ASSESSING ENVIRONMENTAL KNOWLEDGE AND ATTITUDE OF CADETS IN THE PHILIPPINE MILITARY ACADEMY, BAGUIO CITY, PHILIPPINES

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ABSTRACT

Environmental problems continue to be a pressing concern worldwide. Climate change, land degradation, biodiversity loss, and pollution in soil, air, and water are often related to the lack of environmental education or awareness. Environmental education is instrumental in changing or forming a person's knowledge and behavior towards nurturing the environment. An evaluation of environmental knowledge and attitude is a key ingredient in crafting desirable environmental approach and education. Hence, an assessment of these variables involving the cadets of the Philippine Military Academy (PMA) in Baguio City, Philippines was undertaken. The study employs a descriptive-quantitative design in the form of a survey to 575 randomly selected cadets during the first semester of the Academic Year 2019-2020. The study was carried out from January to April 2020. The study revealed that the level of environmental knowledge and the attitudes of cadets is very good and strong positive, respectively. The knowledge of respondents about the environment is not influenced by gender. Still, it differs in terms of class. This may be attributed to their exposure to the environmental course in the academic curriculum. This is similar to their environmental attitude when grouped according to similar categories. Correlation analysis of the two variables is found not significant r (573) =0.10, p (two-tailed) =0.01. A study that will gauge the attitude of the respondents using different quantitative data is recommended. Also, to progress the sense of environmental stewardship among cadets, the environmental science course in the curriculum of the Academy should be retained.

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INTRODUCTION

Environmental problems are amongst the most critical conditions that confront the world today. Some of these problems such as climate change, land degradation, biodiversity loss, and pollution in soil, air, and water significantly impact the health of our biosphere. The effects of these problems are observed in the Philippines, a country known for its dense forest and rich biodiversity (UNDP, 2019). One environmental problem example is taken from the data of ESSC (1999) that shows rapid change in the country's forest cover from 90% in 1521 to 70% in 1900, and then to 22% in 1998. The forest cover loss initiated the protection, preservation, and improvement of the country's existing forests, which triggered a significant concern from the national government and other organizations (Estoque, et al., 2017). During the last decade, the government became supportive, and several reforestation projects and policies emerged in the Philippines (Lasco, et al., 2012).

Humankind is one of the major driving forces of climate change and other environmental problems and issues (Zobeidi, et al., 2020). Hence, knowledge and attitude to the environment are essential variables in nurturing pro-environmental conduct (Choe, et al., 2019). Environmental knowledge includes the understanding of environmental problems and its consequences, as well as the recognition of actions that must be taken to solve such challenges. Environmental attitude, on the other hand, refers to the capacity of an individual to evaluate an array of objects, issues, and people, including the self (Lieflander & Bogner, 2016). Several factors can and do influence the development of an individual's environmental knowledge and attitudes. For instance, education is instrumental in changing or forming a person's knowledge and behavior (Harum, et al., 2011; Lieflander & Bogner, 2016; Varela-Candamio, et al., 2017; Batri, et al., 2019; Zobeidi, et al., 2020) as well as the expansion of a sense of stewardship (Liobikiene & Poskus, 2019).

There are several studies on assessing environmental knowledge and attitude of individuals. A study of Dewulf, et al. (2020) revealed that environmental knowledge provides meaningful but narrow view in generating decisions. However, a study by Jakucionyte-Skodiene, et al. (2020) showed that environmental knowledge together with attitude and positive behavior have essential roles in energy consumption and related CO_2 emissions. Similarly, Cerri, et al. (2017)

and Mohiuddin, et al., (2018) revealed that environmental attitude influences the purchasing of sustainable or green products. In terms of elevating the level of environmental knowledge and attitudes, Mifsud (2011); and Sadik and Sadik (2014) stated that the television and the internet are essential factors in raising environmental awareness. A study by Lieflander and Bogner's (2016) emphasized that students who engaged in learning about the environment will less likely abuse natural resources. Otto and Pensini (2017) verified that even a short-term nature-based environmental education has positive impacts on learner's knowledge and attitude. Although these variables are assessed together, the research findings of Borhan and Ismail (2011), Paco and Lavrador (2017), and Braun and Dierkes, (2017) showed that environmental knowledge does not necessarily lead to a positive environmental attitude of an individual. However, these findings were different from the claims of Bradley, et al., (1999); Harum, et al. (2011); Lieflander and Bogner (2016); Zheng, et al. (2017); Itasanmi and Jegede (2019); Zobeidi, et al. (2020) that environmental knowledge has a positive influence on the environmental attitude of various individuals.

