 2022), biodiversity loss and pollution, leading to dangerous air quality and health problems, particularly in Sumatra and Java, exacerbated by annual toxic haze, now a very serious problem in Indonesia (Monk & Priatna, 2022). In this context, students, as part of the younger generation, are important stakeholders. They bear the consequences of past and present environmental neglect (de Leeuw et al., 2015). At the same time, they may acquire the technical and specialised knowledge needed to promote appropriate solutions and encourage changes in environmental behaviour (Vicente-molina et al., 2018;

Yazdanpanah & Forouzani, 2015). Therefore, assessing environmental attitudes within the framework of environmental literacy is essential for designing culturally responsive and effective sustainability education. Universities are well placed to facilitate changes in students' attitudes towards the natural environment through education, innovation, and research. Understanding how environmental attitudes vary according to students' demographic characteristics can help universities develop environmental education strategies that are more representative and inclusive. Therefore, this study aims to examine the environmental attitudes of Indonesian undergraduate students in Labuhanbatu Regency using an adapted version of the 24-item Environmental Attitudes Inventory (EAI-24). Specifically, students' environmental attitudes were analyzed in relation to selected demographic characteristics.

Method

Participants and Research Procedure

This study employed a quantitative cross-sectional survey design to examine the environmental attitudes of undergraduate students in Labuhanbatu Regency, North Sumatra, Indonesia. The participants were undergraduate students from two universities in Labuhanbatu Regency. A purposive sampling technique was used to select participants who met the predetermined criteria and were considered relevant to the objectives of the study. The selection of participants was based on the need to obtain data describing students' environmental attitudes and their characteristics in the context of higher education in Labuhanbatu Regency.

A total of 312 undergraduate students participated in the study. The participants represented different demographic characteristics, including gender, ethnicity, and religion. These characteristics were considered because the study aimed to examine whether students' environmental attitudes differed according to selected demographic characteristics.

Before data collection, the researcher obtained permission from the participating universities and coordinated the research procedures with the relevant institutional authorities. The participants were informed about the purpose and procedures of the study and were asked to provide informed consent before completing the questionnaire. Participation was voluntary, and the collected data were used solely for research purposes.

Table 1. Characteristics of the participants

Characteristic	Category	Total (n= 312)	Universitas Islam Al- Wahliyah Labuhanbatu	Universitas Labuhanbatu
Gender	Male	90	35	55
	Female	222	95	127
Ethnic	Batak	120	40	80
	Java	98	38	60
	Malay	54	23	31
	Aceh	40	11	29
Religion	Islam	280	120	140
	Christian	28	-	28
	Catholic	4	-	4

Instruments

Environmental attitudes were measured using the Environmental Attitudes Inventory (EAI-24), consisting of 24 items distributed across 12 environmental attitude subscales. Each subscale was represented by two items. The items were rated using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The EAI-24 assessed the following dimensions: enjoyment of nature, support for interventionist policies, environmental movement activism, conservation motivated by anthropocentric concern, confidence in science and technology, environmental threat, altering nature, personal conservation behaviour, human dominance of nature, human utilization of nature, ecocentric concern, and support for population growth policies.

For data analysis, the two item scores representing each EAI-24 subscale were summed to obtain a subscale score. Consequently, each subscale had a possible score range from 2 to 10. The descriptive statistics presented in Table 2 therefore represent the mean of the summed two-item subscale scores rather than the mean of individual Likert responses. Higher scores indicate stronger endorsement of the corresponding environmental attitude dimension. Items requiring reverse scoring were recoded according to the EAI-24 scoring procedure before the subscale scores were calculated.

The EAI-24 was used to assess environmental attitudes rather than environmental knowledge or environmental behavioural skills. Therefore, the instrument was interpreted as a measure of the affective and cognitive dimensions of environmental attitudes within the scope of the present study (Zwickle & Jones, 2018).

Data analysis

The collected data were analyzed using descriptive and inferential statistical procedures. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to describe

participants' demographic characteristics and environmental attitude scores.

