



ENVIRONMENTAL AWARENESS AND SUSTAINABLE PRACTICES AMONG STUDENTS IN SCIENCE, TECHNOLOGY, AND ENGINEERING PROGRAM

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ABSTRACT

This study examined the environmental awareness and sustainable practices of 217 Science, Technology, and Engineering (STE) students at Bongabon National High School and Marciano del Rosario Memorial National High School in Nueva Ecija, Philippines. The findings revealed that students generally demonstrated moderate awareness of environmental issues ($M=3.13$) but high awareness of the environmental impacts of human activities ($M=3.64$). Correlational analysis revealed weak positive relationships between awareness of environmental issues and environmental impact ($r=0.262$), awareness of environmental issues and resource conservation practices ($r=0.209$), and awareness of environmental impact and waste management practices ($r=0.216$). Very weak positive and weak negative correlations were also observed among the other variables. The findings indicate that greater environmental awareness does not necessarily correspond to consistent engagement in sustainable practices. These results emphasize the importance of strengthening environmental education through practical, school-based initiatives that encourage students to translate environmental knowledge into responsible and sustained environmental behaviors.

KEYWORDS: Environmental Awareness, Sustainable Practices, Waste Management, Resource Conservation, STE Students, Descriptive-Correlational Research

I. INTRODUCTION

Anthropogenic activities have intensified environmental degradation, contributing to climate change, soil erosion, and biodiversity loss. These challenges underscore the importance of environmental education in developing students' understanding of environmental issues and promoting sustainable behaviors (Kurniawan et al., 2024; Vladova, 2023). In the Philippines, Republic Act No. 9512, or the National Environmental Awareness and Education Act of 2008, institutionalizes environmental education to strengthen environmental awareness and responsibility. Accordingly, schools play a vital role in equipping learners with the knowledge, attitudes, and values necessary to respond to environmental challenges and participate in environmental protection.

Environmental awareness encompasses students' understanding of environmental issues, the consequences of human activities, and the importance of environmental conservation. Previous studies have indicated an association between environmental knowledge and pro-environmental behavior (Liang et al., 2018). However, awareness does not necessarily translate into consistent sustainable practices. Botoy et al. (2026) reported that students demonstrated moderate environmental awareness and fair to moderate environmental practices, suggesting a potential gap between environmental understanding and actual behavior. This highlights the importance of educational initiatives that connect environmental knowledge with practical application, including sustainability-integrated curricula, project-based learning, green school programs, and community involvement (Modjo, 2025).

This relationship demands particular attention among Junior High School students enrolled in the Science, Technology, and Engineering (STE) program, whose science-oriented education may provide a foundation for understanding environmental processes and ecological concerns. Nevertheless, scientific knowledge alone may not ensure consistent engagement in sustainable behaviors. Despite the recognized importance of environmental education, context-specific evidence is needed to establish the relationship between environmental awareness and sustainable practices among STE students in the study setting. Therefore, this study examined the environmental awareness and sustainable practices of Junior High School students and determined the relationship between these variables. The findings may inform educational strategies that strengthen environmental responsibility and encourage the practical application of environmental knowledge.

a. Objectives

1. To determine the environmental awareness of the students in terms of:
 - a. Environmental Issues; and
 - b. Environmental Impact
2. To identify the level of Junior High School Students' sustainable practices in terms of
 - a. Waste Management Practices; and
 - b. Resource Conservation Practices
3. To determine the relationship between students' environmental awareness and sustainable practices.



II. METHODOLOGY

a. Research Design

This study employs a descriptive-correlational research design to determine the level of environmental awareness and sustainable practices among Junior High School STE students and to examine the extent to which environmental awareness is associated with students' sustainable practices. The descriptive component assesses students' environmental awareness in terms of environmental issues and environmental impact, as well as their level of sustainable practices in terms of waste management practices and resource conservation practices.

b. Research Locale

The study was conducted at Marciano del Rosario Memorial National High School (MRMNHS) in Pamaldan, Cabanatuan City, and Bongabon National High School (BNHS) in Sinipit, Bongabon, Nueva Ecija, Philippines. Both are public secondary schools serving diverse learners under their respective Schools Divisions, with MRMNHS classified as a large school in terms of student population.