Investigating an individual's environmental knowledge and attitude is essential for the improvement of environmental education. While the Philippine legislature enacted Republic Act No. 9512 or the National Environmental Awareness and Education Act of 2008 (PCOO, 2020) which enables colleges and universities to offer environmental courses to students, there is no research conducted to assess environmental knowledge and attitude of students. It is therefore relevant to undertake a research that determines the level of knowledge and attitudes of students particularly the cadets of the Philippine Military Academy (PMA) in Baguio City, Philippines. These cadets, while still students at present, are set to be future military leaders and partners of the Philippine government to protect the country's natural resources. Hence, this study aims to assess the environmental knowledge and attitude of cadets of the PMA.

METHOD

Survey Development

This study employs a descriptive-quantitative design in the form of a survey. The survey was used to gauge the level of environmental knowledge and attitude of the respondents. A self-made questionnaire, consists of ten (10) questions that determine environmental knowledge and ten (10) items that describe the environmental attitude of the respondents, were crafted (Annex A). The content of the environmental knowledge and attitude questionnaire was lifted from the study of Choe, et.al, 2019. It was then revised to become contextually appropriate and suited to the conditions of the cadets of the PMA.

The researchers together with the course director of Environmental Science subject from the Department of Natural Sciences, PMA, validated the content of the questions that were used for the environmental knowledge test. Ten (10) questions were selected. The questionnaire was in multiple-choice-type format, with one correct answer. This questionnaire was pre-tested to 30 students to determine if there are questions that need modification or adjustment.

On the other hand, the questions to measure the environmental attitude of the cadets underwent content validity and pre-tested to 30 students for internal consistency or reliability computation (Table 1). The result of the reliability test for the variable "Environmental Attitude" was 0.92. It shows that the questionnaire is internally consistent, and revision of any question is not

required. This is also aligned with Taber's (2018) recommendation that Cronbach's alpha values above 0.7 are sufficient measure of reliability or internal consistency of an instrument.

Table 1. Reliability Coefficients for Environmental Attitude.

Variable	No. of Item	Cronbach's Alpha
Environmental Attitude	10	0.92

The debate on selecting 4-,6-,7- and so on in Likert scale is still ongoing (Chyung, et.al., 2017). According to studies, a scale with no mid-point minimizes social desirability bias or the desires of the respondents to choose what they believe to be a socially acceptable answer (Garland, 1999; Chang, 1999). Though there is no significant difference in the internal structure in terms of means, standard deviation, correlations, Cronbach's alpha, and factor loading in many Likert scales, it was found that more scale points seem to reduce skewness and show normal distribution (Leung, 2011; and Wu and Leung, 2017). A study of Adelson and Mc-Coach (2010), and Leung, 2011 on the other hand, revealed that the presence and absence of a midpoint does not affect the questionnaire's reliability and validity. As recommended by Chyung, et.al. (2017), the decision of using a specific Likert scale is dependent on what the survey designer considers important in relation to clearing the ways for respondents' perceptive effort. This means reinforcing the ease of taking the survey and, at the same time, allowing the respondents to state their perception well especially when they are under stress. Since the students of the PMA are loaded with various pressures including academic requirements, and military training on top of their other duties, this study used a forced-choice scale so that the respondents chose either a disagreement or agreement in the option (Table 2).

Table 2. The Likert Scale Used in the Study.

Description	Scale	Interpretation
Strongly Disagree	3.26-4.00	Strong positive environmental attitude
Disagree	2.51-3.25	Positive environmental attitude
Agree	1.76-2.50	Negative environmental attitude
Strongly Agree	1.00-1.75	Strong negative attitude

Population Determination and Conduct of Survey

The researchers provided ample time for the respondents to avoid unanswered entries. The respondents of this study are the cadets of the First Term, AY 2019-2020. The sample size was calculated using the Cochran's formula for the finite population. A total of 575 cadets were randomly chosen for an interview (105 – first-class cadets, 87 - second class cadets, 171 - third-class cadets, and 212 - forth class cadets). The computed sample size was further subjected to proportional sampling to determine a viable respondent that should be interviewed per class or year level.

The study was carried out from January to April 2020. During this time, the COVID-19 pandemic was starting to be of concern to many. However, in the PMA, the area is secured and all the students are confined in the camp. They are not allowed to go outside the camp without proper permission from an appropriate authority. Hence, the conduct of this research was not affected by COVID-19 pandemic.

