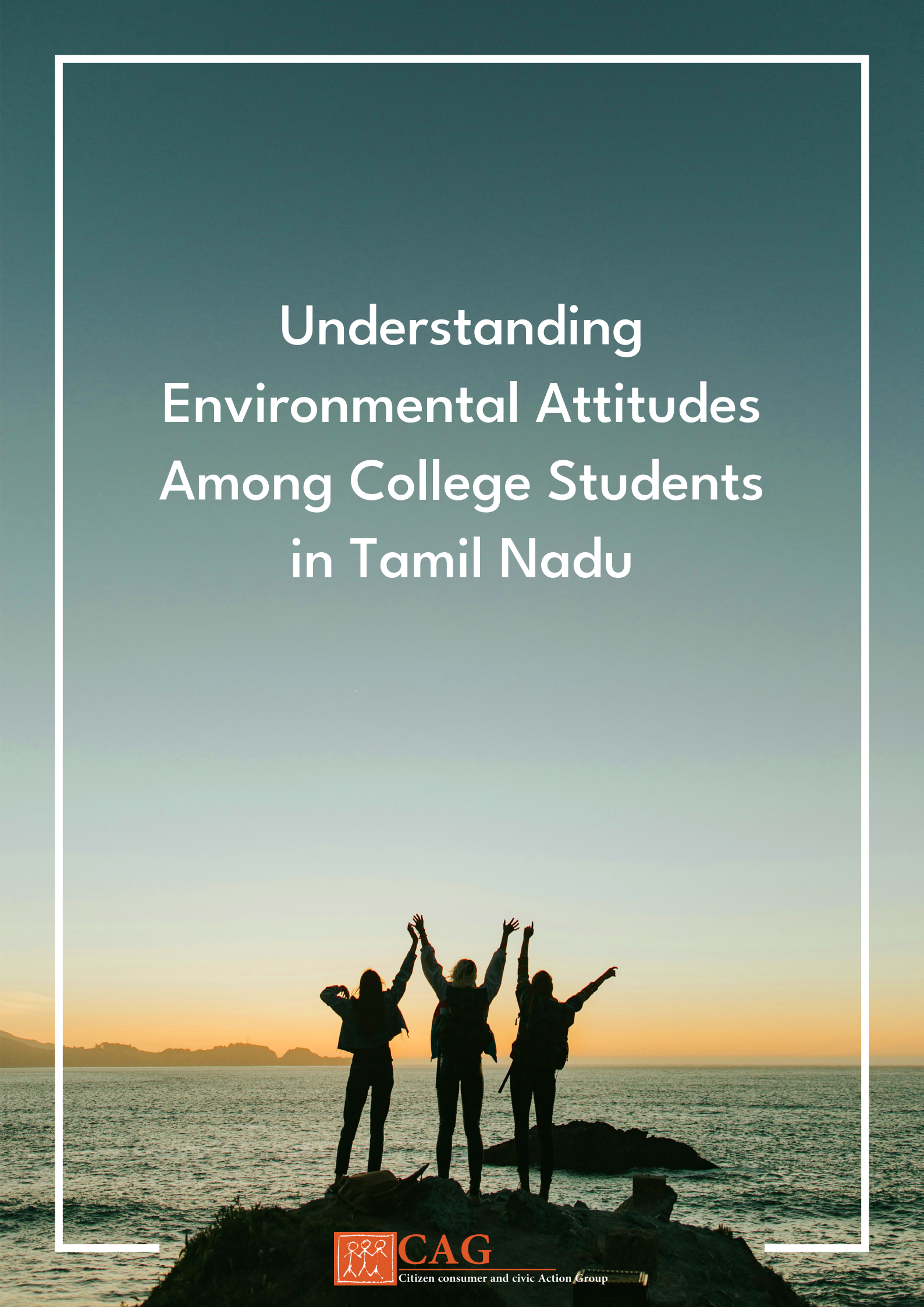
Understanding Environmental Attitudes Among College Students in Tamil Nadu



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Citizen consumer and civic Action Group

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Acknowledgements:

The author acknowledges Vamsi Sankar Kapilavai and S. Saroja for their critical review of the report, and the communications team, for editing the report. Thanks to Satheesh Kumar and his team for their efforts in collecting data among college students across the 38 districts of Tamil Nadu. Thanks to Alexis for designing this report.

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Suggested citation:

Shankar Prakash, A. 2023. “Understanding environmental attitudes of college students in Tamil Nadu | CAG”. *cag.org.in*.

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Executive Summary

This study delves into the environmental attitudes of college students in Tamil Nadu, providing valuable insights through both descriptive and inferential statistical analysis. The demographic profile of the student sample is diverse, encompassing various age groups, school and college types and educational backgrounds. The students' preference for the science stream during their higher secondary education is a significant observation. The student distribution is nearly equal across private and government colleges, providing a balanced representation. The sample, comprising 2608 college students, is further enriched by regional aspects such as rural-urban origin.

Students express a fondness for nature, a commitment to personal conservation behaviour, and an ecocentric concern. However, neutral attitudes emerge on critical issues such as altering nature, population growth policies, and anthropocentric conservation. These attitudes vary across different independent variables, highlighting the need for pedagogical interventions.

The study emphasises the importance of aligning environmental studies education with the diverse and evolving perspectives of college students. While positive attitudes prevail in certain domains, there are areas where neutral sentiments dominate. According to the results, the activities conducted through the National Service Scheme (NSS) serve as the primary source of information on environmental protection for the students. Social media follows NSS as the next significant source of information. Interestingly, despite the compulsory Environmental Studies (EVS) course undertaken by students, it ranks third as a source of information on environmental protection, trailing behind NSS and social media.

Approximately 9% of the students reported that the activities of environmental NGOs and academic seminars and conferences serve as their source of information on environmental protection. However, the annual celebration of World Environment Day on June 5 appears to be ineffective in conveying the importance of environmental protection among students.

The findings of this study offer concrete recommendations for revising the environmental studies syllabus. The suggested approaches include targeted content inclusion, an emphasis on ecocentrism, and addressing overconfidence in science and technology for all environmental problems. These recommendations aim to foster a more sustainable and environmentally conscious mindset among students, thereby contributing to the broader goal of environmental conservation.

1 Introduction

Over several decades, humanity has been confronting severe environmental issues, including desertification, deforestation, air and water pollution, biodiversity loss, and global warming, which leads to climate change (UNFCCC 2022). Numerous scientific studies and reports largely attribute these problems to human activities and behaviours (Keys et al. 2019). As these environmental issues intensify rapidly, the responsibility resting on the younger generation's shoulders, especially college students, is immense. These students, who are future societal leaders, particularly in developing nations like India, are pivotal in guiding environmental conservation efforts in this challenging time.

Understanding their attitudes towards the environment is crucial as we navigate the complexities of sustainability and ecological resilience. This group is at the forefront of technological progress and undergoing significant personal and cognitive growth. The time they spend in higher education institutions is when lasting ideologies and values are established, making it an opportune time to evaluate their propensity for environmental stewardship. These students are on the edge of entering diverse professional fields, where their choices and actions will inevitably shape environmental regulations, business practices, and societal standards. Gaining an understanding of college students' environmental attitudes can offer valuable insights into their level of awareness, motivations, and readiness to embrace sustainable practices (Bøhlerengen and Wiium 2022).

By deciphering these complexities, we can more effectively customise educational programs, advocacy drives, and policy structures to align with this group's distinct viewpoints, thereby promoting a more efficient and inclusive strategy for environmental safeguarding. As we commence this investigation of environmental attitudes among college students in Tamil Nadu based on the Environmental Attitudes Inventory (EAI), the results of this study are expected to not only enrich academic discussions but also lay the groundwork for well-informed and specific interventions designed to cultivate a generation that is not merely aware of the environment but is actively involved in the quest for a sustainable future. Furthermore, this study seeks to offer insights to reevaluate the existing mandatory environmental studies curriculum as outlined by the University Grants Commission (UGC). This could result in a more thorough and pertinent syllabus that better equips students to tackle the environmental challenges that lie ahead.

1.1 Objectives of the Study

- To bring out the environmental attitude of college students in Tamil Nadu.
- Based on the findings, propose recommendations for revising the Environmental Studies syllabus.

2 Existing measures of environmental attitudes

Since the 1970s, at least 15 measures of environmental attitudes and concerns have been developed, each with its own unique definition and specificity. This variety in measurement tools can make cross-study comparisons challenging, but it also allows for more context- or behaviour-specific assessments of attitudes. Early scales developed in the 1970s include the Maloney-Ward Ecology Inventory (Maloney and Ward 1973), the Weigel Environmental Concern Scale (Weigel & Weigel, 1978), and the New Environmental Paradigm (Dunlap et al. 2000). These scales measure various aspects of environmental attitudes, from knowledge and affect to the belief in Earth's sanctity.

In the 1990s, scales were developed to measure environmental concern, environmental pessimism, and worry about exposure to organic solvents (Schahn and Holzer 1990; Bowler and Schwarzer 1991). The Environmentalism Scale (Banerjee and McKeage 1994) was also created, which measures attitudes about the severity of environmental problems, environmental issues outside the self, and one's own connection to nature. Towards the late 1990s, scales were developed to examine pro-environmental behaviour and specific environmental attitudes. These tools, including the Motivation Toward the Environment Scale (Pelletier et al. 1999) and the Survey of Environmental Issue Attitudes (Schindler 1999), have been instrumental in understanding and assessing environmental attitudes in various contexts, including in children (Larson, Green, and Castleberry 2011). These instruments serve as a prelude to the comprehensive Environmental Attitudes Inventory (EAI).

3 Methods

The UGC has directed all higher education institutions in India to offer a compulsory course on environmental studies. As this study involves data collection from college students, and given that environmental studies is a compulsory course, data were collected from students in their third or fourth year of study. This ensures that they have already completed their compulsory environmental studies course. The data was collected from students across all 38 districts, representing diverse educational streams including arts, commerce, engineering and technology, science, and medicine (including dental and veterinary science). During the fieldwork, an attempt was made to ensure proportional representation based on gender and stream of education. However, due to the unavailability of colleges offering medicine and its related courses in every district, proportional representation could only be achieved for gender.

To facilitate the data collection process, field investigators were recruited from each district. These investigators were given an initial orientation about the study's purpose and the research tool (i.e., environmental attitudes inventory) to be used for data collection. Subsequent workshops were conducted in each district to familiarise them with the research tool. The tool was also translated into Tamil. The KOBO toolbox, which includes both Tamil and English versions of the tool, was used by the field investigators to collect data from college students.

The study employed a non-probability sampling method known as snowball sampling to collect data from students across different educational faculties. On an average, 68 samples were collected from each district, resulting in a total of 2608 respondents. Given the broad coverage and the number of respondents, this sample size can be confidently considered as representative of the college student population in Tamil Nadu to understand their environmental attitude.

