



RESEARCH PAPER

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Green minds, brighter future exploring environmental awareness among Cotabato foundation college of science and technology (CFCST) students

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ABSTRACT

This study investigated the level of environmental awareness of second year college students of Cotabato Foundation College of Science and Technology (CFCST), Doroluman, Arakan, Cotabato, Philippines across the seven environmental concepts: Balance of Nature, Pollution, Stewardship, Finiteness of Resources, Change, Interdependence, and Diversity and Stability. Using a descriptive research design, structured survey questionnaires were administered to 106 randomly selected students from various degree programs. The results revealed that the students are very much aware of all seven environmental concepts, indicating a strong understanding of ecological relationships and environmental responsibility. When grouped according to gender, significant differences were found in the concepts of Balance of Nature, Pollution, and Stewardship, where female students exhibited higher awareness than males. However, no significant difference was observed when students were grouped according to their major field of concentration, indicating a consistent level of environmental awareness across disciplines. The study concludes that the high level of awareness may be attributed to the effective integration of environmental education in the curriculum. It is recommended that the college continue to strengthen its environmental education programs, enhance gender engagement strategies, and extend future studies to include other year levels and academic programs to provide a more comprehensive assessment of environmental awareness.

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INTRODUCTION

Environmental awareness-the capacity to recognize, interpret, and evaluate the biophysical and socio-ecological elements of one's surroundings-is a foundational component of environmental literacy and an essential prerequisite for responsible environmental behavior (Hollweg *et al.*, 2011; Sengupta *et al.*, 2010). Environmental literacy comprises interrelated domains of knowledge, attitudes, skills, and values that enable individuals to identify environmental problems, assess their causes and consequences, and engage in informed decision-making to promote sustainability. In the contemporary era, increasing population density and rapid technological advancement have intensified anthropogenic pressures on ecosystems, manifesting in resource depletion, pollution, habitat loss, and deteriorating public health-trends that emphasize the urgent need for enhanced public understanding of environmental issues (Ejem and Bello, 2013; Yap *et al.*, 2024).

Although technological and industrial development have yielded economic benefits and global interconnectedness, these advances frequently entail ecological trade-offs.

Industrialization and technology-driven productivity can accelerate environmental degradation when not coupled with scientific understanding and effective stewardship (Mandler *et al.*, 2012). Consequently, fostering environmental awareness is not solely a matter of imparting facts; it requires educational strategies that cultivate analytical reasoning, socio-scientific judgement, and a commitment to sustainable practices. Recent scholarship highlights that instruction which explicitly links scientific concepts to socio-scientific issues enhances students' capacity to apply disciplinary knowledge to real-world environmental problems (Georgiou and Kyza, 2023).

Within the sciences, chemistry occupies a central role in explaining the mechanisms underlying many environmental phenomena-ranging from pollutant transformation and nutrient cycling to material

degradation and chemical hazards. Chemistry education therefore has unique potential to contribute to environmental literacy by equipping learners with conceptual frameworks and methodological tools to diagnose environmental problems, evaluate risks, and propose evidence-based interventions (Mandler *et al.*, 2012; Asworo, 2024). Pedagogical approaches that foreground green chemistry principles and socio-scientific inquiry have been shown to strengthen students' scientific literacy and orientation toward responsible citizenship, thereby bridging abstract chemical knowledge and practical environmental stewardship (Georgiou and Kyza, 2023).

Empirical evidence from both international and Philippine contexts indicates variability in environmental literacy across educational levels and curricular emphases. Studies in the Philippines report moderate levels of environmental literacy among senior high school students, suggesting opportunities for deeper, higher-education interventions to consolidate environmental understanding and pro-environmental behaviour (Mahinay *et al.*, 2023).

Moreover, research synthesizing trends in chemistry-literacy scholarship reveals a growing emphasis on linking chemical knowledge with broader literacy goals-an evolution that supports the rationale for investigating the relationship between science curricula and environmental awareness at the tertiary level (Asworo, 2024).

Demographic and academic variables, such as gender and field of study, have also been associated with differences in environmental attitudes and awareness. Prior meta-analyses and primary studies indicate that gender may moderate environmental concern and engagement, with females often reporting higher environmental sensitivity (Zelezny *et al.*, 2000). Likewise, students' majors and the epistemic orientation of their coursework (e.g., science- vs. education-oriented curricula) may produce differing levels of exposure to environmental content and scientific modes of inquiry, thereby influencing environmental awareness (Ejem and Bello, 2013; Al-Barakat *et al.*, 2025).