Both schools implement the Science, Technology, and Engineering (STE) Program, established at BNHS in 2003 and at MRMNHS in 2011. The program provides enriched learning experiences in science, technology, engineering, and mathematics through scientific inquiry and problem-solving activities. These schools were selected as research locales because their STE students are exposed to scientific concepts relevant to environmental issues and sustainability, making them suitable settings for examining the relationship between environmental awareness and sustainable practices.

c. Respondents

The respondents of the study consist of 217 Science, Technology, and Engineering (STE) students. 126 students from this sample are from Bongabon National High School, and 91 students are from Marciano del Rosario Memorial National High School. These students were selected as respondents because the STE program emphasizes scientific inquiry, critical thinking, and the application of scientific knowledge to real-

world issues, including environmental concerns. Their academic exposure to science-related concepts may have provided a relevant context for examining their awareness of environmental issues and impacts, as well as their engagement in sustainable practices, particularly in waste management and resource conservation.

d. Instruments

The study used a researcher-made questionnaire to assess students' environmental awareness in terms of environmental issues and impacts, and sustainable practices in terms of waste management and resource conservation. The instrument was pilot-tested for clarity and reliability, yielding a Cronbach's alpha of 0.87, indicating good internal consistency.

e. Data Gathering Procedure

The data collection procedure involved the administration of research questionnaires to enrolled STE students from Grades 7 to 10 at MRMNHS and BNHS during the School Year 2026–2027. Prior to the conduct of the survey, necessary permissions from the school authorities were secured. In addition, the researchers explained the purpose, scope, and procedures of the study to the participants. Participation was voluntary, and respondents were informed that they may decline or withdraw from the study at any time without penalty. Respondents were given 10-15 minutes to complete the survey questionnaire.

f. Statistical Analysis

The data gathered were analyzed using descriptive and inferential statistics. The mean and standard deviation were used to determine the levels of students' environmental awareness in terms of environmental issues and environmental impact, as well as their sustainable practices in terms of waste management and resource conservation. Furthermore, the Pearson product-moment correlation coefficient (Pearson's r) was used to determine the strength, direction, and statistical significance of the relationship between environmental awareness and sustainable practices at the 0.01 level of significance.

III. RESULTS AND DISCUSSION

1. Environmental Awareness

Table 1.a: Environmental Issues

Environmental Issues	Mean	VD	Rank
I am aware that...			
1. Indigenous communities, such as the Dumagat-Remontado in the Sierra Madre borderlands, have documented the critical depletion of primary flowering trees and the subsequent displacement of native wild deer and honeybee populations.	2.97	MA	7
2. Forest disturbance and wildlife threats are documented in Pantabangan, Carranglan Watershed, and Caraballo Mountain Range in Nueva Ecija.	3.27	VA	3
3. Landslides along road cuts and steep slopes occurred during the 1990 Luzon earthquake.	3.88	VA	1
4. Nueva Ecija lost 6.0 kilohectares of tree cover between 2001-2005.	2.76	MA	9
5. The construction of the Central Luzon Link Expressway (CLLEX) involved converting roughly 104 hectares of farmland in Aliaga.	2.45	SA	10



6. Rapid commercial expansion in cities like Cabanatuan and San Jose has intensified reliance on deep-well water extraction.	2.87	MA	8
7. Upland erosion results in continuous sediment accumulation in downstream rivers and the Pantabangan Reservoir	3.12	MA	6
8. Demand for infrastructure materials has led to uncontrolled river quarrying across the province.	3.56	VA	2
9. Unregulated mining activities in the foothill borders connecting Nueva Ecija to the Caraballo and Cordillera ranges have caused extensive heavy metal contamination in peripheral streams.	3.17	MA	5
10. Household charcoal combustion is one of the leading contributors to low-altitude air emissions in suburban and rural Nueva Ecija.	3.23	MA	4
OVERALL	3.13	MA	

VD (Verbal Description): 1.00-1.74: TU (Totally Unaware); 1.75-2.49: SA (Slightly Aware); 2.50-3.24: MA (Moderately Aware); 3.25-4.00: VA (Very Aware)

The results indicate that students have moderate awareness of environmental issues in Nueva Ecija (M=3.13), with the highest awareness of landslides following the 1990 earthquake (M=3.88), followed by river quarrying (M=3.56) and forest disturbances (M=3.27). However, students are slightly aware of the conversion of farmland in Aliaga for the Central Luzon Link Expressway (CLLEX) (M=2.45), suggesting greater familiarity with prominent environmental

issues than with the consequences of infrastructure development. These findings are consistent with Okit and Pazaulan (2021), who reported moderate student awareness of environmental issues and problems, which may be associated with limited access to comprehensive environmental information, understanding of environmental problems, and opportunities for environmental education.