The internal consistency of the EAI-24 dimensions was examined using Cronbach's alpha coefficients. The analysis was conducted for the relevant EAI-24 subscales to determine the reliability of the environmental attitude measures.

Pearson's bivariate correlation analysis was used to examine the relationships between environmental attitude dimensions where appropriate. Independent-samples t-tests were used to examine differences in environmental attitude scores between demographic subgroups, particularly gender and other categorical demographic characteristics included in the questionnaire. Statistical significance was determined at $p < .05$.

Only demographic variables that were actually collected through the questionnaire and reported in the participant characteristics were included in the inferential analysis. Age was therefore not included as an analytical variable because age was not collected or reported as a participant characteristic in this study (Field, 2013).

Result and Discussion

Students' Environmental Attitudes as Measured by the EAI-24

The environmental attitudes of 312 undergraduate students were assessed using the EAI-24. The instrument consisted of 24 items distributed across 12 subscales, with two items representing each subscale. Because the two item scores were summed, each subscale had a possible score range of 2–10. Therefore, the mean values presented in Table 2 represent mean subscale scores rather than individual-item means.

Data collection was conducted directly with the participating undergraduate students in Labuhanbatu Regency. The researcher distributed the EAI-24 questionnaire and provided the necessary instructions to ensure that participants understood the questionnaire

before completing it. The data collection process is presented in Figure 1.



Figure 1. Data collection process

The descriptive results showed considerable variation across the 12 environmental attitude dimensions. Relatively lower subscale scores were observed for enjoyment of nature ($M = 2.92$, $SD = 1.58$), ecocentric concern ($M = 2.95$, $SD = 1.89$), environmental threat ($M = 3.21$, $SD = 1.59$), and personal conservation behaviour ($M = 3.55$, $SD = 1.55$). Relatively higher scores were observed for conservation motivated by

anthropocentric concern ($M = 7.67$, $SD = 2.12$), human utilization of nature ($M = 6.88$, $SD = 1.81$), human dominance of nature ($M = 6.27$, $SD = 2.63$), and altering nature ($M = 6.12$, $SD = 2.32$).

The results indicate a relatively stronger orientation toward human utilization of nature than toward preservation-oriented dimensions. In particular, the relatively high score for conservation motivated by anthropocentric concern suggests that students may support environmental conservation when it is associated with human needs and benefits. Similarly, the relatively high scores for human utilization of nature and human dominance of nature indicate that human-centered perspectives remain evident among the participants.

Conversely, the relatively lower scores for enjoyment of nature and ecocentric concern suggest that affective attachment to nature and concern for the intrinsic value of the environment were less strongly endorsed. These findings provide an important indication that environmental attitudes among university students are multidimensional and cannot be adequately represented by a single overall score.

Table 2. Descriptive EAs of respondents

EAI-24 subscale	Mean subscale score	SD	Cronbach' α
Enjoyment Nature	2.92	1.58	0.67
Support for Interventionist policies	3.98	1.78	0.35
Environmental movement activism	3.60	1.89	0.80
Conservation motivated by anthropocentric concern	7.67	2.12	0.51
Confidence in science and technology	5.49	2.16	0.52
Environmental threat	3.21	1.59	0.62
Altering nature	6.12	2.32	0.60
Personal conservation behaviour	3.55	1.55	0.60
Human dominance nature	6.27	2.63	0.77
Human utilization of nature	6.88	1.81	0.58
Eco-centric concern	2.95	1.89	0.57
Support for population growth policies	5.05	2.64	0.69

Differences in Environmental Attitudes by Gender

Independent-samples t-tests indicated significant differences between male and female students on selected EAI-24 subscales. Female students obtained a higher environmental-threat score ($M = 6.51$, $SD = 2.57$) than male students ($M = 6.06$, $SD = 2.75$), with a statistically significant difference ($t = -2.85$, $p < .05$, two-tailed).

A significant difference was also observed for ecocentric concern. Female students obtained a lower score ($M = 3.74$, $SD = 1.91$) than male students ($M = 4.20$, $SD = 2.05$), with a statistically significant difference ($t = 3.37$, $p < .05$, two-tailed).