Study site

The research was conducted at the Philippine Military Academy (Figure 1). This military school is located at Fort Gregorio del Pilar Baguio City, Philippines. It is roughly 250 km north of Manila and approximately 1,400 m above sea level, with an average temperature of 20 ° C (Altarez, et al., 2019).
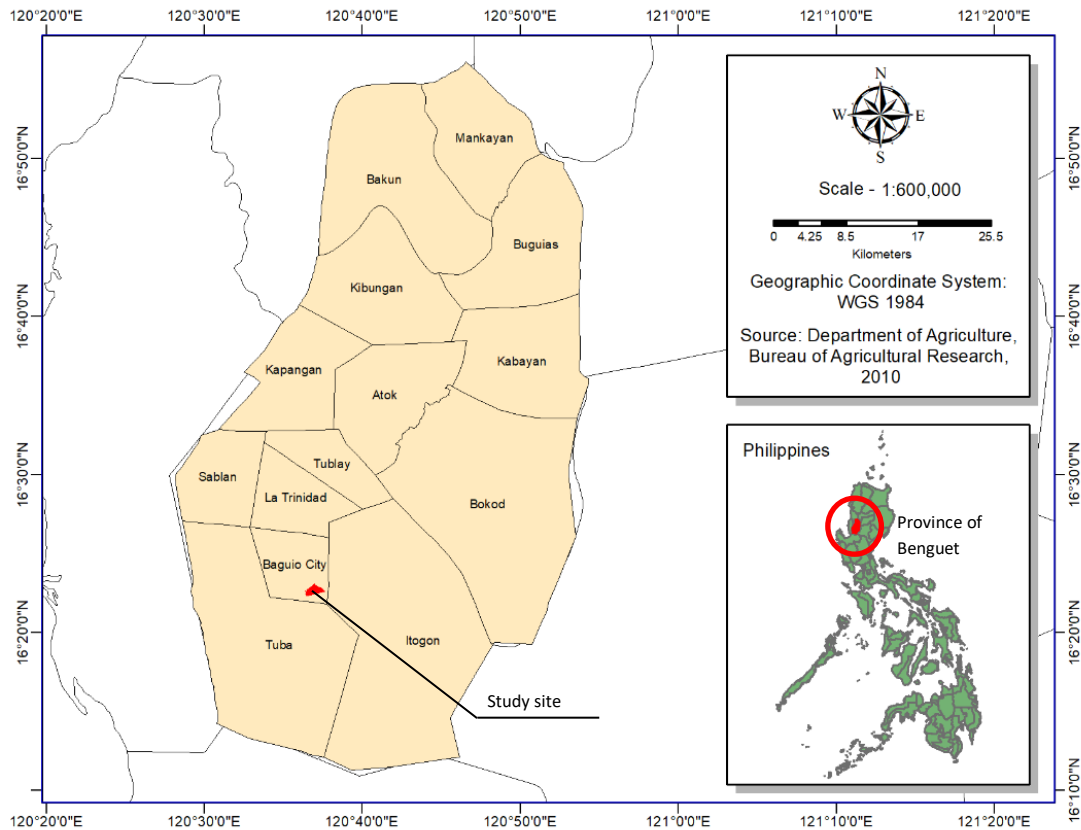

Figure 1. Location of the study area (Altarez, et al., 2019)

Profile of the Respondents

The cadets of the PMA are taking academic courses during their 4-year stay in the institution. However, their academics are also topped with additional courses, such as physical, aptitude, and military courses. The performance of cadets is measured by assessing the different subjects included in their curriculum. Finally, after finishing the curriculum, the cadets or students of the Academy will be conferred with a Bachelor of Science Degree. Also, because of the K-12 program of the Philippine government, the PMA gradually changed its curriculum. Thus, in due time, cadets will graduate with a degree of Bachelor of Science in National Security Management.

Table 3 shows the distribution of respondents by sex, 100 (17.40%) females, and 475 (82.60%) males for a total of 575 respondents. The respondents are mostly male because of the limitations on the number of female cadets due to the imposed quota. The quota of female cadets every

class ranges from 10% to 20% of the class' total strength before entering the Academy as first-year or fourth-class cadets.