Table 1.b: Environmental Impact

Environmental Impact	Mean	VD	Rank
I am aware that...			
1. Stockpiling manure and poor farm-residue management contaminate soil and nearby water resources.	3.78	VA	4
2. Discharging liquid animal waste through open channels into rice fields, rivers, creeks, and irrigation canals results in poor groundwater quality.	3.97	VA	1
3. Illegal timber poaching and slash-and-burn farming (kaingin) have systematically dismantled the Coronel watershed's absorption capacity, intensifying flash-flood dynamics down the Gabaldon Valley.	3.67	VA	6
4. High density of tricycles in the central commercial area of Cabanatuan City contributes to local particulate emissions.	3.96	VA	2
5. Rice straw burning releases air pollutants and reduces soil nutrients, including nitrogen, phosphorus, and potassium.	3.44	VA	8
6. Destructive siltation severely reduces the water storage capacity of the Pantabangan Dam.	3.10	MA	10
7. The recorded grass fires in Cabanatuan City in 2019 pose major threats to local safety and the environment	3.21	MA	9
8. Unregulated septage and sewage disposal spreads dangerous waterborne pathogens into local water systems.	3.77	VA	5
9. Water contamination from dumping manure and urine in creeks and canals causes severe eutrophication in local creeks, leading to oxygen depletion in the water.	3.65	VA	7
10. Road construction and associated changes in land use reduces the land available for food production	3.87	VA	3
OVERALL	3.64	VA	

VD (Verbal Description): 1.00-1.74: TU (Totally Unaware); 1.75-2.49: SA (Slightly Aware); 2.50-3.24: MA (Moderately Aware); 3.25-4.00: VA (Very Aware)

The results suggest that students are very aware of the impact of different environmental issues brought by anthropogenic activities (M=3.64). More particularly, students show strong awareness on the impact of discharging liquid animal waste in rice fields, rivers, and irrigation on

groundwater quality (M=3.97). They also understand how the high density of tricycles in Cabanatuan City leads to local particulate matter emissions, which pose a risk to human health (M=3.96). Consequently, students have moderate awareness of the concept of siltation and its impact on the water storage capacity of Pantabangan Dam (M=3.10).



In a systematic review by Fadly and Setyawan (2026), they reveal that education is one of the major key variables in students' awareness of the environment. They said that this awareness is associated with educational context,

sustainability, environmental knowledge, attitudes, and pro-environmental behavior. Thus, the strong awareness of the students may be attributed to students' learning in school.

2. Sustainable Practices

Table 2.a: Waste Management Practices

Sustainable Practices	Mean	VD	Rank
1. Separate trash into biodegradable, non-biodegradable, and recyclable bins when disposing of items inside the school campus.	3.76	AL	1
2. Bring reusable water bottle, lunch box, or utensils to school instead of buying single-use plastics or plastic bottled beverages.	3.23	OF	5
3. Use a tote bag, backpack, or eco-bag when buying snacks or school supplies at the campus canteen or nearby stores.	2.34	SO	9
4. Keep trash inside the bag or pocket if there are no available trash bins nearby, rather than dropping it on the floor or ground.	3.27	AL	4
5. Empty and rinse plastic bottles or beverage cans before placing them into designated recycling bins.	1.89	SO	10
6. Actively avoid dumping household garbage or heavy debris into public gutters, drainage paths, open rivers, or vacant lots.	3.48	AL	3
7. Use household composting methods (like backyard pits or pots) to manage organic fruit and vegetable scraps instead of sending them to landfills.	2.54	OF	7
8. Refrain from burning dry leaves, plastics, or yard waste in our backyard or vacant community lots.	3.68	AL	2
9. Decline disposable plastic spoons, forks, and straws at the school canteen or nearby sari-sari stores.	3.12	OF	6
10. Isolate hazardous school and household items, such as dead batteries, empty ink cartridges, and broken electronics, so toxic heavy metals do not leak into local groundwater tables.	2.44	SO	8
OVERALL	2.98	OF	