Guided by these theoretical and empirical considerations, the present study aims to examine the level of environmental awareness among second-year college students of the Cotabato Foundation College of Science and Technology. It particularly seeks to describe their awareness in terms of key environmental concepts-balance of nature, pollution, stewardship, finiteness of resources, change, interdependence, and diversity and stability- and to explore how this awareness may differ according to gender and field of specialization.

Through this investigation, the study endeavors to provide empirical insights into how exposure to science-oriented disciplines, particularly chemistry, influences students' environmental understanding and contributes to the cultivation of environmentally literate and responsible citizens.

MATERIALS AND METHODS

Research design

This study utilized a descriptive research design employing the survey method to determine the level of environmental awareness among second-year college students enrolled in selected degree programs at the Cotabato Foundation College of Science and Technology (CFCST).

Respondents and sampling procedure

The respondents were drawn from the population of second-year students enrolled in selected degree programs of CFCST during the academic year. A 20% sample of the total second-year population was determined using simple random sampling through the fishbowl technique, ensuring that every student had an equal probability of inclusion in the study.

A total of 106 students participated, consisting of 38 males and 68 females, distributed among the following degree programs: Bachelor of Science in Agriculture, Bachelor of Science in Forestry, Bachelor of Science in Food Technology, Bachelor in Elementary Education, and Bachelor in Secondary Education majoring in Technology and Livelihood Education (TLE), Mathematics, English, and Biological Science.

Research instrument

The study employed an Environmental Awareness Questionnaire adapted from the instruments developed by Ejem and Bello (2013) with some modifications. The instrument was designed to assess awareness across key environmental concepts, including: Balance of Nature, Pollution, Stewardship, Finiteness of Resources, Change, Interdependence, and Diversity and Stability.

Data gathering procedure

Prior to data collection, permission to conduct the study was sought from the appropriate institutional authorities. Once approval was granted, the validated questionnaire was distributed to the selected respondents during regular class hours to ensure convenience and high response rates. The purpose of the study was clearly explained to the participants, and they were assured that their participation was voluntary, that their responses would remain confidential, and that data would be used solely for academic purposes. The accomplished questionnaires were retrieved, checked for completeness, and encoded for analysis.

Data analysis

Descriptive and inferential statistics were employed in the analysis of the data. Mean scores were computed to determine the respondents' level of environmental awareness in each conceptual dimension. To test for significant differences in awareness levels among students from different academic programs, a one-way Analysis of Variance (ANOVA) was performed. Statistical significance was set at $p < 0.05$, and all computations were carried out using standard statistical software.

Ethical considerations

The study adhered to ethical standards in educational research. Participants were informed about the objectives and scope of the study and were provided with a consent form prior to participation. They were assured of their anonymity, confidentiality of information, and voluntary participation. No identifying information was recorded, and data were stored securely for research purposes only. The study complied with the ethical guidelines set forth by the

CFCST Research Ethics Committee for research involving human participants.

Limitations of the study

The study was limited to second-year college students enrolled in selected degree programs at CFCST during the academic year. Thus, the findings may not be generalized to students from other year levels or academic institutions. Additionally, as the study utilized self-reported data through survey questionnaires, responses may have been influenced by social desirability bias or participants' subjective interpretation of the items. Nevertheless, the random sampling method and validated instrument helped minimize these potential limitations.

RESULTS AND DISCUSSION

Level of environmental awareness of the second year students of CFCST for the seven environmental concepts

Students' awareness on 'Balance of nature'

Table 1 presents the level of environmental awareness of second-year students of Cotabato Foundation College of Science and Technology (CFCST) on the concept of the Balance of Nature. The results reveal that the respondents are "very much aware" of all the presented environmental concepts, as indicated by the mean scores ranging from 4.16 to 4.69.

Among the indicators, the highest mean score of 4.69 corresponds to the statement "Trees help hold the soil so that it is not washed away every time it rains." This indicates that students possess a strong understanding of the ecological role of trees in preventing soil erosion and maintaining environmental stability. This finding aligns with the observations of Singh and Gupta (2021), who emphasized that knowledge of ecosystem functions, such as soil conservation, reflects a high level of ecological literacy among youth.

Indicators related to recognizing the richness of the Philippines in natural resources and the role of the Department of Environment and Natural Resources (DENR) in environmental management

both obtained a mean of 4.63, suggesting that students are well-informed about the country's natural endowments and the importance of government involvement in environmental protection. This reflects effective environmental education campaigns and national awareness programs that highlight sustainable resource use and policy-driven conservation (DENR, 2022).