3.1 Description of the EAI

The Environmental Attitudes Inventory, developed by Milfont and Duckitt (2010), is a comprehensive tool that incorporates questions from a range of environmental attitudes. This inventory underwent rigorous testing and refinement with samples from various countries, which reduced the original 200-item scale to a more manageable 120 items. The 120 items are categorised under 12 scales, namely: Enjoyment of Nature, Interventionist Policies, Environmental Activism, Anthropocentric Conservation, Confidence in Science, Environmental Fragility, Altering Nature, Personal Conservation Behaviour, Dominance over Nature, Utilisation of Nature, Ecocentric Concern, and Support for Population Growth

Policies. Milfont and Duckitt further proposed a condensed version of the scale, consisting of 72 items, which was utilised in this study. Despite its length, the Environmental Attitudes Inventory is thorough and backed by robust theoretical and empirical evidence. Consequently, this inventory was chosen as the instrument to gauge the environmental attitudes of college students in Tamil Nadu.

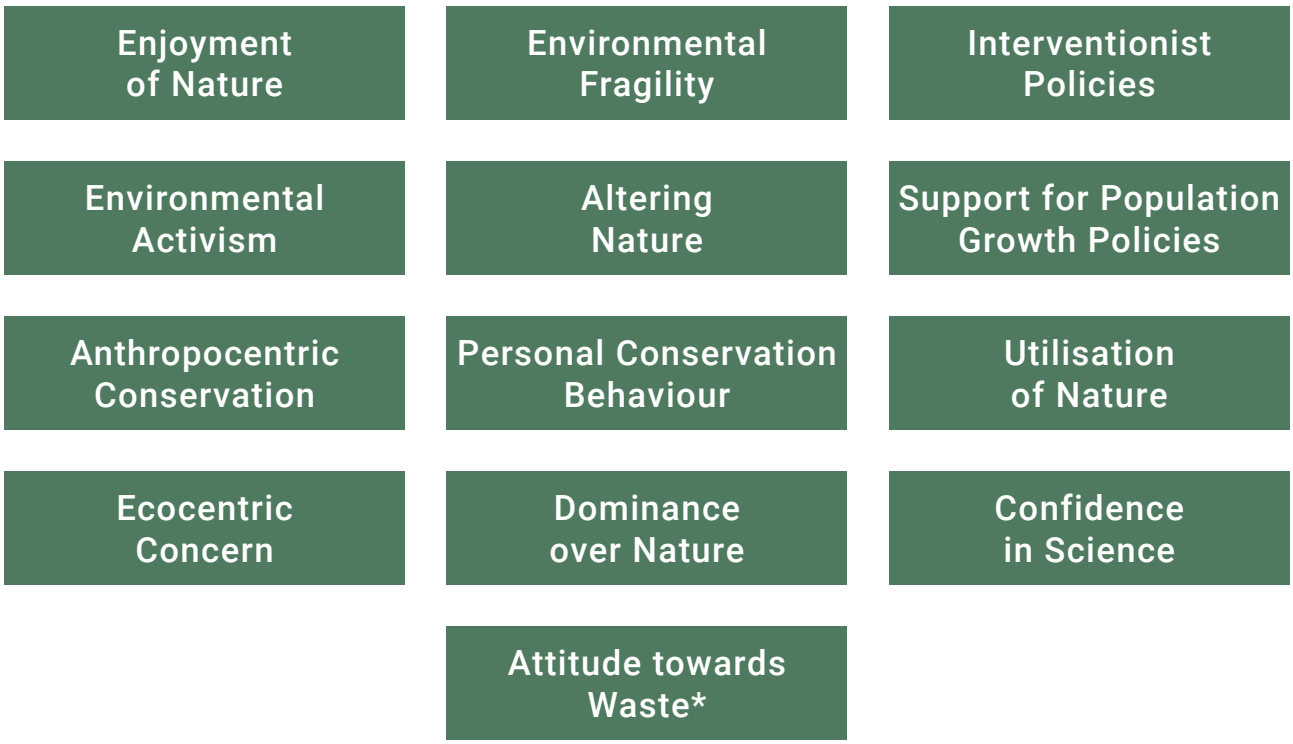

Figure 1: Different scales under the environmental attitudes inventory

These scales measure various aspects of environmental attitudes. The "Enjoyment of Nature" scale measures an individual's appreciation and enjoyment of nature. "Interventionist Policies" assesses support for policies that intervene in business and industry for environmental protection. "Environmental Activism" measures the willingness to participate in activities or movements aimed at protecting the environment. "Anthropocentric Conservation" assesses the belief in conserving the environment for human benefit. "Confidence in Science" measures trust in science and technology to solve environmental problems. "Environmental Fragility" assesses the belief in the fragility and vulnerability of the environment. "Altering Nature" measures attitudes towards human alteration of nature. "Personal Conservation Behaviour" assesses personal commitment to conservation and pro-environmental behaviour. "Dominance over Nature" measures the belief in human dominance and control over nature. "Utilisation of Nature" assesses attitudes towards the use of nature for human benefit. "Ecocentric Concern" measures concern for the environment for its own sake, not just for

human benefit. “Support for Population Growth Policies” assesses support for policies controlling population growth to protect the environment. In addition to these scales, an additional scale was added to measure the students’ attitudes towards waste, providing a more comprehensive understanding of the environmental attitudes of college students.

3.2 Coding of responses and mean score interpretation

As mentioned above, EAI consists of 12 scales (plus one added related to waste), each representing a different aspect of environmental attitudes. Each scale is measured using a 7-point Likert scale, where one typically represents “strongly disagree” and seven represents “strongly agree” for positively worded statements. Negative statements are reverse-coded. This means that if a respondent selects 1 (strongly disagree) for a negative statement, it would be re-coded as 7 (strongly agree) in the data analysis. Similarly, a response of 2 would be re-coded as 6, a response of 3 as 5, and so on. This is done to ensure that higher scores consistently represent more positive or pro-environmental attitudes, regardless of whether the statement is worded positively or negatively. So, in the context of the EAI, a higher mean score on a scale would suggest that respondents generally agree more with the pro-environmental statements in that scale. This would indicate a more positive attitude towards the aspect of the environment that the scale represents.

3.3 Variables examined

— Independent variables:

- Gender
- School type
- 12th standard school board
- 12th standard stream
- Stream of undergraduate degree
- College type
- Native place
- Place of residence

— Dependent variables:

- 12 scales under the environmental attitudes inventory and an additional scale to measure attitudes towards waste

4 Data Analysis

In addition to descriptive statistical analysis of the respondents' age, several inferential statistical analyses were conducted to examine the differences in environmental attitudes between various independent and dependent variables. Statistical tests such as the One-Way Analysis of Variance (ANOVA) and independent samples t-test were employed to identify any potential differences in attitudes. One-way ANOVA was used to understand the differences among three or more groups, while an independent samples t-test was used to understand the difference between two groups. These are parametric inferential statistical analyses, which require the data to meet certain conditions, including linearity and normality. The data from this study were found to be roughly normally distributed, as confirmed through Q-Q plots and histograms (see Figure 2).

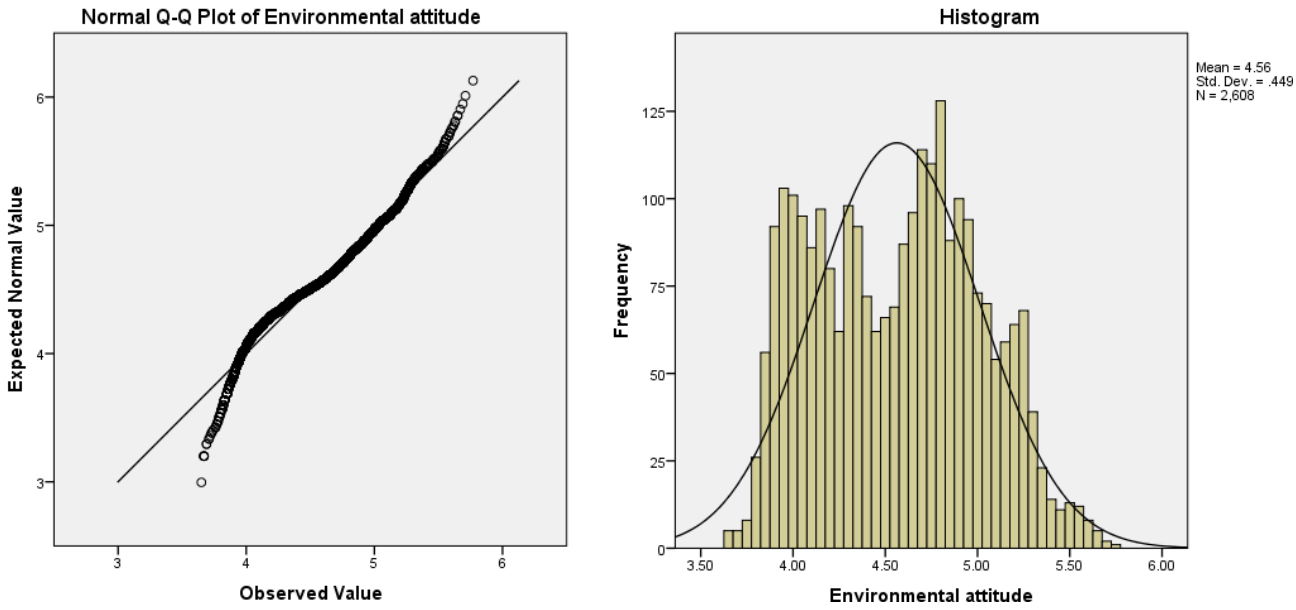

Figure 2: Q-Q plot and histogram of environmental attitude data distribution

The validity of the data was further confirmed based on Cronbach's alpha value, a measure commonly used for internal consistency reliability. The Cronbach's alpha value for the observed 78 items was 0.83. Since the Cronbach's alpha value is greater than 0.7, the responses observed were deemed reliable (Taber, 2018).

5 Results and Discussion

The study results are organised and presented in relation to the independent and dependent variables. In presenting the dependent variables, the study provides the findings and contextualises them within the broader body of existing literature. This approach allows for a comprehensive understanding of the results, as it situates the study's findings within the larger academic discourse on environmental attitudes. Any relevant literature that aligns with or contradicts the study's findings is discussed, providing a nuanced interpretation of the results.

Minimum	Median	Mode	Mean	Maximum
19	20	20	20.55	35
		N = 2608		

Table 1: Descriptive statistics of age (in years)

The descriptive statistical analysis of the college students' ages revealed that the average age was 20.5 years, with a majority of the students being 20 years old. The age range of the students varied from 19 years, being the youngest, to 35 years, being the oldest. In terms of gender distribution, it was nearly balanced, with males constituting 49.9% and females accounting for 50.1% of the sample. Thus, gender parity was effectively achieved during the data collection process.