These findings indicate that gender differences were specific to particular dimensions of environmental attitudes rather than representing a uniform difference

across the entire EAI-24. The higher environmental-threat score among female students may reflect greater sensitivity to perceived environmental risks, whereas the higher ecocentric-concern score among male students in this sample suggests a different pattern of orientation toward the intrinsic value of nature. These associations should not be interpreted as causal effects of gender because the present study used a cross-sectional survey design.

Differences in Environmental Attitudes by Ethnicity

The analysis also identified differences in selected EAI-24 subscales across ethnic groups. Javanese and Batak students differed in environmental movement activism. Javanese students obtained a mean score of 3.21 ($SD = 1.73$), whereas Batak students obtained a

mean score of 7.14 (SD = 2.25), with a statistically significant difference ($t = 9.32$, $p < .05$, two-tailed).

A difference was also observed between Malay and Acehnese students in enjoyment of nature. Malay students obtained a mean score of 2.04 (SD = 1.60), whereas Acehnese students obtained a mean score of 2.68 (SD = 1.63). These findings suggest that environmental attitudes may vary across students from different ethnic backgrounds. However, ethnicity should be interpreted as a demographic characteristic associated with differences in the observed responses rather than as a causal explanation for those differences. Further qualitative research is needed to investigate how cultural experiences, environmental practices, family background, and local ecological contexts may contribute to these variations.

The results of the analysis of the EAI-24 scale showed that the level of enjoyment of nature, eco-centric concern, environmental threat is relatively low. Attitudes of students, conversely conservation motivated by anthropocentric concern, human utilization of nature and human dominance nature were high. Environmental attitudes are multidimensional constructs that include both preservation-oriented and utilization-oriented perspectives, reflecting differences in how individuals perceive the relationship between humans and the natural environment (Khasanah, 2022; Fakhriyah et al., 2024). This finding is consistent with the results of (Null et al., 2023) a study showing low levels of awareness and concern for environmental issues among university students. The study found that 43% of university students said they were only slightly concerned about environmental issues, indicating a low level of environmental concern among the population (Cantú-Martínez, 2020).

The relatively high score for conservation motivated by anthropocentric concern is particularly important. It indicates that support for conservation may be associated with perceived benefits to humans rather than solely with the intrinsic value of ecosystems. Similarly, the relatively high scores for human utilization of nature and human dominance of nature indicate that human-centered perspectives remain evident among the participants (Sitanggang et al., 2023; Maulidiana et al., 2023). The results of previous studies indicate that the level of concern for environmental issues among students from developing countries is lower than the level of environmental awareness and concern in developed countries such as Japan, Denmark and Germany (Alsaati et al., 2020 ; Jusoh et al., 2018). From an environmental literacy perspective, this suggests that the affective dimension—environmental sensitivity and values—remains underdeveloped, potentially hindering the translation of knowledge into

pro-environmental behaviour (Ernst & Theimer, 2011; Amin & Maritasari, 2023).

A study by Dinurrohmah et al., (2022) analysed global trends in scientific publications relating to pro-environmental behaviour (PEB) among school pupils using bibliometric methods, focusing on the evolution of research themes from theoretical knowledge towards practical interventions and sustainability curricula. This study maps the shift in research focus, which now places greater emphasis on the influence of core values and geographical factors in shaping students' environmental awareness.

With regard to the demographic variables, there are differences in the environmental threat subscale for female, which is higher than for male. The higher environmental threat subscale in female compared to men can be attributed to several interrelated factors, including socio-cultural dynamics, biological vulnerabilities, and differing perceptions of risk. On socio-cultural dynamics, women are frequently responsible for household tasks, which increases their exposure to environmental pollutants (Azoulay, 2024). On biological vulnerabilities, Studies indicate that women have lower adaptive capacities to climate change, increasing their sensitivity to environmental threats (Aggarwal et al., 2022; Fatmawati & Khotimah, 2025).