Similarly, awareness of the Clean and Green Program and the denudation of forests resulting in soil erosion and flash floods obtained mean scores of 4.43 and 4.53, respectively. These results suggest that the respondents are aware of the consequences of deforestation and recognize the importance of community-based and governmental initiatives in maintaining ecological balance. This finding supports UNESCO's (2020) assertion that environmental education fosters attitudes and behaviors that contribute to the sustainability of ecosystems.

The lowest mean score of 4.16, corresponding to the statement "Our main concern is not just to preserve its quality and beauty," still falls within the "very much aware" category. This indicates that while students are knowledgeable, there remains a need to further deepen their understanding that environmental stewardship involves not only preservation but also sustainable utilization and active participation in ecological restoration. This notion is consistent with Hollweg *et al.* (2011), who defined environmental literacy as encompassing knowledge, attitudes, and actions that support informed and responsible environmental decision-making.

Overall, the findings imply that CFCST students possess a high level of environmental awareness regarding the balance of nature, demonstrating their understanding of both the aesthetic and functional values of the natural environment. This level of awareness reflects the effectiveness of environmental education programs integrated into their academic experiences, fostering attitudes that support environmental conservation and sustainability (Sengupta *et al.*, 2010).

Table 1. Level of environmental awareness of second year students of CFCST on the concept 'Balance of nature'

Environmental concept	Mean	Qualitative description
1. An appreciation of the beauty of nature enhances one's commitment to protect it	4.40	Very much aware
2. Our main concern is not just to preserve its quality and beauty.	4.16	Very much aware
3. Our task is to help preserve balance, harmony and completeness of nature.	4.37	Very much aware
4. Our support to the government's Clean and Green Program will help preserve the beauty of nature.	4.43	Very much aware
5. The Philippines is rich in natural resources.	4.63	Very much aware
6. The DENR is the primary government agency responsible for environmental management.	4.63	Very much aware
7. Tree help hold the soil so that it is not washed away every time it rains.	4.69	Very much aware
8. The denudation of forests results to soil erosion and flash floods.	4.53	Very much aware

Table 2. Level of environmental awareness of second year students of CFCST on the concept 'Pollution'

Environmental concept	Mean	Qualitative description
1. We should be against the pollution of the environment, land, sea and air.	4.57	Very much aware
2. Highly-developed or industrialized nations bear much of the responsibility for the pollution of the sea.	4.26	Very much aware
3. Chemical fertilizers and insecticides do immense damage to the natural vitamins and minerals in the soil.	4.27	Very much aware
4. Pollution not only diminishes the quality of life, it dramatically shortens life itself.	4.47	Very much aware
5. Some pollutants can be efficiently transformed into useful materials.	3.61	Much aware
6. Pollution can be minimized if people give attention to it.	4.46	Very much aware
7. The burning of garbage and waste materials can contribute to the greenhouse effect.	4.58	Very much aware
8. Using aerosol sprays contribute to ozone depletion.	3.96	Much aware
9. Smoking can cause disease.	4.85	Very much aware
10. Many diseases are caused by man's destruction of his environment.	4.52	Very much aware

Students' awareness on 'Pollution'

The findings in Table 2 reveal that the second-year college students of CFCST possess a very high level of awareness on the concept of pollution, with particular emphasis on its adverse effects on human health and the environment. The highest mean score (4.85) was recorded for sub-concept #9, "Smoking can cause disease," indicating that the respondents are very much aware of the harmful impacts of smoking. This heightened awareness can be attributed to continuous public health campaigns, explicit warnings on cigarette packaging, and social reminders from parents, teachers, and peers emphasizing the health risks associated with smoking. The implementation of Republic Act 8749, otherwise known as the Philippine Clean Air Act of 1999, which prohibits smoking in public areas and public utility vehicles, further reinforces this awareness by institutionalizing anti-smoking measures nationwide.

Moreover, the results show that the respondents are also very much aware of the broader environmental implications of pollution, as reflected in their high ratings on statements such as "We should be against

the pollution of the environment, land, sea, and air" (Mean= 4.57), and "Pollution not only diminishes the quality of life, it dramatically shortens life itself" (Mean= 4.47). These responses reveal the students' understanding of pollution as a critical ecological and public health issue, consistent with the findings of Singh and Gupta (2022), who emphasized that environmental awareness among youth plays a crucial role in promoting sustainable behavior.