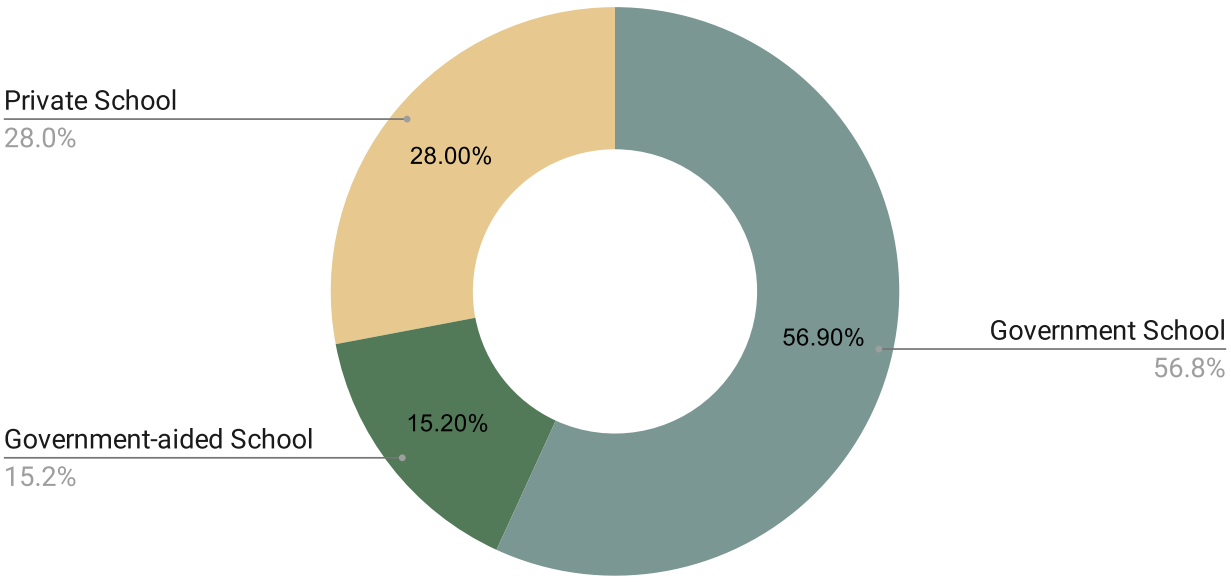

Figure 3: The school where the students completed their 12th standard

In terms of the schools where the students completed their 12th standard, a majority of them attended government schools. Another 28% of the students were educated in private schools, which include matriculation schools. The remaining 15.2% completed their schooling in government-aided schools. It's important to note that the category of government schools also encompasses schools run by the state government and Kendriya Vidyalayas, which the central government administers.

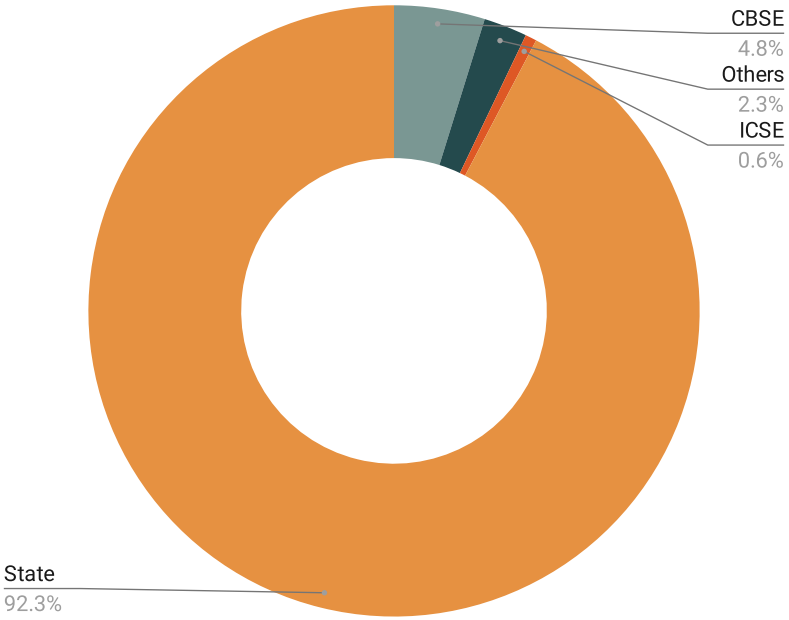

Figure 4: The board from which the students completed their 12th standard

Regarding the educational board from which the students completed their 12th standard, a significant majority (92.3%) of the students graduated from the state board. A smaller percentage of students are from the Central Board of Secondary Education (CBSE) (4.8%) and the Indian Certificate of Secondary Education (ICSE) (0.6%). The remaining students (2.3%) completed their 12th standard from other boards, including National Institute of Open Schooling.

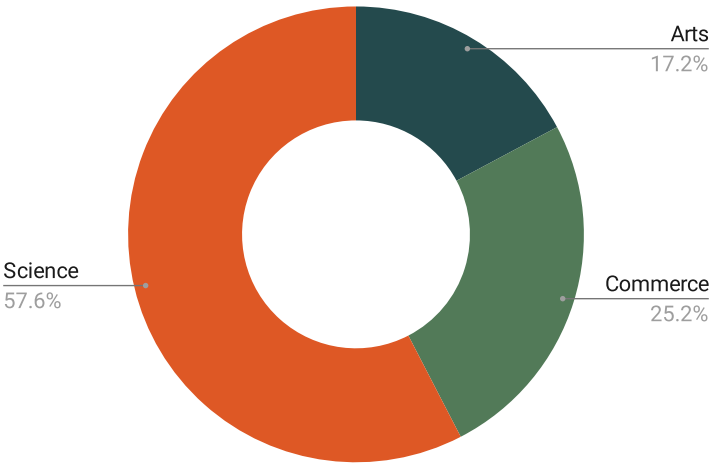

Figure 5: The education stream from which the students completed their 12th standard

In terms of the educational stream from which the students completed their 12th standard, a majority (57.6%) pursued the science stream, which includes subjects such as physics, chemistry, mathematics, biology, computer science, botany, and zoology. The commerce stream, which includes economics, accountancy, and business maths, was chosen by 25.2% of the students. The arts stream, encompassing subjects like history, geography, and political science, was pursued by 17.2% of the students. These findings reveal that most of the respondents of this study have chosen the science stream during their higher secondary education.

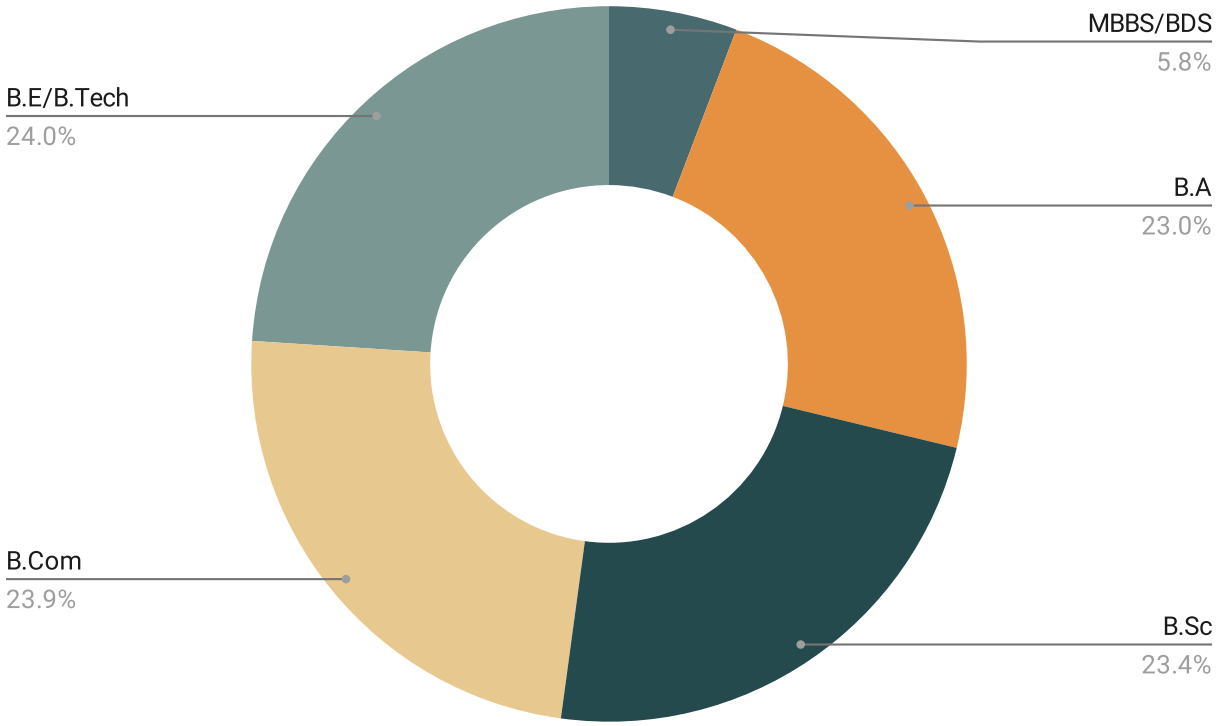

Figure 6: The educational stream in which the students are pursuing their undergraduate studies

As noted in the methods section, the data collection aimed for a proportionately distributed sample across all educational streams of undergraduate studies. However, not all districts have colleges offering medicine and related courses. The distribution of students pursuing B.A., B.Sc., B.E./B. Tech., and B.Com. Degrees are almost equal. Students undergoing medicine, dental, and veterinary science constitute 5.8% of the sample. This variable is considered important for comparing any differences in environmental attitudes among students based on their education stream.

Regarding the type of college, most of the respondents (56.3%) are pursuing their undergraduate education in private colleges, including government-aided and self-financing institutions. The remaining 43.7% are pursuing their undergraduate degree in government colleges.

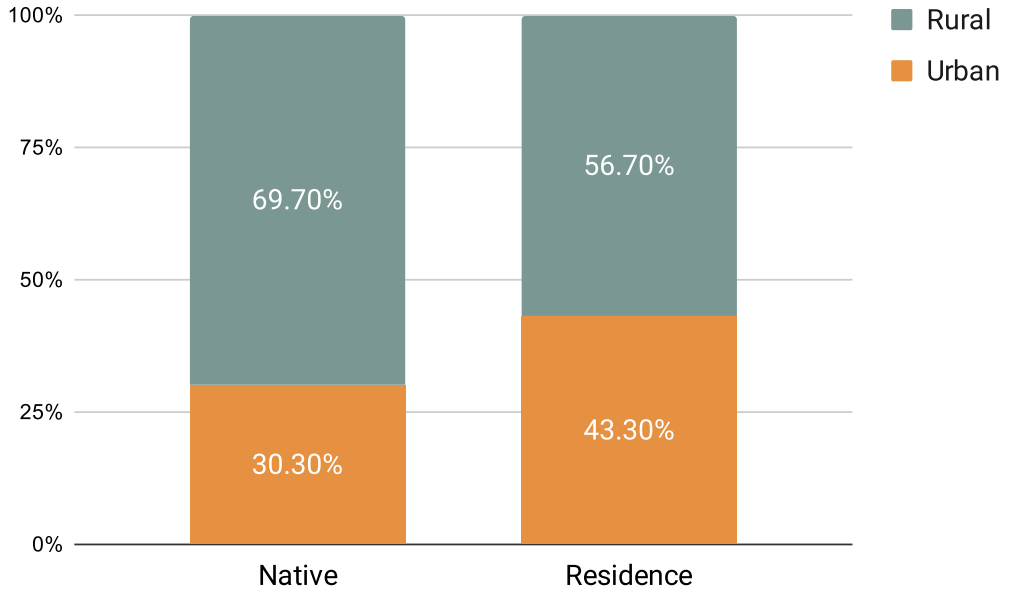

Figure 7: Nativity and residence of the students

In an effort to understand the students' nativity and current residence, it was found that a significant majority (around 70%) are originally from rural areas, while the remaining 30% are from urban areas. As for their current place of residence, approximately 57% live in rural areas, and 43% reside in urban areas. For the purpose of this study, students from rural local bodies, including village and town panchayats, are classified as rural. Conversely, students from urban local bodies such as municipalities and corporations are classified as urban.