Female score lower than male on the eco-centric concern subscale, the higher eco-centric subscale scores in males compared to bandaged females can be attributed to various factors related to gender roles and environmental attitudes. Research indicates that masculinity is often linked to anthropocentric beliefs, while femininity is more closely associated with ecocentrism (Calvo-Salguero et al., 2014; Saputri et al., 2025). This suggests that traditional gender roles may influence how individuals relate to nature, with men potentially adopting more eco-centric views when they engage with environmental issues. Additionally, the concept of eco-masculinity posits that men can develop a caring relationship with nature, which may enhance their eco-centric perspectives (Pease, 2021). Furthermore, studies show that men exhibit more environmentally conscious behaviours than women in certain contexts, indicating a complex interplay between gender, nationality, and age in shaping environmental attitudes (Yoon & Yang, 2015).

Tribes in Indonesia show a wide range of environmental concerns (Rozi & Taufik, 2020), the next major difference is that the level of environmental activism among the Javanese tribe is lower than that of the Batak tribe. The Batak tribes exhibit higher environmental activism compared to the Javanese tribes due to their deep-rooted local wisdom and cultural practices that emphasize environmental conservation.

The higher environmental movement activism score observed among Batak students should be interpreted cautiously. The present study did not directly measure cultural practices, local wisdom, or environmental traditions; therefore, the observed difference cannot be attributed specifically to particular cultural practices. Previous studies have reported that local cultural and social contexts may be associated with environmental attitudes and conservation practices (Napitu et al., 2022; Amri et al., 2025). Further qualitative research is needed to examine whether local ecological knowledge, community practices, family experiences, or other sociocultural factors contribute to differences in environmental activism among students from different ethnic backgrounds.

The ethnic differences should also be interpreted carefully. Although the Batak group showed a higher environmental movement activism score than the Javanese group in the present sample, the result should not be attributed automatically to specific cultural practices because the study did not directly measure cultural practices or local ecological traditions. Similarly, because the instrument identified the ethnic category as "Batak," the discussion should not generalize the finding specifically to the Batak Toba community. These findings suggest that environmental attitudes may differ across ethnic groups, although the underlying sociocultural mechanisms require further investigation.

Malay ethnic students have higher scores in enjoying nature compared to Acehnese ethnic students. The higher enjoyment of nature among Malays compared to Acehnese can be attributed to cultural, semantic, and environmental factors. The concept of 'alam' in Malay culture emphasizes a spiritual connection to nature, viewing it as a creation of the Creator, which fosters a deeper appreciation for the natural world (Bakar et al., 2021). Additionally, the strong ties to rural landscapes, characterized by community bonding and cultural significance, enhance the Malays' desire to engage with nature (N. A. Ismail & Ariffin, 2015). Furthermore, the preservation of traditional practices and myths, such as those in Kampong Tua Nongsa, reflects a harmonious relationship with the environment, reinforcing their enjoyment of nature (Jasmani et al., 2019). Taken together, these findings, which show that ethnicity has a significant impact on the environmental awareness of university students, suggest that ethnicity has a significant impact on the environmental behaviour of university students.

The study also found a difference in environmental-threat scores across religious groups. However, the unequal distribution of participants among religious categories requires cautious interpretation. The finding indicates a statistical difference within the sample but

does not demonstrate that religious affiliation causes differences in environmental attitudes (Stevenson et al., 2014). Research by Djohar Maknun et al. (2025) shows that the integration of religious values into conservation education effectively enhances environmental knowledge and awareness among prospective biology teacher training students. Using both qualitative and quantitative approaches, this study found that the internalisation of religious values fosters a stronger sense of environmental responsibility than conventional methods. (Maknun et al., 2025)