The respondents also showed considerable awareness of how pollution can be mitigated and managed, particularly in the items "Pollution can be minimized if people give attention to it" and "The burning of garbage and waste materials can contribute to the greenhouse effect" whose mean is 4.46 and 4.58 respectively. This reflects an understanding of the relationship between human activities and environmental degradation. Similar results were reported by Shri *et al.* (2021), who found that college students often recognize anthropogenic causes of pollution and support community-based environmental action as a preventive strategy.

Table 3. Level of environmental awareness of second year students of CFCST on the concept ‘Stewardship’

Environmental concept	Mean	Qualitative description
1. Every individual is a steward of nature.	4.46	Very much aware
2. Large and rapid population growth put pressure on the environment.	4.32	Very much aware
3. The environment cannot catch up with the population's demand for its resources unless people learn how to manage and utilize resources.	4.50	Very much aware
4. Every man, every community and every nation is accountable for the proper management of the Earth.	4.51	Very much aware
5. Stewardship makes you aware that the more you utilize resources, the greater is your responsibility to preserve such resources.	4.37	Very much aware
6. Irresponsible stewardship will result to poverty.	4.15	Very much aware
7. Nature provides everything that is necessary to sustain life.	4.69	Very much aware

Table 4. Level of environmental awareness of second year students of CFCST on the concept ‘Finiteness of resource’

Environmental concept	Mean	Qualitative description
1. Habitat destruction and pollution are reducing the Earth's biological diversity.	4.42	Very much aware
2. Indigenous cultural communities have become marginal-ized due to the loss of their ancestral domain & resource base.	4.03	Very much aware
3. The major problems of the community resources management are forest degradation, plant and animal extinction and coral ecosystem destruction.	4.49	Very much aware
4. Some of the natural resources are diminished and destroyed by irresponsible people.	4.62	Very much aware
5. The careless cutting of trees and the “kaingin” system have resulted into wanton destruction of our forest.	4.73	Very much aware
6. As pollution increases, the demand for resources also increases.	4.36	Very much aware
7. The tree planting programs develop deep sense of responsibility in nation building and a more healthful environment.	4.73	Very much aware
8. Water is the most important resource of human beings; therefore, we should use it wisely.	4.72	Very much aware

However, the relatively lower mean scores in sub-concept #5 (“Some pollutants can be efficiently transformed into useful materials,” with a mean rating of 3.61 and sub-concept #8 (“Using aerosol sprays contribute to ozone depletion,” whose mean is 3.96, suggest that while students acknowledge the existence of these issues, their scientific understanding of the underlying processes remains limited. This indicates a need for enhanced environmental education focusing on scientific mechanisms such as pollutant conversion, recycling, and the chemistry of ozone-depleting substances. As observed by Masongsong (2024), awareness is often conceptual but not always accompanied by deep scientific comprehension, emphasizing the importance of integrating experiential learning into environmental curricula.

Students' awareness on ‘Stewardship’

The results in Table 3 further demonstrate that second-year students of CFCST are very much aware of all seven (7) sub-concepts of stewardship, stressing their recognition of humanity's collective responsibility toward the environment. The highest mean of 4.69 was recorded for the statement “Nature provides everything

that is necessary to sustain life”, indicating a deep appreciation of the interdependence between humans and nature. This aligns with the ecological worldview described by Kollmuss and Agyeman (2020), wherein environmental awareness fosters moral and emotional connectedness to the natural world.

The respondents' strong agreement with statements such as “Every individual is a steward of nature” with a mean of 4.46 and “Every man, every community and every nation are accountable for the proper management of the Earth” whose mean is 4.51 further reflects their understanding of environmental accountability. Such awareness implies that they view stewardship not only as a moral duty but also as a shared social responsibility.

Moreover, students recognize the pressures posed by rapid population growth (Mean = 4.32) and irresponsible resource utilization (Mean = 4.15) as key drivers of environmental degradation. Their acknowledgment that “Irresponsible stewardship will result to poverty” reflects an understanding of the link between environmental sustainability and socio-economic stability.