Scale	Mean	Std. Deviation
Enjoyment of Nature	5.54	1.04
Personal conservation behaviour	5.47	1.06
Environmental Activism	5.17	1.04
Environmental Fragility	5.15	0.91
Ecocentric Concern	5.02	0.94
Interventionist Policies	4.85	0.79
Support for Population Growth Policies	4.63	1.16
Attitude towards Waste	4.36	0.77

(Cont.)

Scale	Mean	Std. Deviation
Anthropocentric Conservation	4.22	0.69
Confidence in Science and Technology	4.12	1.02
Dominance over Nature	3.91	0.86
Altering Nature	3.66	0.89
Utilisation of Nature	3.22	0.9

Table 2: Scale-wise descriptives statistics of student's environmental attitude

The results for each scale are presented as mean scores to understand the students' environmental attitudes. For the specific statements under each scale, please refer to Appendix 1. The mean is considered the simple average of the observed numerical values. The standard deviation is a measure of how spread out the numbers are around the mean. A small standard deviation indicates that most of the numbers are close to the average, while a large standard deviation suggests that the numbers are more spread out. As previously mentioned, a higher mean score suggests that students agree more with the pro-environmental statements on that particular scale. A lower standard deviation indicates that the responses are closer to the mean. Therefore, based on these results, a mean score within the range of 5 could be inferred as a positive attitude, within 4 as neutral, and within 3 as negative.

Based on the mean and standard deviation, it was inferred that students enjoy nature, view it as a stress reducer, and desire to spend more time in wilderness areas. This sentiment is also mirrored in their personal conservation behaviour, including attitudes towards conserving water, electricity, and natural resources. While they support environmental activism, including backing environmental organisations and assisting in fundraising efforts, this support is somewhat less pronounced compared to their enjoyment of nature and personal conservation behaviours.

Students recognise the fragility of our environment and understand that human interference with nature can lead to disastrous consequences. Their ecocentric concern, which encompasses the belief that nature should be protected and that humans are subject to the laws of nature, is also positively inclined. They express sadness over the clearing of forests for developmental activities.
It's noteworthy that students exhibit neutral attitudes towards several significant environmental factors that have a substantial impact on the environment. They have mixed opinions on support for policies that intervene in business and industry for environmental protection, population growth

policies, their attitudes towards waste, anthropocentric attitudes towards nature conservation, and the belief that science and technology will solve all environmental problems. These neutral attitudes towards these factors may significantly influence their behaviour that impacts the environment. Therefore, it's crucial to foster positive attitudes among students towards these significant factors of environmental protection.

Despite students' positive attitudes towards the enjoyment of nature, personal conservation behaviour, environmental fragility, and ecocentric concern, they still exhibit attitudes of dominance over nature and support altering and utilising nature for human consumption. It's significant to note that while they acknowledge enjoying being out in nature, they are also willing to utilise nature for consumption. This finding is considered significant and calls for further research to understand why attitudes differ among students.

Scale	Gender				*t*	*p*-value
	Male (n = 1301)		Female (n = 1307)			
	M	*SD*	*M*	*SD*		
Enjoyment of Nature	5.59	1.03	5.50	1.05	2.169	.030
Interventionist Policies	4.89	0.78	4.82	0.79	2.286	.22
Environmental Activism	5.21	1.05	5.12	1.03	2.068	.39
Anthropocentric Conservation	4.22	0.69	4.22	0.69	.071	.943
Confidence in Science	4.17	1.06	4.06	0.98	2.559	.011
Environmental Fragility	5.15	0.91	5.14	0.92	.326	.745
Altering Nature	3.64	0.88	3.68	0.89	-.976	.329
Personal Conservation Behaviour	4.48	1.08	5.46	1.04	.605	.545
Dominance over Nature	3.94	0.87	3.88	0.84	1.857	.063

(Cont.)

Scale	Gender				*t*	*p*-value
	Male (n = 1301)		Female (n = 1307)			
	M	*SD*	*M*	*SD*		
Utilisation of Nature	3.18	0.90	3.26	0.91	-2.325	.020
Ecocentric Concern	5.03	0.93	5.00	0.95	.696	.486
Support for Population Growth Policies	4.64	1.17	4.62	1.14	.631	.528
Attitude towards Waste	4.36	0.75	4.36	0.80	.282	.778
Environmental Attitude	**4.58**	**0.45**	**4.55**	**0.44**	**1.731**	**.084**

df = 2606; *Note. N = 2608*

Table 3: Difference between students' gender and their environmental attitude

In order to comprehend the difference in environmental attitudes between male and female students, an inferential statistical analysis, specifically an independent sample t-test, was conducted. The t-value provides an indication of the degree of difference between the groups – the higher the t-value, the greater the difference. The p-value, on the other hand, determines if this difference is statistically significant. Despite the t-value suggesting a difference on a few scales, the p-value indicates that there is no significant statistical difference between the environmental attitudes of male and female students. This suggests that both male and female students have similar environmental attitudes.

However, a meta-analysis study conducted by Gökmen (2021) showed that the gender variable impacts environmental attitudes, with female respondents demonstrating a more positive attitude towards the environment than their male counterparts. This finding is also supported by studies conducted by Dhenge et al (2022) and Xiao and McCright (2015).

In our study, the absence of a significant difference in environmental attitudes between male and female students could be ascribed to various factors. It's probable that the technological advancements facilitating access to information on environmental protection could have contributed to raising awareness and fostering positive attitudes towards the environment among all students, irrespective of their gender (see Table 11).

Scale	School Type			*F-Statistic*	*p*-value
	Government School (n = 1483)	Govern-ment aided School (n = 396)	Private School (n = 729)		
	M (SD)			(df1 = 2) (df2 = 2605)	
Enjoyment of Nature	5.54 (1.04)	5.74 (0.94)	5.43 (1.07)	12.038	.000***
Interventionist Policies	4.88 (0.78)	4.90 (0.72)	4.76 (0.83)	6.424	.002**
Environmental Activism	5.23 (1.01)	5.35 (0.97)	4.93 (1.11)	27.752	.000***
Anthropocentric Conservation	4.21 (0.72)	4.36 (0.64)	4.17 (0.65)	9.959	.000***
Confidence in Science	4.04 (1.02)	4.29 (1.01)	4.17 (1.02)	11.103	.000***
Environmental Fragility	5.21 (0.91)	5.25 (0.88)	4.96 (0.92)	21.922	.000***
Altering Nature	3.65 (0.93)	3.59 (0.83)	3.71 (0.83)	2.618	.073
Personal Conservation Behaviour	5.50 (1.04)	5.68 (1.00)	5.29 (1.09)	19.167	.000***
Dominance over Nature	3.93 (0.90)	3.96 (0.79)	3.85 (0.80)	2.981	.051
Utilisation of Nature	3.16 (0.89)	3.23 (0.84)	3.35 (0.95)	11.112	.000***
Ecocentric Concern	5.01 (0.92)	5.32 (0.94)	4.87 (0.95)	30.857	.000***

(Cont.)

Scale	School Type			*F-Statistic*	*p*-value
	Government School (n = 1483)	Government aided School (n = 396)	Private School (n = 729)		
	M (SD)			(df1 = 2) (df2 = 2605)	
Support for Population Growth Policies	4.67 (1.21)	4.61 (1.01)	4.57 (1.11)	1.869	.155
Attitude towards Waste	4.39 (0.77)	4.38 (0.72)	4.29 (0.80)	4.718	.009**
Environmental Attitude	**4.57 (0.46)**	**4.67 (0.39)**	**4.49 (0.45)**	**21.256**	**.000*** **

***$p < .001$; **$p < .01$; *Note.* $N = 2608$.

Table 4: Difference between students' school type and their environmental attitude

One-way ANOVA was used to understand the difference in environmental attitudes among students from different types of schools. The F-statistic indicates the degree of difference between the groups – a higher F-statistic value signifies a greater difference. The p-value determines if this difference is statistically significant. All other scales showed a significant statistical difference except for the scales on altering nature, dominance over nature, and support for population growth policies. Overall, based on the p-value, the difference in environmental attitudes among students from different types of schools is statistically significant. Furthermore, when comparing the mean scores, students from government-aided schools exhibited a better attitude towards the environment compared to students from government and private schools.

This finding has also been confirmed by Mittu (2019), who found a difference in the attitudes of private and government secondary school students towards environmental pollution, a significant aspect of environmental attitudes. Private secondary school students were more concerned about environmental pollution than government secondary school students. This could be attributed to the fact that more activities related to environmental pollution are organised in private secondary schools compared to government secondary schools.

Scale	College Type				*t*	*p*-value
	Government (n = 1140)		Private (n = 1468)			
	M	*SD*	*M*	*SD*		
Enjoyment of Nature	5.62	1.00	5.48	1.06	3.515	.000***
Interventionist Policies	4.89	0.79	4.82	0.79	2.295	.022
Environmental Activism	5.21	1.00	5.13	1.07	1.949	.051
Anthropocentric Conservation	4.25	0.67	4.20	0.70	1.508	.132
Confidence in Science	4.15	1.01	4.09	1.03	1.434	.152
Environmental Fragility	5.21	0.89	5.09	0.93	3.401	.001**
Altering Nature	3.65	0.89	3.67	0.88	-.499	.618
Personal Conservation Behaviour	5.54	1.02	5.41	1.08	3.242	.001**
Dominance over Nature	3.95	0.88	3.88	0.84	2.071	.038
Utilisation of Nature	3.18	0.89	3.25	0.91	-2.109	.035
Ecocentric Concern	5.08	0.95	4.96	0.93	3.269	.001**
Support for Population Growth Policies	4.69	1.17	4.59	1.14	2.201	.028
Attitude towards Waste	4.39	0.78	4.34	0.77	1.656	.098
Environmental Attitude	**4.60**	**0.45**	**4.53**	**0.45**	**3.930**	**.000*** **

***$p < .001$; **$p < .01$; df = 2606; *Note.* $N = 2608$.

Table 5: Difference between students' college type and their environmental attitude

In terms of the relationship between the type of college and students' environmental attitudes, a statistically significant difference has been observed. This difference pertains to the scales of enjoyment of nature, environmental fragility, personal conservation behaviour, and ecocentric concern between students from government and private colleges. A statistically significant difference was also observed in the overall environmental attitude. The mean score suggests that students from government colleges have a relatively better environmental attitude compared to their counterparts from private colleges.

While this study did not measure the reasons for this difference in attitude between government and private college students, one potential explanation could be that most government colleges might expose students more directly to environmental issues, for instance, through activities under the National Service Scheme (NSS) (refer to Table 11). This could heighten their awareness and concern about the environment.