VD (Verbal Description): 1.00-1.74: NE (Never); 1.75-2.49: SO (Sometimes); 2.50-3.24: OF (Often); 3.25-4.00: AL (Always)

The findings indicate that students generally demonstrate favorable waste management practices ($M = 2.98$), particularly in waste segregation ($M = 3.76$) and avoiding open waste burning ($M = 3.68$). However, rinsing plastic bottles and beverage cans before recycling received a lower mean ($M = 1.89$), indicating an area for improvement. These findings align with Penazo-Aparece and Paceño (2025), who reported positive

waste segregation practices among students. Moreover, Estrellan and Iino (2010) highlighted the environmental risks of open waste burning, while Donnelly et al. (2023) emphasized the importance of minimizing recyclable-material contamination. Overall, the results suggest that strengthening students' recycling habits is necessary to promote more consistent and responsible waste management.

Table 2.b: Resource Conservation Practices

Sustainable Practices	Mean	VD	Rank
1. Turn off the school or household faucet completely while soaping my hands or brushing my teeth to avoid wasting clean freshwater resources.	3.76	AL	4
2. Switch off classroom lights, electric fans, or gadgets when leaving a room.	3.43	AL	7
3. Use natural sunlight instead of turning on room lights when studying or relaxing during the day.	3.88	AL	1
4. Reuse leftover water (like water from washing vegetables or unfinished water bottles) to water houseplants.	3.01	OF	10
5. Avoid flushing trash, wipes, or tissues down the toilet	3.46	AL	6
6. Use cloth handkerchiefs or washable rags instead of paper towels and tissues	3.82	AL	3
7. Participated in or supported tree-planting activities organized by my school or local community.	3.55	AL	5



8. Supported organic farming by choosing foods grown without heavy chemical pesticides that harm the soil.	3.17	OF	9
9. Researched the environmental background of brands before buying their products to ensure they source materials responsibly.	3.19	OF	8
10. Walk or bike to nearby community stores.	3.86	AL	2
OVERALL	3.51	AL	

VD (Verbal Description): 1.00-1.74: NE (Never); 1.75-2.49: SO (Sometimes); 2.50-3.24: OF (Often); 3.25-4.00: AL(Always)

The results show that students always practice resource conservation ($M=3.51$). Specifically, students always practice the use of natural sunlight instead of turning on room lights when studying or relaxing during the day ($M=3.88$). In addition, students also always practice walking or biking to nearby community stores ($M=3.86$). Consequently, they often practice reusing leftover water (like water from washing vegetables or unfinished water bottles) to water houseplants ($M=3.01$).

This indicates that students demonstrate positive resource conservation practices, particularly in reducing electricity consumption and adopting environmentally friendly transportation. These findings can be supported by existing literature on energy conservation, sustainable transportation, and household water conservation.

Li (2010) emphasized that utilizing natural daylight is an effective strategy for reducing dependence on artificial lighting and improving energy efficiency in buildings. The review established that daylighting contributes to energy conservation by maximizing the availability of sunlight and reducing the need for electric lighting. Additionally, Brand et al. (2021) highlighted the environmental benefits of active transportation, particularly walking and cycling, in reducing carbon emissions associated with motorized transportation. Lastly, regarding water conservation, Oteng-Peprah et al. (2018) explained that reusing household greywater for non-potable purposes is a potential strategy for reducing freshwater consumption. Furthermore, Pinto and Maheshwari (2015) recognized that household water reuse can contribute to sustainable water management, particularly when reused water is suitable for landscape irrigation.