Table 5. Level of environmental awareness of second year students of CFCST on the concept 'Change'

Environmental concept	Mean	Qualitative description
1. Over the past century, the average global temperature has increased significantly.	3.98	Much aware
2. Natural foods are more healthful compared to processed ones.	4.63	Very much aware
3. Environmental degradation results from lack of appreciation of nature.	4.01	Very much aware
4. Recycling of solid wastes into compost and organic ferti-lizers is a better way of preventing depletion of soil fertility.	4.59	Very much aware
5. Toxic and other hazardous wastes, when improperly handled and unregulated can create havoc not only on humans but also on the environment.	4.52	Very much aware
6. The most rewarding process in the utilization of toxic and other hazardous substances is through recycling.	4.37	Very much aware

Students' awareness on 'Finiteness of resource'

The data in Table 4 reveal that second-year students of CFCST are very much aware of all eight (8) sub-concepts under the concept "Finiteness of Resource." This finding suggests a strong understanding among students that natural resources are limited and must be managed responsibly to ensure environmental sustainability and intergenerational equity. The highest mean scores were recorded for the sub-concepts "The careless cutting of trees and the 'kaingin' system have resulted in severe destruction of our forest" (Mean = 4.73) and "The tree planting programs develop a deep sense of responsibility in nation building and a more healthful environment" (Mean = 4.73). These results indicate that students possess a deep awareness of the environmental consequences of deforestation and appreciate the importance of reforestation as a means of ecological restoration and national development.

This heightened awareness can be attributed to the students' close association with agricultural livelihoods, as many come from farming families whose daily lives are directly affected by land degradation, deforestation, and water scarcity. The awareness of the impacts of illegal logging and "kaingin" (slash-and-burn farming) reflects their firsthand experiences and understanding of how unwise exploitation of forest resources leads to soil erosion, biodiversity loss, and even natural disasters such as floods and landslides (FAO, 2020; DENR, 2023).

However, the lowest mean score (Mean = 4.03) was observed for the sub-concept "Indigenous cultural communities have become marginalized due to the loss of their ancestral domain and resource base." Although still qualitatively described as "very much aware," this relatively lower level of awareness suggests limited

understanding among students regarding the significant role of indigenous peoples (IPs) in environmental conservation and nation-building. This gap may be due to insufficient exposure to IP-related issues or the lack of integration of indigenous knowledge systems in environmental education.

The overall high level of awareness among the students demonstrates a commendable recognition of the finite nature of the Earth's resources and the need for responsible management. Nevertheless, the findings also highlight the importance of enhancing environmental education by incorporating discussions on cultural and social dimensions of resource management- particularly the struggles and contributions of indigenous communities. This holistic understanding can foster more inclusive environmental stewardship, where ecological sustainability is aligned with cultural preservation and social justice (UNESCO, 2020; IPCC, 2023).

Students' awareness on 'Change'

As shown in Table 5, the sub-concept "Natural foods are more healthful compared to processed ones" obtained the highest mean of 4.63, indicating that second-year students are very much aware of the benefits of natural foods. However, this awareness does not always reflect in actual practice, as many still prefer fast and processed foods due to convenience and lifestyle factors (Almoraie *et al.*, 2024).

The sub-concept "Over the past century, the average global temperature has increased significantly" got the lowest mean of 3.98, suggesting limited knowledge about global warming. This agrees with Shepardson *et al.* (2011), who found that many students hold misconceptions about climate change and its impacts.

Table 6. Level of environmental awareness of second year students of CFCST on the concept ‘Interdependence’

Environmental concept	Mean	Qualitative description
1. Forests provide food and medicine. They also provide vital resources.	4.63	Very much aware
2. Human beings are product of heredity and environment.	4.52	Very much aware
3. Most farmers used chemicals and pesticides which are detrimental to health, therefore they should be banned. Other alternatives that are not harmful must be used.	4.43	Very much aware
4. Living things cannot live without the environment.	4.78	Very much aware
5. Population size, land and resource management affects resources.	4.58	Very much aware

Table 7. Level of environmental awareness of second year students of CFCST on the concept ‘Diversity and stability’

Environmental concept	Mean	Qualitative description
1. Undistributed natural resource preserved as wildlife areas are of great value in perfecting and perpetuating endangered species.	4.27	Very much aware
2. A sustainable society is one that satisfies its needs without jeopardizing the prospects of the future generations.	4.29	Very much aware
3. Wise utilization of natural resources will provide prosperity throughout generations.	4.68	Very much aware

Table 8. Descriptive statistics of the level of environmental awareness of the second year students of CFCST for the seven environmental concepts

	N	Minimum	Maximum	Mean	Std. Deviation
Balance of nature	106	2.88	5.00	4.45	.49307
Pollution	106	2.90	5.00	4.32	.50935
Stewardship	106	2.86	5.00	4.40	.51557
Finiteness	106	3.00	5.00	4.46	.46453
Change	106	2.00	5.00	4.34	.58575
Interdependence	106	1.00	5.00	4.50	.61798
Diversity	106	2.00	5.00	4.37	.66301
Valid N (listwise)	106				

Other sub-concepts, such as recycling and waste management, received high means, showing that students understand the importance of proper waste disposal and environmental protection (UNEP, 2021). Overall, students of CFCST show high awareness of environmental change, though their understanding of climate-related issues still needs further strengthening through environmental education and practical engagement.