Scale	School Board				*F-Statistic*	*p*-value
	State Board (n = 1483)	CBSE (n = 396)	ICSE (n = 729)	Others (n = 59)		
	M (SD)				(df1 = 3) (df2 = 2604)	
Enjoyment of Nature	5.56 (1.03)	5.87 (0.88)	5.43 (1.32)	4.19 (0.61)	39.087	.000***
Interventionist Policies	4.85 (0.78)	5.22 (0.68)	4.77 (0.55)	4.05 (0.80)	30.989	.000***
Environmental Activism	5.18 (1.04)	5.30 (0.96)	4.99 (1.21)	4.16 (0.54)	19.934	.000***
Anthropocentric Conservation	4.23 (0.70)	4.22 (0.63)	4.13 (0.55)	3.97 (0.48)	2.899	.034
Confidence in Science	4.10 (1.03)	4.48 (1.09)	4.10 (0.52)	4.02 (0.48)	5.654	.001**
Environmental Fragility	5.16 (0.91)	5.28 (0.85)	5.10 (1.02)	4.25 (0.64)	20.553	.000***
Altering Nature	3.65 (0.89)	3.64 (0.77)	4.18 (0.87)	4.03 (0.67)	5.339	.001**
Personal Conservation Behaviour	5.50 (1.04)	5.61 (1.10)	5.27 (0.85)	4.14 (0.66)	33.803	.000***

(Cont.)

Scale	School Board				*F-Statistic*	*p*-value
	State Board (n = 1483)	CBSE (n = 396)	ICSE (n = 729)	Others (n = 59)		
	M (SD)				(df1 = 3) (df2 = 2604)	
Dominance over Nature	3.91 (0.86)	3.97 (0.82)	3.40 (0.88)	4.04 (0.64)	2.594	.051
Utilisation of Nature	3.22 (0.90)	3.03 (0.92)	3.48 (1.31)	3.72 (0.62)	8.438	.000***
Ecocentric Concern	5.02 (0.94)	5.26 (0.96)	5.01 (0.86)	4.16 (0.50)	19.804	.000***
Support for Population Growth Policies	4.63 (1.16)	4.81 (1.15)	4.91 (1.28)	4.03 (0.61)	6.753	.000***
Attitude towards Waste	4.36 (0.78)	4.48 (0.69)	4.27 (0.65)	4.06 (0.77)	4.092	.007**
Environmental Attitude	**4.57 (0.45)**	**4.70 (0.40)**	**4.54 (0.46)**	**4.06 (0.23)**	**29.834**	**.000*** **

***$p < .001$; **$p < .01$; *Note.* $N = 2608$.

Table 6: Difference between students' school board and their environmental attitude

Scale	School Education Stream			*F-Statistic*	*p*-value
	Arts (n = 449)	Commerce (n = 658)	Science (n = 1501)		
	M (SD)			(df1 = 2) (df2 = 2605)	
Enjoyment of Nature	5.59 (1.05)	5.47 (1.05)	5.56 (1.03)	2.344	.096
Interventionist Policies	4.89 (0.82)	4.76 (0.78)	4.88 (0.77)	6.277	.002**
Environmental Activism	5.25 (1.04)	5.05 (1.03)	5.19 (1.05)	5.984	.003**
Anthropocentric Conservation	4.26 (0.68)	4.21 (0.72)	4.21 (0.68)	.974	.378
Confidence in Science	4.17 (0.94)	4.04 (0.91)	4.13 (1.09)	2.418	.089
Environmental Fragility	5.22 (0.94)	5.04 (0.93)	5.17 (0.89)	6.136	.002**
Altering Nature	3.64 (0.95)	3.74 (0.87)	3.63 (0.87)	3.910	.020
Personal Conservation Behaviour	5.52 (1.09)	5.39 (1.07)	5.49 (1.04)	2.319	.099

(Cont.)

Scale	School Education Stream			*F-Statistic*	*p*-value
	Arts (n = 449)	Commerce (n = 658)	Science (n = 1501)		
	M (SD)			(df1 = 2) (df2 = 2605)	
Dominance over Nature	3.95 (0.89)	3.90 (0.77)	3.91 (0.88)	.509	.601
Utilisation of Nature	3.28 (0.86)	3.33 (0.94)	3.15 (0.90)	9.870	.000***
Ecocentric Concern	5.01 (0.94)	4.98 (0.97)	5.04 (0.93)	.904	.405
Support for Population Growth Policies	4.78 (1.16)	4.57 (1.14)	4.61 (1.16)	4.833	.008**
Attitude towards Waste	4.41 (0.81)	4.28 (0.77)	4.38 (0.76)	4.509	.011
Environmental Attitude	**4.61 (0.48)**	**4.52 (0.43)**	**4.57 (0.44)**	**5.725**	**.003****

***$p < .001$; **$p < .01$; *Note.* $N = 2608$.

Table 7: Difference between students' school education stream and their environmental attitude

Scale	College Education Stream					*F-Statistic*	*p*-value
	Arts (n = 599)	Commerce (n = 624)	Engineering (n = 625)	Science (n = 609)	Medicine (n= 151)		
	M (SD)					(df1 = 4) (df2 = 2603)	
Enjoyment of Nature	5.59 (1.00)	5.47 (1.04)	5.51 (1.05)	5.55 (1.05)	5.74 (1.05)	2.629	.033
Interventionist Policies	4.86 (0.81)	4.80 (0.81)	4.87 (0.75)	4.88 (0.75)	4.85 (0.88)	1.037	.387
Environmental Activism	5.18 (1.03)	5.12 (1.04)	5.14 (1.07)	5.27 (1.02)	4.98 (1.03)	3.151	.014
Anthropocentric Conservation	4.25 (0.71)	4.19 (0.67)	4.18 (0.66)	4.27 (0.69)	4.20 (0.75)	1.745	.137
Confidence in Science	4.08 (1.00)	4.16 (1.00)	4.23 (1.10)	4.02 (1.01)	3.99 (0.86)	4.229	.002**
Environmental Fragility	5.19 (0.92)	5.10 (0.92)	5.13 (0.89)	5.17 (0.91)	5.13 (0.94)	1.007	.403
Altering Nature	3.61 (0.91)	3.74 (0.89)	3.67 (0.86)	3.65 (0.92)	3.53 (0.73)	2.708	.029
Personal Conservation Behaviour	5.48 (1.04)	5.47 (1.04)	5.40 (1.10)	5.51 (1.02)	5.50 (1.15)	.949	.434

(Cont.)

Scale	College Education Stream					*F-Statistic*	*p*-value
	Arts (n = 599)	Commerce (n = 624)	Engineering (n = 625)	Science (n = 609)	Medicine (n= 151)		
	M (SD)					(df1 = 4) (df2 = 2603)	
Dominance over Nature	3.91 (0.87)	3.96 (0.86)	3.91 (0.89)	3.87 (0.83)	3.90 (0.79)	.962	.427
Utilisation of Nature	3.19 (0.88)	3.25 (0.91)	3.23 (0.94)	3.22 (0.88)	3.20 (0.91)	.473	.755
Ecocentric Concern	5.05 (0.92)	4.96 (0.95)	4.93 (0.92)	5.11 (0.94)	5.08 (1.02)	3.483	.008**
Support for Population Growth Policies	4.66 (1.16)	4.59 (1.15)	4.64 (1.10)	4.62 (1.17)	4.67 (1.35)	.383	.821
Attitude towards Waste	4.34 (0.76)	4.34 (0.80)	4.35 (0.75)	4.36 (0.79)	4.55 (0.71)	2.509	.040
Environmental Attitude	**4.57 (0.43)**	**4.55 (0.45)**	**4.55 (0.45)**	**4.58 (0.45)**	**4.56 (0.51)**	**.323**	**.862**

**$p < .01$; *Note.* $N = 2608$.

Table 8: Difference between students' college education stream and their environmental attitude

With the exception of the specific scales on anthropocentric conservation and dominance over nature, statistically significant differences were observed in students' attitudes across other scales. Consequently, the overall environmental attitude among students from different boards – state board, CBSE, ICSE, and others – exhibits statistically significant differences (see Table 6). From the mean score, it can be inferred that students from the CBSE board exhibit a better environmental attitude compared to those from state, ICSE, and other boards.

In terms of the school educational streams of the students, differences were observed in the scales measuring their attitudes towards interventionist policies, environmental activism, environmental fragility, utilisation of nature, and support for population growth policies among arts, science, and commerce stream students. Overall, a statistically significant difference in environmental attitudes was observed (see Table 7). Students in the arts stream have a relatively better environmental attitude than those in the science and commerce streams. The arts stream includes subjects such as history, political science, and geography, which often involve discussions on environmental issues, sustainability, and social justice. This exposure could lead to a better understanding and consequently, a more positive attitude towards the environment.

Contrary to the previous findings, when considering the overall environmental attitudes of students, no statistically significant difference was observed across different college educational streams – arts, commerce, engineering, science, and medicine (see Table 8). This suggests that the type of educational stream a student is enrolled in does not significantly influence their overall environmental attitude. However, it's important to note that there were exceptions. For instance, statistically significant differences were found in specific scales such as 'confidence in science' and 'ecocentric concern'. In other words, students from different educational streams generally exhibit similar environmental attitudes. This could be due to the compulsory involvement of every student in extracurricular activities, such as participation in the National Service Scheme (NSS), National Cadet Corps (NCC), etc (see Table 11). These activities may provide a platform that fosters similar environmental attitudes among students, irrespective of their educational stream. However, their confidence in science's ability to solve environmental problems and their ecocentric concerns can vary significantly.

A study conducted among college students in Mizoram to understand their attitudes towards environmental protection revealed that students from the science stream have a better attitude compared to those from arts and commerce streams (Vanlalhmangaihzuali and Lalhriatpuii 2022). Another study, which measured college students' attitudes towards environmental education in West Bengal, found no difference in attitudes between students in the science and social science streams (Bauri and Behera 2018). A separate study aimed at understanding the environmental

curriculum across environmental and non-environmental disciplines found that, with the exception of forestry students, there was no difference in attitudes observed among students from other disciplines (Fytopoulou et al. 2023). Therefore, conflicting findings have been observed with regard to the discipline of college students and their environmental attitudes.