The results of this study highlight that the demographic and cultural diversity that characterises many student populations appears to be differentially associated with student environmental attitudes. Given that phenomena such as poverty and lack of education, which generally reflect structural social inequalities, are associated with lower levels of pro-environmental attitudes. The environmental attitudes (EAs) of students exhibit significant variation influenced by demographic factors, educational background, and personal experiences. Research indicates that students' EAs can lean towards either pro-environmental or anthropocentric perspectives, often shaped by their gender, ethnicity, and educational experiences. For instance, a study at a South African university found that students generally favoured utilization over preservation, with gender and ethnicity playing notable roles in shaping these attitudes (Evert et al., 2021). Similarly, Chinese students' EAs were significantly affected by their grade level and parental education, while factors like gender and income showed less impact (Yue et al., 2023). In Hungary, a majority of students displayed anthropocentric views, indicating a prevalent human-centric approach to environmental issues (Miklós, 2014). Furthermore, students' attitudes evolve over their academic journey, with final-year students showing a stronger preference for holistic and pro-environmental paradigms (Rončević & Cvetković, 2016). Therefore, fostering environmental literacy requires longitudinal and interdisciplinary strategies that address not only attitudes but also critical thinking, systems knowledge, and action competence (Coyle, 2005). Furthermore, it is important that demographically sensitive research and findings such as these can be used to develop more inclusive educational interventions that are tailored and scaled to better meet the needs of students across a wider demographic range. This is particularly true in the culturally diverse country of Indonesia.

Conclusion

This study concludes that the environmental attitudes of undergraduate students in Labuhanbatu are

multidimensional and vary across the 12 subscales of the Environmental Attitudes Inventory (EAI-24). The results indicate a relatively stronger orientation toward human utilization and anthropocentric perspectives, as reflected in the higher subscale scores for conservation motivated by anthropocentric concern, human utilization of nature, human dominance of nature, and altering nature. In contrast, relatively lower scores were observed for enjoyment of nature, ecocentric concern, environmental threat, and personal conservation behaviour. These findings indicate that students' environmental attitudes cannot be adequately represented by a single overall environmental attitude score.

The analysis also identified differences in selected environmental attitude dimensions according to demographic characteristics. Gender differences were observed in environmental threat and ecocentric concern, while differences between ethnic groups were identified in selected dimensions, particularly environmental movement activism. However, these findings represent statistical differences within the study sample and should not be interpreted as evidence that gender or ethnicity causes differences in environmental attitudes.

The findings have important implications for higher education. Environmental education should not focus exclusively on increasing students' environmental knowledge but should also strengthen affective and value-based dimensions, particularly students' connection with nature, ecocentric concern, personal conservation behaviour, and willingness to participate in environmental activities. Experiential learning, environmental problem-solving activities, community-based projects, and direct engagement with local environmental issues may provide opportunities for students to translate environmental knowledge and values into meaningful environmental action.

For future research, longitudinal studies are recommended to examine changes in environmental attitudes over time and to determine whether environmental education programs can produce sustained changes in students' environmental attitudes. Experimental or quasi-experimental studies are also recommended to evaluate the effectiveness of specific interventions, such as experiential environmental education, project-based learning, community-based environmental activities, and campus sustainability programs. In addition, qualitative and mixed-methods research could explore the social, cultural, educational, and personal factors underlying the differences identified across gender, ethnicity, and other demographic characteristics. Future studies should also consider larger and more balanced samples across demographic groups and investigate the relationship

between environmental attitudes and actual environmental behaviour. Such research would provide a more comprehensive understanding of how environmental attitudes can be transformed into consistent and sustainable environmental actions among university students.

Because this study employed a cross-sectional quantitative survey design, the findings do not establish causal relationships between demographic characteristics, environmental attitudes, or environmental contextual factors. Future research should therefore move beyond descriptive and correlational evidence toward longitudinal, experimental, qualitative, and mixed-methods approaches to provide stronger evidence regarding the development of environmental attitudes and their translation into environmentally responsible behaviour.

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Author Contributions

"Conceptualization, F.E.S, E.S and A.M.H.; methodology, F.E.S, E.S, A.M., and D.A.H.; formal analysis, F.E.S.; investigation, E.S, A.M.H., D.A.H.; resources, F.E.S, E.S; data curation, F.E.S.; writing—original draft preparation, F.E.S.; writing—review and editing, F.E.S, and E.S.; visualization, F.E.S and A.M.H.; supervision, F.E.S, and E.S.; project administration, F.E.S.; funding acquisition, F.E.S".

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Conflicts of Interest

The authors declare no conflict of interest.

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