Students’ awareness on ‘Interdependence’

Second year college students of CFCST are very much aware of all five (5) sub-concepts under the environmental concept of “Interdependence” (Table 6). This indicates that students have a strong understanding of the interconnected relationship between humans and the environment. They recognize that all living organisms, including humans, depend on nature for survival and that the misuse of natural resources can disrupt ecological balance. The high level of awareness may be attributed to continuous exposure to environmental topics in

school and through various media platforms such as television, the internet, and social media, which consistently highlight the importance of environmental protection and sustainable living.

The findings suggest that students are not only conscious of the dependence between humans and nature but also understand the need for responsible practices such as sustainable agriculture and population management. Their high level of awareness reflects a positive outlook toward environmental stewardship and indicates the effectiveness of environmental education in promoting ecological responsibility among young individuals.

Students’ awareness on ‘Diversity and stability’

Table 7 shows that second-year students of CFCST are very much aware of all three (3) sub-concepts under “Diversity and Stability.” The highest mean of 4.68 was obtained from the statement “Wise utilization of natural resources will provide

prosperity throughout generations,” indicating strong recognition of sustainable resource use. This result supports the findings in Table 4, which revealed that unwise utilization of natural resources leads to environmental degradation and climate change.

Furthermore, the results suggest that students understand the link between biodiversity, sustainability, and long-term ecological balance. Their high awareness reflects positive attitudes toward conservation and the importance of protecting resources for future generations.

Table 9. Descriptive statistics on the mean differences in the level of environmental awareness of the second year students of CFCST according to their gender

Gender		Balance of nature	Pollution	Stewardship	Finiteness	Change	Interdependence	Diversity
Male	Mean	4.2664	4.1868	4.2293	4.3421	4.2061	4.4368	4.2456
	N	38	38	38	38	38	38	38
	Std. Dev.	.53993	.55467	.53919	.52928	.54859	.53797	.73800
Female	Mean	4.5496	4.4029	4.5000	4.5202	4.4118	4.5382	4.4461
	N	68	68	68	68	68	68	68
	Std. Dev.	.43684	.46871	.47892	.41464	.59675	.65950	.61115

Table 10. Data summary of ANOVA calculations for the significant difference in the level of environmental awareness of second year students of CFCST according to gender

Parameters	SOS	SS	df	MS	F	Sig.
Balance of nature	Between groups	1.955	1	1.955	8.625	.004
	Within groups	23.572	104	0.227		
	Total	25.527	105			
Pollution	Between groups	1.138	1	1.138	4.536	.036
	Within groups	26.103	104	0.251		
	Total	27.241	105			
Stewardship	Between groups	1.786	1	1.786	7.110	.009
	Within groups	26.124	104	0.251		
	Total	27.910	105			
Finiteness	Between groups	0.773	1	0.773	3.675	.058
	Within groups	21.884	104	0.210		
	Total	22.658	105			
Change	Between groups	1.031	1	1.031	3.063	.083
	Within groups	34.995	104	0.336		
	Total	36.025	105			
Interdependence	Between groups	0.251	1	.251	.654	.421
	Within groups	39.849	104	.383		
	Total	40.100	105			
Diversity & Stability	Between groups	0.980	1	0.980	2.255	.136
	Within groups	45.177	104	0.434		
	Total	46.156	105			

Table 8 shows that second-year students of CFCST have a very high level of environmental awareness, with mean scores ranging from 4.32 to 4.50. The highest mean was for Interdependence (Mean= 4.50), indicating strong awareness of the interconnectedness of humans and nature. This is followed by Finiteness of Resources (Mean= 4.46) and Balance of Nature (Mean= 4.45), showing understanding of resource limitations and ecological balance. Although slightly lower, Pollution (Mean= 4.33) and Change (Mean= 4.34) still reflect high awareness. Generally, students demonstrate strong environmental understanding,

suggesting effective environmental education in the college.