Scale	Native Place				*t*	*p*-value
	Rural (n = 1819)		Urban (n = 789)			
	M	*SD*	*M*	*SD*		
Enjoyment of Nature	5.54	1.01	5.55	1.10	-.204	.839
Interventionist Policies	4.84	0.77	4.88	0.81	-1.050	.294
Environmental Activism	5.22	1.01	5.05	1.11	3.765	.000***
Anthropocentric Conservation	4.22	0.69	4.24	0.69	-.635	.525
Confidence in Science	4.03	0.98	4.32	1.09	-6.669	.000***
Environmental Fragility	5.16	0.92	5.12	0.89	1.045	.296
Altering Nature	3.61	0.91	3.77	0.83	-4.093	.000***
Personal Conservation Behaviour	5.50	1.03	5.40	1.11	2.039	.042
Dominance over Nature	3.85	0.85	4.06	0.85	-5.945	.000***
Utilisation of Nature	3.20	0.90	3.27	0.90	-1.978	.048
Ecocentric Concern	5.04	0.93	4.97	0.96	1.607	.108
Support for Population Growth Policies	4.65	1.19	4.58	1.08	1.446	.148
Attitude towards Waste	4.37	0.76	4.33	0.80	1.409	.159
Environmental Attitude	**4.55**	**0.42**	**4.58**	**0.50**	**-1.262**	**.207**

***$p < .001$; **$p < .01$; df = 2606; *Note.* $N = 2608$.

Table 9: Difference between students' native place and their environmental attitude

In terms of the student's native place, the overall environmental attitudes do not show a statistically significant difference between students from rural and urban areas. However, when examining specific scales such as environmental activism, confidence in science, altering nature, and dominance over nature, statistically significant differences were observed between students from rural and urban areas. This suggests that while the overall environmental attitudes are similar, certain aspects of these attitudes are influenced by the students' rural or urban origins.

Scale	Current Place of Residence				*t*	*p*-value
	Rural (n = 1480)		Urban (n = 1128)			
	M	*SD*	*M*	*SD*		
Enjoyment of Nature	5.53	1.01	5.55	1.07	-.586	.558
Interventionist Policies	4.83	0.78	4.88	0.80	-1.504	.133
Environmental Activism	5.20	1.01	5.12	1.08	2.111	.035
Anthropocentric Conservation	4.21	0.69	4.24	0.69	-.974	.330
Confidence in Science	3.90	0.90	4.39	1.11	-12.491	.000***
Environmental Fragility	5.15	0.92	5.14	0.91	.389	.697
Altering Nature	3.64	0.91	3.69	0.85	-1.436	.151
Personal Conservation Behaviour	5.48	1.04	5.46	1.08	.508	.612
Dominance over Nature	3.86	0.84	3.98	0.87	-3.756	.000***
Utilisation of Nature	3.21	0.90	3.24	0.91	-.733	.464
Ecocentric Concern	5.02	0.94	5.01	0.94	.178	.859

(Cont.)

Scale	Current Place of Residence				*t*	*p*-value
	Rural (n = 1480)		Urban (n = 1128)			
	M	*SD*	*M*	*SD*		
Support for Population Growth Policies	4.60	1.20	4.67	1.09	-1.464	.143
Attitude towards Waste	4.36	0.78	4.36	0.77	-.039	.969
Environmental Attitude	**4.54**	**0.42**	**4.59**	**0.48**	**-3.171**	**.002****

***$p < .001$; **$p < .01$; df = 2606; *Note.* $N = 2608$.

Table 10: Difference between students' current place of residence and their environmental attitude

Table 10 reveals a statistically significant difference in the overall environmental attitudes of students based on their current place of residence. Specifically, the scales measuring 'confidence in science' and 'dominance over nature' show significant differences between students residing in rural and urban areas. This suggests that a student's current living environment, whether rural or urban, can influence certain aspects of their environmental attitudes. Students residing in urban environments are likely more exposed to environmental problems, including air pollution, compared to students residing in rural areas. This exposure to environmental problems might have prompted them to seek more information on environmental protection, which could have helped them to develop a relatively better environmental attitude than students from rural areas.

Residents of rural areas interact with the environment in ways that are relatively different from those of their urban counterparts; they are undoubtedly more connected with nature. However, not many studies have examined the influence of nativity and residence in a distinct manner. Berenguer, Corraliza, and Martín (2005) discovered that individuals living in rural areas exhibit more environmentally responsible attitudes. Similarly, students in the United Kingdom who were raised in rural areas reported more positive orientations towards the natural environment than those raised in urban areas (Hinds and Sparks 2008). In line with these studies, another research employed the Environmental Attitudes Inventory (EAI) to understand the difference in environmental attitudes between rural and urban students. However, it concluded that there isn't sufficient evidence to assert a significant difference in attitudes between rural and urban students (Severin 2020).

Source of information	Responses*	
	N = 2608	%
Activities of National Service Scheme (NSS)	1407	15.4
Social Media (YouTube, Facebook, etc.)	1168	12.8
Course on Environmental Studies (EVS)	1040	11.4
Activities of environmental NGOs	893	9.8
Academic seminars and conferences	855	9.4
TV News channels	754	8.3
Activities of government departments	719	7.9
Friends and family	491	5.4
Newspapers (including e-newspapers and its websites)	459	5.0
During World Environment Day celebrations every June 5	424	4.6
Documentaries on OTT (Netflix, Prime Video, etc.)	354	3.9
Non-academic books and magazines	288	3.2
Radio	266	2.9

**Multiple responses were obtained for the above question*

Table 11: Main source of information on environmental protection during college days

In addition to the previously discussed variables, the primary source of environmental protection information during college years is considered a significant variable for this study. As per the results presented in Table 11, it is evident that among the listed sources of information, the activities conducted through the National Service Scheme (NSS) serve as the principal source of information on environmental protection. Following NSS, social media emerges as the next significant source of information. Interestingly, despite students undertaking a semester-compulsory course on Environmental Studies (EVS), it ranks as the third main source of information on environmental protection, trailing behind NSS and social media.

Around 9% of the students reported that the activities of environmental NGOs and academic seminars and conferences serve as their source of information on environmental protection. Despite the annual celebration of World Environment Day on June 5, it appears to be ineffective in conveying the importance of environmental protection among students. These findings could assist relevant government departments and higher education institutions in devising strategies on different ways to effectively communicate the message of environmental protection among students.

6 Limitations

This study represents an initial attempt to understand the environmental attitudes of college students in Tamil Nadu. It's important to note that having a positive attitude does not necessarily translate into action or behaviour change towards environmental protection and pro-environmental behaviour. Therefore, a more targeted, longitudinal study may be necessary to understand the relationship between attitude and actual behaviour.

The study also takes into account the potential for social-desirability bias. This is a common issue in self-reporting based social science research, where respondents may answer questions in a manner that they believe will be viewed favourably by others. This bias can skew the results and paint a more positive picture than what might be the reality.

Therefore, while interpreting the findings of the study, these limitations should be taken into consideration. It's crucial to remember that the attitudes reported in this study may not fully reflect the students' actual behaviours or actions towards the environment. Further research is needed to explore this gap and develop more effective strategies for promoting pro-environmental behaviour among college students.

7 Recommendations

Based on the study's findings, the following recommendations were drawn for higher educational institutions.

Targeted content inclusion: The study reveals specific areas where students exhibit neutral attitudes or variations in opinions. This information can guide curriculum designers to incorporate targeted content that addresses these nuanced perspectives. For instance, including modules that emphasise the significance of policies related to the restriction of business and industry, population growth, and waste management can help bridge gaps in understanding and foster more positive attitudes among students.

Promoting ecocentrism over anthropocentrism: Given the students' positive inclination towards ecocentric concerns, coupled with their neutral attitude towards anthropocentrism, it would be beneficial for the pedagogy to emphasise the importance of nature protection and the interdependence between humans and the environment. Case studies and examples that showcase successful and demonstrable ecocentric conservation models (e.g., community-led conservation) could be presented to students. This exposure would inspire a deeper appreciation for the fragility of ecosystems and the crucial role they play in our lives. This approach could effectively foster an ecocentric mindset among students, promoting a more sustainable future.

Spell out the limitations of science and technology: The study underscores a neutral stance in students' confidence in science's ability to resolve all environmental issues. This suggests that some students may believe that science and technology can solve all environmental problems. However, while science and technology can aid in addressing environmental issues, they are not always the sole solution for the damage already inflicted on the environment. In other words, science and technology can help mitigate the after-effects of such destruction, but they cannot completely reverse the damage done.

Addressing the sense of dominance over nature: The findings reveal a dichotomy in students' attitudes, as they acknowledge the enjoyment of nature while also expressing openness to its consumption. This observation calls for action to promote sustainable practices, emphasising the responsible use of natural resources. It underscores the importance of striking a balance between human needs and environmental conservation. In essence, it's crucial to educate students about the significance of sustainability and the role they can play in achieving it.

7.1 Implications for Environmental Studies syllabus

The Environmental Studies course prescribed by the University Grants Commission (UGC) for all undergraduate students in higher education institutions in India is designed to provide a comprehensive and interdisciplinary approach to studying the environment. This course is a mandatory part of the curriculum and carries two credits. The course is ideally taken in the second year of study, either during the third or fourth semester. The syllabus is divided into eight units, which are covered over 50 lectures. The first seven units, accounting for 45 lectures, are classroom-based and aim to enhance students' knowledge, skills, and attitudes towards the environment.

Here's a brief overview of each unit:

1. **Introduction to Environmental Studies:** This unit provides a broad overview of the field of environmental studies, introducing its multidisciplinarity and key concepts including sustainability and sustainable development.
2. **Ecosystem:** This unit delves into the structure and function of ecosystems, exploring the relationships between organisms and their environment including forest, grassland, desert and aquatic ecosystems.
3. **Natural Resources:** Renewable and Non-renewable Resources: This unit examines various natural resources, their uses, and the importance of conserving both renewable and non-renewable resources.
4. **Biodiversity and Conservation:** This unit focuses on the variety of life on Earth, the importance of biodiversity and threats to biodiversity. It also focuses on various ecosystem and biodiversity services.
5. **Environmental Pollution:** This unit discusses different types of pollution, their causes and effects. It also has components on solid waste management as well.
6. **Environmental Policies & Practices:** This unit explores the policies and practices related to environmental management and environmental protection laws, including issues around climate change. Significantly, it discusses nature reserves, the rights of tribal populations, and human-wildlife conflicts.
7. **Human Communities and the Environment:** This unit examines the impact of human activities on the environment and how communities can work towards sustainability. It covers a wide range of areas, including human population growth and environmental movements.

The eighth and final unit involves fieldwork. This hands-on experience allows students to visit sites of environmental assets and local polluted sites. They also study the identification of plants and animals and learn about ecosystems. This practical exposure complements the theoretical knowledge gained in the classroom, providing a holistic understanding of environmental studies.

This course aims to equip students with the knowledge and skills necessary to understand and address environmental issues, fostering a generation of environmentally conscious individuals who can contribute to sustainable development. One significant limitation of the existing syllabus is that the resources prescribed in the suggested readings for this course need an update to keep the students informed about recent developments.

A simple comparison between the environmental studies syllabus and the specific scales under the Environmental Attitudes Inventory can provide insights into how the syllabus helps college students develop a pro-environmental attitude. The following table is intended to provide a comparative overview between these two aspects. Remember, the effectiveness of a syllabus in shaping attitudes can depend on various factors, including the depth and breadth of the topics covered, the pedagogical approaches used, and the extent to which students engage with the material.