Table 3: Correlation Coefficient Among Environmental Awareness and Sustainable Practices

Variable	1	2	3	4
1. Awareness of Environmental Issues	-			
2. Awareness of Environmental Impact	0.262**	-		
3. Waste Management Practices	0.083	0.216**	-	
4. Resource Conservation Practices	0.209**	-0.329**	-0.271**	-

Correlation is significant at the 0.01 level (2-tailed)

The results show the correlation coefficient between environmental awareness and sustainable practices. A weak positive correlation ($r = 0.262$; $p < 0.01$) is observed between awareness of environmental issues and environmental impact. This means that students' moderate awareness of environmental issues is associated with a slight increase of understanding of environmental consequences or impact. The correlation coefficient of $r=0.083$ ($p > 0.01$) indicates a very weak positive relationship between awareness of environmental issue and waste management practices. A moderate level of environmental awareness of students is associated with a negligible increase in waste management. On the other hand, a weak positive relationship ($r=0.209$; $p < 0.01$) is observed between environmental awareness and resource conservation practices. Additionally, there is a weak positive relationship between awareness of environmental impact and waste management practices of the students ($r = 0.216$; $p < 0.01$). Among these variables, a notable, negative weak correlation is observed between awareness of environmental impact and resource conservation practices ($r = -0.329$; $p < 0.01$), which means that a higher awareness of the impact of environmental consequences is associated with lower resource conservation practices. Another weak negative relationship occurs between waste management practices and resource conservation practices ($r = -0.271$; $p < 0.01$). This suggests that higher waste management practices are associated with lower resource conservation practices. The findings reveal that

environmental awareness and sustainable practices among students are generally characterized by weak correlations, indicating that greater awareness does not necessarily translate into stronger sustainable practices, particularly in resource conservation, similar to the results of Ullah and Samad (2026), wherein they found a positive weak correlation between knowledge and practice.

IV. CONCLUSION

Based on the findings of the study, the researchers arrived at the following conclusions:

- 1.a The results on the responses on Environmental awareness indicate that students generally possess moderate awareness ($M=3.13$) regarding environmental issues within the province of Nueva Ecija. Specifically, they are very aware of the landslides along road cuts and steep slopes that occurred during the 1990 Earthquake ($M=3.88$). They also possess strong awareness of the issue of river quarrying brought by demand for infrastructure materials such as sand and gravel ($M=3.56$), and the forest disturbance in Pantabangan, Carranglan Watershed, and Caraballo Mountain Range in the province ($M=3.27$). Students are slightly aware that the construction of the Central Luzon Link Expressway (CLLEX) involved converting roughly 104 hectares of farmland in Aliaga ($M=2.45$).



- 1.b The results of the responses on the Environmental impact suggest that students are very aware of the impact of different environmental issues brought by anthropogenic activities ($M=3.64$). More particularly, students show strong awareness of the impact of discharging liquid animal waste in rice fields, rivers, and irrigation on groundwater quality ($M=3.97$). They also understand how the high density of tricycles in Cabanatuan City leads to local particulate matter emissions, which pose a risk to human health ($M=3.96$). Consequently, students have moderate awareness on the concept of siltation and its impact on water storage capacity of Pantabangan Dam ($M=3.10$).
- 2.a For sustainable practices in terms of waste management, the findings of the present study reveal that students often practice sustainable waste management, as reflected by the overall mean of 2.98. Specifically, students always practice separating waste into biodegradable, non-biodegradable, and recyclable bins within the school campus ($M = 3.76$). They also always refrain from burning dry leaves, plastics, and yard waste in their backyards or vacant community lots ($M = 3.68$). However, students only sometimes practice emptying and rinsing plastic bottles or beverage cans before placing them in designated recycling bins ($M = 1.89$).
- 2.b In terms of sustainable practices on resource conservation, the results show that students always practice the use of natural sunlight instead of turning on room lights when studying or relaxing during the day ($M=3.88$). In addition, students also always practice walking or biking to nearby community stores ($M=3.86$). Consequently, they often practice reusing leftover water (like water from washing vegetables or unfinished water bottles) to water house plants ($M=3.01$).
3. The findings revealed weak positive correlations between awareness of environmental issues and environmental impact ($r=0.262$), environmental awareness and resource conservation practices ($r=0.209$), and awareness of environmental impact and waste management practices ($r= 0.216$). Meanwhile, a very weak positive correlation was observed between environmental awareness and waste management practices ($r=0.083$). Conversely, weak negative correlations were found between awareness of environmental impact and resource conservation practices ($r=-0.329$), and between waste management and resource conservation practices ($r=-0.271$). Overall, the findings suggest that environmental awareness does not necessarily translate into consistent sustainable practices among students, as evidenced by the weak positive and negative relationships among the variables.

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