Level of environmental awareness on seven environmental concepts: Comparing male and female second year students of CFCST

Table 9 shows the descriptive statistics on the mean differences in the level of environmental awareness among second year students of CFCST according to their gender. The results reveal that females consistently obtained high level of awareness in all seven environmental concepts than their male counterpart. This suggests that female students exhibit a deeper

appreciation of the interconnectedness between humans and the environment, and acknowledge the importance of responsible resource management.

Among females, the highest mean was recorded in the Balance of Nature with (Mean= 4.5496) followed by Stewardship (Mean = 4.5000) and Interdependence (Mean= 4.5382), suggesting a strong understanding of ecological balance and responsibility toward environmental protection. Male students also showed awareness in these areas, but with slightly lower mean values.

The above results are confirmed by the ANOVA summary (Table 10) that the mean differences of both males and females are statistically significant in three concepts: Balance of Nature ($p= 0.004$), Pollution ($p = 0.036$), and Stewardship ($p= 0.009$). This suggests that gender significantly influences students' understanding of these environmental dimensions, with females showing stronger awareness and concern. The absence of significant differences in Finiteness, Change, Interdependence, and Diversity implies that both male and female students share similar levels of awareness in these aspects.

Table 11. Summary table of ANOVA calculation for significant difference in the level of environmental awareness of second year students of CFCST according to their major field concentration

Parameters	SOS	SS	df	MS	F	Sig.
Balance of nature	Between groups	2.532	7	.362	1.541	.162
	Within groups	22.995	98	.235		
	Total	25.527	105			
Pollution	Between groups	3.527	7	.504	2.082	.053
	Within groups	23.715	98	.242		
	Total	27.241	105			
Stewardship	Between groups	3.207	7	.458	1.818	.092
	Within groups	24.703	98	.252		
	Total	27.910	105			
Finiteness	Between groups	2.029	7	.290	1.377	.223
	Within groups	20.628	98	.210		
	Total	22.658	105			
Change	Between groups	4.346	7	.621	1.921	.074
	Within groups	31.679	98	.323		
	Total	36.025	105			
Interdependence	Between groups	1.947	7	.278	.714	.660
	Within groups	38.153	98	.389		
	Total	40.100	105			
Diversity and stability	Between groups	4.699	7	.671	1.587	.148
	Within groups	41.458	98	.423		
	Total	46.156	105			

Level of environmental awareness of the second year students according to their major field of concentration

Table 11 presents the summary of the ANOVA calculation on the significant difference on the level of environmental awareness of the second-year students of CFCST when they are grouped according to their major field of concentration. The results reveal that no significant differences were found among the different major fields across all seven environmental concepts-Balance of Nature, Pollution, Stewardship, Finiteness of Resources, Change, Interdependence, and Diversity and Stability-since all computed significance values ($p > 0.05$) exceeded the 0.05 level of significance.

The results imply that major field concentration does not significantly influence the students' level of environmental awareness. This further reflects that environmental literacy among CFCST students is relatively uniform across disciplines, emphasizing the effectiveness of the college's environmental programs in instilling ecological values and understanding among all students.

CONCLUSION

The study concludes that the second-year college students of CFCST are highly aware of the seven environmental concepts, reflecting the effectiveness of integrating environmental education across subjects that promote

understanding of ecological issues within the community. Gender appeared as a significant factor influencing awareness in the concepts of Balance of Nature, Pollution, and Stewardship, with females showing greater environmental sensitivity than males, while both genders demonstrated similar awareness in Finiteness of Resources, Change, Interdependence, and Diversity and Stability. Meanwhile, students' major field of concentration showed no significant influence on their environmental awareness, suggesting that the institution provides equal exposure to environmental learning opportunities across disciplines, thereby fostering a shared sense of ecological responsibility among students. In light of these findings, it is recommended that the college sustain and further strengthen its environmental education programs, ensuring they address the specific needs of students and engage both genders effectively. Teachers and administrators should also review and enhance the curriculum, participate in environmental trainings and seminars, and implement activities that promote ecological responsibility. Future studies may include other year levels and degree programs to gain a broader understanding of students' awareness, practices, and attitudes toward environmental issues.