Environmental studies syllabus units	Environmental attitudes inventory scale
Introduction to environmental studies	Enjoyment of nature
Ecosystem	Enjoyment of nature; Environmental fragility; Altering nature; Ecocentric concern
Natural resources: renewable and non-renewable resources	Human utilisation of nature; Personal conservation behaviour
Biodiversity and conservation	Enjoyment of nature; Anthropocentric conservation; Environmental fragility; Altering nature; Ecocentric concern
Environmental pollution	Interventionist policies; Confidence in science and technology; Human utilisation of nature; Attitude towards waste
Environmental policies & practices	Interventionist policies; Anthropocentric conservation; Environmental fragility; Altering nature; Human dominance over nature; Human utilisation of nature; Ecocentric concern; Attitude towards waste
Human communities and the environment	Environmental activism; Support for population growth policies; Attitude towards waste; Personal conservation behaviour

Table 12: A simple comparison of the units in the environmental studies syllabus and the scales in the Environmental Attitudes Inventory

Though each scale under the environmental attitudes inventory is somehow directly or indirectly relevant to the contents of the environmental studies syllabus. Therefore, based on the findings of the study, the syllabus may include components related to the government's interventionist approach on restricting industries using natural resources and raw materials and population growth policies, solid waste management and the negative effect of anthropocentric conservation. Having such components reiterates that prevention is better than cure; therefore, we should not over-rely on science and technology to rectify all environmental problems. Apart from adding these components, the following components should be emphasised more. Human dominance over nature will always hurt the stability of ecosystem and biodiversity services. For the sake of nature, it should not always be altered, and prioritising environmental health over economic growth is important for the sustainable utilisation of resources.

In addition to these components, the syllabus could place greater emphasis on the following aspects:

1. Human dominance over nature: The belief that human dominance over nature will always harm the stability of ecosystems and biodiversity services. It's crucial to understand that nature should not always be altered for human convenience.

2. Sustainable utilisation of resources: The importance of prioritising environmental health over economic growth in the sustainable utilisation of resources. This principle underscores the need for a balance between development and conservation.

By incorporating these elements, the syllabus can provide a more comprehensive and nuanced understanding of environmental issues, fostering a pro-environmental attitude among students.

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Appendix 1

Section 1

This section of the survey contains twelve specific scales designed to measure your attitude towards the environment. Your responses will be recorded on a seven-point scale, ranging from "Strongly Disagree" to "Strongly Agree". The seven-point scale is abbreviated as follows: Strongly Disagree (**SD**); Disagree (**D**); Somewhat Disagree (**SMD**); Neither Agree nor Disagree (**N**); Somewhat Agree (**SMA**); Agree (**A**); Strongly Agree (**SA**). Please read each statement carefully and tick one box in each row that best reflects your opinion. Thank you for your participation!

	Scale 1: Enjoyment of Nature	SD	D	SMD	N	SMA	A	SA
1	I really like going on trips into the countryside, for example to forests or fields							
2	I find it very boring being out in wilderness areas							
3	Being out in nature is a great stress reducer for me							
4	I have a sense of well-being in the silence of nature							
5	I find it more interesting in a shopping mall than out in the forest looking at trees and birds							
6	I think spending time in nature is boring							
	Scale 2: Interventionist Policies	**SD**	**D**	**SMD**	**N**	**SMA**	**A**	**SA**
1	Governments should control the rate at which raw materials are used to ensure that they last as long as possible							
2	Controls should be placed on industry to protect the environment from pollution, even if it means things will cost more							

(Cont.)

3	People in developed societies are going to have to adopt a more conserving life-style in the future							
4	I am opposed to governments controlling and regulating the way raw materials are used in order to try and make them last longer							
5	Industries should be able to use raw materials rather than recycled ones if this leads to lower prices and costs, even if it means the raw materials will eventually be used up							
6	I don't think people in developed societies are going to have to adopt a more conserving life-style in the future							
Scale 3: Environmental activism		**SD**	**D**	**SMD**	**N**	**SMA**	**A**	**SA**
1	I would like to join and actively participate in an environmentalist group							
2	I don't think I would help to raise funds for environmental protection							
3	I would NOT get involved in an environmentalist organisation							
4	Environmental protection costs a lot of money. I am prepared to help out in a fund-raising effort							
5	I would not want to donate money to support an environmentalist cause							
6	I would like to support an environmental organisation							
Scale 4: Anthropocentric conservation		**SD**	**D**	**SMD**	**N**	**SMA**	**A**	**SA**
1	One of the most important reasons to keep lakes and rivers clean is so that people have a place to enjoy their leisure							

(Cont.)

2	Nature is important because of what it can contribute to the pleasure and welfare of humans							
3	The thing that concerns me most about deforestation is that there will not be enough timber for future generations							
4	Conservation is important even if it lowers peoples' standard of living							
5	We need to keep rivers and lakes clean in order to protect the environment, and NOT as places for people to enjoy their leisure							
6	We should protect the environment even if it means peoples' welfare will suffer							
Scale 5: Confidence in science and technology		**SD**	**D**	**SMD**	**N**	**SMA**	**A**	**SA**
1	Science and technology will eventually solve our problems with pollution, overpopulation, and diminishing resources							
2	Modern science will NOT be able to solve our environmental problems							
3	We cannot keep counting on science and technology to solve our environmental problems							
4	Humans will eventually learn how to solve all environmental problems							
5	The belief that advances in science and technology can solve our environmental problems is completely wrong and misguided							
6	Modern science will solve our environmental problems							

(Cont.)

	Scale 6: Environmental fragility	SD	D	SMD	N	SMA	A	SA
1	If things continue on their present course, we will soon experience a major ecological catastrophe							
2	When humans interfere with nature it often produces disastrous consequences							
3	Humans are severely abusing the environment							
4	The idea that the balance of nature is terribly delicate and easily upset is much too pessimistic							
5	I do not believe that the environment has been severely exploited by humans							
6	People who say that the unrelenting exploitation of nature has driven us to the brink of ecological collapse are wrong							
	Scale 7: Altering nature	**SD**	**D**	**SMD**	**N**	**SMA**	**A**	**SA**
1	I'd prefer a garden that is wild and natural to a well-groomed and ordered one							
2	Human beings should not tamper with nature even when nature is uncomfortable and inconvenient for us							
3	Turning new unused land over to cultivation and agricultural development should be stopped							
4	I'd much prefer a garden that is well groomed and ordered to a wild and natural one							

(Cont.)

5	When nature is uncomfortable and inconvenient for humans, we have every right to change and remake it to suit ourselves							
6	Grass and weeds growing between the pavement stones really looks untidy							
Scale 8: Personal conservation behaviour		**SD**	**D**	**SMD**	**N**	**SMA**	**A**	**SA**
1	I could not be bothered to save water or other natural resources							
2	In my daily life I'm just not interested in trying to conserve water and/or power							
3	I always switch the light off when I don't need it on any more							
4	In my daily life I try to find ways to conserve water or power							
5	I am NOT the kind of person who makes efforts to conserve natural resources							
6	Whenever possible, I try to save natural resources							
Scale 9: Human dominance over nature		**SD**	**D**	**SMD**	**N**	**SMA**	**A**	**SA**
1	Humans were meant to rule over the rest of nature							
2	Human beings were created or evolved to dominate the rest of nature							
3	Plants and animals have as much right as humans to exist							
4	Plants and animals exist primarily to be used by humans							
5	I DO NOT believe humans were created or evolved to dominate the rest of nature							
6	Humans are no more important than any other species							

(Cont.)

Scale 10: Human utilisation of nature		SD	D	SMD	N	SMA	A	SA
1	Protecting peoples' jobs is more important than protecting the environment							
2	Humans do NOT have the right to damage the environment just to get greater economic growth							
3	Protecting the environment is more important than protecting economic growth							
4	Protecting the environment is more important than protecting peoples' jobs							
5	The question of the environment is secondary to economic growth							
6	The benefits of modern consumer products are more important than the pollution that results from their production and use							
Scale 11: Ecocentric concern		**SD**	**D**	**SMD**	**N**	**SMA**	**A**	**SA**
1	The idea that nature is valuable for its own sake is naive and wrong							
2	Nature is valuable for its own sake							
3	I do not believe protecting the environment is an important issue							
4	Despite our special abilities humans are still subject to the laws of nature							
5	It makes me sad to see forests cleared for developmental activities							
6	It does NOT make me sad to see natural environments destroyed							

(Cont.)

Scale 12: Support for population growth policies		SD	D	SMD	N	SMA	A	SA
1	Families should be encouraged to limit themselves to two children or less							
2	A married couple should have as many children as they wish, as long as they can adequately provide for them							
3	Our government should educate people concerning the importance of having two children or less							
4	We should never put limits on the number of children a couple can have							
5	We would be better off if we dramatically reduced the number of people on the Earth							
6	The government has no right to require married couples to limit the number of children they can have							
Scale 13: Attitude towards waste		**SD**	**D**	**SMD**	**N**	**SMA**	**A**	**SA**
1	I'm not aware that segregating waste at the household level results in less waste being dumped into landfills							
2	I don't view single-use plastics as a significant environmental problem							
3	I think all packaging, regardless of cost, should be recyclable							
4	I'm aware that the widespread use of plastics is affecting our environment							
5	I prefer recycling over reducing and reusing							
6	I believe in using disposables at gatherings							

Section 2

This section aims to gather information about your profile for the analysis of your environmental attitude. The information collected will not reveal your personal identity, so please feel free to share the requested information. Please tick one box in each row.

Age		
Gender	1.	Male
	2.	Female
	3.	Others
The school where you completed your 12th standard	1.	Government School
	2.	Government aided School
	3.	Private School
Which board did you study for your 12th standard?	1.	State Board
	2.	CBSE
	3.	ICSE
	4.	Other, specify:
The stream in which you completed your 12th standard	1.	Arts (e.g., history, geography, political science, etc.)
	2.	Commerce (e.g., accountancy, economics, etc.)
	3.	Science (e.g., physics, chemistry, maths, biology/botany/ zoology, etc.)

The undergraduate degree you are currently pursuing	1.	B.A. (including LLB), specify your discipline (e.g., economics, history, etc.)_____		
	2.	B.Com.		
	3.	B.E./B.Tech, specify your discipline (e.g., civil, mechanical, etc.)_____		
	4.	B.Sc., specify your discipline (e.g., chemistry, physics, etc.)_____		
	5.	MBBS/BDS/B.V.Sc.		
The college where you are pursuing your undergraduate degree	1.	Government College		
	2.	Private College		
During your college days, what was your **main source** of information on environmental protection?	1.	Academic seminars and conferences	8.	Friends and family
	2.	Activities of environmental NGOs	9.	Newspapers (including e-newspapers and its websites)
	3.	Activities of government departments	10.	Non-academic books and magazines
	4.	Activities of National Service Scheme (NSS)	11.	Radio
	5.	Course on Environmental Studies (EVS)	12.	Social Media (YouTube, Facebook, etc.)
	6.	Documentaries on OTT (Netflix, Prime Video, etc.)	13.	TV News channels
	7.	During World Environment Day celebrations every June 5	14.	Others, specify:
Native Place	Rural			
	Urban			
Current Place of Residence	Rural			
	Urban			

ADDENDUM

Outcome of the workshop to revisit existing environmental studies syllabus for undergraduate students conducted by

CAG
Citizen consumer and civic Action Group

1st March 2024, Chennai

In an effort to understand environmental attitudes among college students in Tamil Nadu, CAG conducted a study across all 38 districts of Tamil Nadu, surveying 2608 students. We utilised the Environmental Attitudes Inventory (EAI), which comprises 12 scales: enjoyment of nature, interventionist policies, environmental activism, anthropocentric conservation, confidence in science, environmental fragility, altering nature, personal conservation behaviour, dominance over nature, utilisation of nature, ecocentric concern, and support for population growth policies. Additionally, we added a new scale to assess students' attitude towards waste such as segregation and single-use plastics.

Based on our study findings, we recommend targeted content inclusion in areas where students exhibit negative or neutral attitudes. For instance, emphasising the significance of policies related to business and industry restrictions would be beneficial. Furthermore, we propose promoting ecocentrism over anthropocentrism, clearly outlining the limitations of science and technology in solving the environmental crisis, and addressing human beings' inclination to dominate over nature.

Complementing our study, we organised a one-day workshop to discuss the study findings and deliberate on the existing environmental studies curriculum prescribed by the University Grants Commission. Currently, this curriculum is compulsory for students from all streams at the undergraduate level. The workshop brought together diverse individuals from various backgrounds, including academic institutions, government organisations, independent researchers, journalists, environmentalists, and students.

Among the participants from academic institutions, we had representatives from a wide range of disciplines, and not just limited to environmental science/studies. These disciplines included botany, chemistry, community medicine, commerce, criminology, defence and strategic studies, economics, geography, geology, psychology, visual communication, and zoology. Additionally, we had representatives from the State Planning Commission, Tamil Nadu Pollution Control Board, and Tamil Nadu Forest Department. Environmental civil society organisations were also well-represented.

The workshop intentionally fostered a transdisciplinary approach, emphasising viewpoints from various stakeholders. After all, the environment encompasses almost every aspect of our lives. By bringing together experts and practitioners from different fields, we aimed to create a holistic understanding and explore effective strategies to revisit the existing environmental studies curriculum.

Discussions during the workshop

The consensus among workshop participants was clear: the existing syllabus, despite its title "Environmental Studies," predominantly aligns with the field of "Environmental Science." Keeping the content as 'environmental studies' is pivotal because true environmental education should transcend scientific boundaries. It should encompass a broader transdisciplinary perspective, incorporating social, economic, and cultural dimensions alongside scientific content. While some of these elements do exist within the syllabus, it is evident that they fall short of meeting the desired depth and breadth. By bridging this gap we can empower students to understand environmental issues holistically. The shift from a science-centric approach to a

comprehensive “studies” framework is essential for nurturing environmentally conscious citizens who can engage with real-world challenges beyond laboratory experiments. Additionally, many participants from higher education institutions have observed that the syllabus requires revamping to align with the University Grants Commission’s (UGC) Learning Outcome Based Curriculum Framework (LOCF).

The age of the current syllabus is a pressing concern. Dating back to 2004, it is now two decades old. During this time, the world has witnessed significant environmental transformations. Climate change has escalated, demanding immediate adaptation and mitigation measures. The Intergovernmental Panel on Climate Change (IPCC) unequivocally attributes global warming to human activities. As we strive to arrest average global temperature rise within the critical 1.5° Celsius threshold, the urgency for updated educational content becomes evident. Moreover, the Government of India’s ambitious goal of achieving carbon neutrality by 2070 underscores the need for a syllabus that reflects these contemporary imperatives.

In light of these developments, updating the syllabus is not a mere formality; it is an urgent necessity. We must infuse it with the latest scientific insights, policy frameworks, and practical solutions. However, the process isn’t one-size-fits-all. While the University Grants Commission (UGC) can provide a model syllabus, each state government should tailor it to their unique context. Geography, landscape, and biodiversity play crucial roles in shaping environmental challenges at the regional level. Therefore, state-specific components are essential. By fostering a transdisciplinary approach, we can bring together viewpoints from diverse stakeholders—academics, practitioners, policymakers, civil society, and indigenous communities. After all, the environment permeates almost every facet of our lives, and our educational framework should reflect this interconnected reality.

Another important outcome of the deliberations was reducing the syllabus content to just five units. The existing eight units can indeed burden both students and teachers. Several academics have observed that they often feel compelled to rush through classes to cover the extensive syllabus. Therefore, as a common practice in any curriculum, it was suggested to consolidate the syllabus into five units. Additionally, rather than having a dedicated unit solely for fieldwork, it was recommended to incorporate fieldwork into each unit. This approach ensures that students are exposed to the environmental components discussed in the specific unit. Based on these observations, a modified syllabus has been suggested.

Suggested unit-wise syllabus

Unit 1: Introduction to Environmental Studies

- Transdisciplinary nature of environmental studies, its scope and importance
- Concept of sustainability and sustainable development
- Basics of climate change, including mitigation and adaptation
- Activity: Understanding sustainable practices within the campus

Unit 2: Ecosystem, biodiversity and conservation

- What is an ecosystem?
- Different types of ecosystems – Terrestrial ecosystem: Forest, grassland and desert; Aquatic ecosystem: Marine, freshwater and estuary
- Concept of biodiversity
- India as a mega-biodiversity nation; Endangered and endemic species of India
- National Biodiversity Authority, State Biodiversity Boards, Biodiversity Management Committees and People's Biodiversity Register
- Threats to biodiversity: Habitat loss, wildlife crime & trafficking of exotic wildlife species, human-wildlife negative interaction, zoonoses and biological invasions
- Concept of one health
- Activity: Visits to nearby terrestrial and aquatic ecosystems and biodiversity hotspots

Unit 3: Natural resources and human communities

- Introduction to renewable and non-renewable resources
- Resource utilisation: Overutilisation and underutilisation
- Concept of circular economy and sustainable consumption
- Natural resources, conflict and conflict resolution during developmental and extraction projects like dam building and mining
- Promotion of ecocentricism over anthropocentricism
- International, national and regional environmental movements to uphold the rights of local and indigenous communities
- Activity: Interacting with people who live in the vicinity of sites with considerable environmental degradation; interaction with local environmental NGOs

Unit 4: Environmental protection

- Salient features of existing environmental laws
- Environment Impact Assessment and Social Impact Assessment
- Energy demand reduction and carbon footprints
- Disaster risk reduction and management strategies
- Recognising the limits of science and technology in environmental protection
- Activity: Documenting how science and technology aid during oil spills in water bodies and understanding their advantages and limitations

Unit 5: Environmental pollution

- Pollution: Types, causes, effects and their control and prevention strategies; air, water, soil, light and noise pollution; National Ambient Air Quality Standards and National Air Quality Index (AQI)
- Solid waste management: Control measures of municipal, industrial, biomedical and electronic waste; home composting
- Promotion of 5 R's: refuse, reduce, reuse, repurpose and recycle
- Activity: Reporting incidents of pollution to the State Pollution Control Board

List of resource persons participated in the workshop		
Sl.No.	**Name and designation**	**Institution**
1.	Dr. Sultan Ahmed Ismail Member	State Planning Commission Government of Tamil Nadu
2.	Dr. S. Janakarajan President	South Asia Consortium for Interdisciplinary Water Resources Studies
3.	Dr. D. Narasimhan Professor (Retired)	Department of Botany Madras Christian College
4.	Dr. G. Bhaskaran Professor & Head	Centre for Water Resources Management University of Madras
5.	Dr. Shaik Mohammad Hussain Professor & Head	Department of Geology University of Madras
6.	Dr. Utham Kumar Jamadhagni Professor & Head	Department of Defence and Strategic Studies University of Madras
7.	Dr. P. Thamizoli Social Anthropologist	Independent
8.	Dr. S. Kaneez Fathima Associate Professor	P.G & Research Department of Zoology J.B.A.S College for Women
9.	Dr. M. Gopi Assistant Professor & Head	Department of Plant Biology & Plant Biotechnology, Guru Nanak College
10.	Dr. Durga M Assistant Professor & Head	Department of Biochemistry & Bioinformatics Dr. MGR Janaki College of Arts and Science for Women
11.	Dr. T. Divya Dovina Assistant Professor	Department of Psychology Women's Christian College
12.	Dr. S. Suthanthira Kannan Assistant Professor	Department of Community Medicine ESIC Medical College & Hospital
13.	Mrs. K. Buvaneswari Assistant Professor	Department of Chemistry, KCG College of Technology
14.	Dr. P. Ravikumar Assistant Professor	Department of Geography Presidency College
15.	Dr. J. Janci Arokia Rani Assistant Professor	School of Human Excellence Loyola College
16.	Dr. Prameena Sheeja Assistant Professor	Department of Environmental Science SDNB Vaishnav College for Women
17.	Dr. S. Ulaganathan Assistant Professor	Department of Economics Guru Nanak College
18.	Dr. C. Revathi Assistant professor	Department of Chemistry Chellammal Women's College
19.	Dr. Elangovan N Assistant Professor	Department of Chemistry AM Jain College
20.	Dr. R. Vidhyalakshmi Assistant Professor	Department of Microbiology Dr. MGR Janaki College of Arts and Science for Women

21.	Dr. J. Annie Velma Assistant Professor	School of Human Excellence Loyola College
22.	Dr. K. Narmada Assistant Professor	Department of Geography, IDE University of Madras
23.	Dr. Asfiya Banu Assistant Professor	Department of Travel and Tourism Management, J.B.A.S College for Women
24.	Dr. S. Jansirani Assistant Professor	Department of Commerce Patrician College of Arts and Science
25.	Mr. K. Kalidasan Environmentalist	*Osai*
26.	Mr. Geo Damin Environmentalist	*Poovulagin Nanbargal*
27.	Ms. Sherry Jose Assistant Professor	Environmental Studies AM Jain College
28.	Dr. R. L. Narendran Environmental Scientist	Tamil Nadu Pollution Control Board Government of Tamil Nadu
29.	Mr. Aditya D. Bhelkar Environmental Scientist	Tamil Nadu Pollution Control Board Government of Tamil Nadu
30.	Mrs. Sharanya S.V Assistant Professor	Department of Corporate Economics J.B.A.S College for Women
31.	Mr. Martin Baskar J Assistant Professor	Department of Visual Communication Patrician College of Arts and Science
32.	Mr. Thomas Gowthaman P Ph.D. Research Scholar	Department of Criminology University of Madras
33.	Mr. V. Vigneshwaran Ph.D. Research Scholar	Department of Defence and Strategic Studies University of Madras
34.	Mr. Dipjyoti Gogoi ICSSR Doctoral Fellow	Centre for Water Resources Management University of Madras
35.	Mr. S. Aravind Raj ICSSR Doctoral Fellow	Centre for Water Resources Management University of Madras
36.	Ms. Chitra P Project Coordinator	Advanced Institute for Wildlife Conservation Government of Tamil Nadu
37.	Mr. V Thirumurugan Project Coordinator	Advanced Institute for Wildlife Conservation Government of Tamil Nadu
38.	Ms. G. Glory Green Fellow	Department of Environment & Climate Change Government of Tamil Nadu
39.	Ms. Preetha Lakshmi Ph.D. Research Scholar	Department of Commerce Patrician College of Arts and Science
40.	Ms. Carolin Valentina Ph.D. Research Scholar	Department of Commerce Patrician College of Arts and Science

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