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REFERENCES

- Al-Barakat A, AlAli R, Alotaibi S, Alrashood J, Abdullatif A, Zaher A.** 2025. Science education as a pathway to sustainable awareness: teachers' perceptions on fostering understanding of humans and the environment: a qualitative study. *Sustainability* **17**(15), 7136.
- Almoraie NM, Alothmani NM, Alomari WD, Al-Amoudi AH.** 2024. Addressing nutritional issues and eating behaviours among university students: a narrative review. *Nutrition Research Reviews*, 1–16.
- Asworo YD.** 2024. How important does chemistry and literacy? bibliometric analysis from 1993–2023. *Journal of Research in Environmental and Science Education* **1**(1), 42–57.
- Department of Environment and Natural Resources (DENR).** 2022. Annual report: sustaining environmental governance and natural resource protection. Department of Environment and Natural Resources. <https://www.denr.gov.ph/>
- Georgiou Y, Kyza EA.** 2023. Fostering chemistry students' scientific literacy for responsible citizenship through socio-scientific inquiry-based learning (SSIBL). *Sustainability* **15**(8), 6442.
- Hollweg KS, Taylor JR, Bybee RW, Marcinkowski TJ, McBeth WC, Zoido P.** 2011. Developing a framework for assessing environmental literacy. Washington, DC: North American Association for Environmental Education. <http://www.naaee.net>
- Intergovernmental Panel on Climate Change (IPCC).** 2023. Summary for policymakers. In: Climate change 2023: synthesis report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, Lee H, Romero J (eds.)]. IPCC, Geneva, Switzerland, 1–34. <https://doi.org/10.59327/IPCC/AR6-9789291691647.001>
- Ejem L, Bello A.** 2013. Environmental awareness, literacy and biodiversity conservation practices of freshmen students in Bukidnon State University, Philippines. *JPAIR Institutional Research* **1**(1).
- Kollmuss A, Agyeman J.** 2002. Mind the gap: why do people act environmentally and what are the barriers to pro-environmental behavior? *Environmental Education Research* **8**(3), 239–260.
- Mahinay HAC, Marapao MSA, Jempero JB, Allawan JGL.** 2023. Environmental literacy levels and environmental pollution among senior high school students. *Journal of Environmental Impact and Management Policy* **3**(6). <https://doi.org/10.55529/jeimp.36.17.25>

Mandler D, Naaman RM, Blonder R, Yayon M, Hofstein A. 2012. High school chemistry teaching through environmentally oriented curricula. *Chemistry Education Research Practice* **13**, 80–92.

Masongsong JR. 2024. Environmental awareness and participation among college students of Mindoro State University–Calapan City Campus. *American Journal of Environment and Climate* **3**(1), 25–29.

Republic Act No. 9512. National Environmental Awareness Act and Education Act of 2008. Retrieved 1 August 2019.

Sengupta M, Das J, Maji PK. 2010. Environmental awareness and environment-related behaviour of twelfth grade students in Kolkata: effects of stream and gender. *Anwesa* **5**, 1–8.

Shepardson DP, Niyogi D, Choi S, Charusombat U. 2011. Students' conceptions about the greenhouse effect, global warming, and climate change. *Climatic Change* **104**(3), 481–507.

Shri GU, Tiwari RR. 2021. Environmental literacy among college students. *Indian Journal of Occupational and Environmental Medicine* **25**(3), 128–132.

Singh P, Gupta N. 2021. Environmental awareness and sustainable behavior among college students: a case study. *International Journal of Environmental Studies* **78**(5), 853–869.
<https://doi.org/10.1080/00207233.2020.1864321>

United Nations Educational, Scientific and Cultural Organization (UNESCO). 2020. Education for sustainable development: a roadmap.
<https://unesdoc.unesco.org/ark:/48223/pf0000374802>

United Nations Environment Programme. 2021. From pollution to solution: a global assessment of marine litter and plastic pollution. United Nations.
<https://doi.org/10.18356/9789210056955>

United Nations Permanent Forum on Indigenous Issues (UNPFII). 2010. Briefing Note No. 5: gender and Indigenous people's environment. United Nations, New York.
www.un.org/esa/socdev/unpfii/documents/BriefingNote5_GREY.pdf

Yap CK, Nuli R, Syazwan WM, Omar H, Aguol KA, Nawi MM, Leow CS. 2024. Population growth and environmental resources: a short note on their relationships and consequences and impacts. *Biomedical Journal of Scientific & Technical Research* **55**(2), 46884–46896.

Zelezny LC, Chua P, Aldrich C. 2000. Elaborating on gender differences in environmentalism. *Journal of Social Issues* **56**(3), 443–445.