Table 3. Distribution of Respondents by Sex

Sex	Frequency	Percentage
Male	475	82.60
Female	100	17.40
Total	**575**	**100**

Among the 575 respondents, 36.87% are the first-year students or otherwise called in the Academy as fourth-class cadets. Respondents are further distributed as follows- 29.74% of the sample size are third class cadets, 15.13% are second class cadets, and 18.26% are graduating cadets (Table 4).

Table 4. Distribution of Respondents by Class

Class	Frequency	Percentage
1 CL	105	18.26
2 CL	87	15.13
3 CL	171	29.74
4 CL	212	36.87
Total	**575**	**100**

RESULT AND DISCUSSION

Environmental knowledge

In general, half of the respondents have very good knowledge of the environment. Only a minimal percentage, roughly around 7%, have poor to fair performance (Table 5). The respondents' relatively decent scores may be attributed to the environmental lessons they acquired from their elementary and secondary education, as well as the environmental science subject they took up in the Academy. Likewise, the enacted RA 9512 law, explicitly highlighting the intensification of environmental education in the Philippines, may have a significant contribution to the respondents' very good environmental knowledge. The internet and television, as highlighted by Mifsud (2011); and Sadik and Sadik (2014), may have also influenced the respondents' level of understanding of the environment. A strong environmental knowledge provides an advantage in satisfactorily implementing the military personnel's environment-related duties and obligations in modern military organizations (NATO-CCMS, 2000). A future soldier with a high level of environment literacy will facilitate a continuous building of an environmentally responsible Armed Forces of the Philippines (Smit and van der Merwe, 2018).

Table 5. Environmental Knowledge of Score Distribution of The Respondents

Score	Interpretation	1CL		2CL		3CL		4CL		Overall	
		Freq	Percentage	Freq	Percentage	Freq	Percentage	Freq	Percentage	Freq	Percentage
1-2	Poor	1	0.95	0	0	8	4.68	2	0.95	11	1.91
3-4	Fair	3	2.86	2	2.30	15	8.77	9	4.24	29	5.04
5-6	Good	21	20.00	10	11.49	48	28.07	49	23.11	128	22.26
7-8	Very Good	59	56.19	42	48.28	80	46.78	122	57.55	303	52.70
9-10	Excellent	21	20.00	33	37.93	20	11.70	30	14.15	104	18.09
Total		**105**	**100**	**87**	**100**	**171**	**100**	**212**	**100**	**575**	**100**

An independent sample t-Test was conducted (Table 6) to determine the garnered environmental knowledge score difference between male and female respondents. The result of the analysis revealed that there was no significant difference in the scores between the male respondents (M=7.08; SD=1.68) and female respondents (M=7.35; SD=1.58); t Stat = -1.49, p = 0.13. The result further shows that environmental knowledge is not influenced by gender.

Table 6. Independent Sample t-Test Analysis for Environmental Knowledge Score of Male and Female Respondents

Variable	Mean	SD	t Stat	P-value (two-tail)
Male	7.08	1.68	-1.49	0.13
Female	7.35	1.58		

A one-way ANOVA was conducted to compare the scores of the respondents when grouped according to their class (Table 7). The analysis revealed that a significant difference existed in the ratings of respondents when grouped by class (F=18.63>Critical=2.62; P-value = 1.53×10^{-11} <a=0.05). The result may be attributed to the exposure of cadets to Environmental Science subjects in their curriculum. Second class and first-class cadets have taken the course during their third year in the Academy, while the underclass cadets have yet to take the said course. Moreover, upper-class cadets (third, second, and first-class) have more authority in accessing the internet and televisions. These resources may have also influenced the disparity in the scores of the respondents when grouped according to class.

Table 7. ANOVA for Environmental Knowledge Score of the Different Classes of the Respondents

Source	df	MS	F	P-value	F critical
Between Groups	3	47.31473	18.62851	1.53E-11	2.62
Within Groups	571	2.53991			
Total	**574**				

Environmental Attitude

In all ten questions crafted to gauge the level of attitude of the cadets toward the environment shows that they have a strong positive environmental attitude. Table 8 also shows that the responses of the cadets from EAQ1 to EAQ10 are not widely varied from the mean. Arcury (1990) and Burbank, et al. (2006) highlighted that increased environmental awareness influenced by increased information may lead to increased knowledge about the environment. Increased knowledge is a precondition for changing attitudes. Such result is consistent with the

study of Smit and van der Merwe (2018), that soldiers regardless of profile in life, with good environmental knowledge have a positive attitude towards the environment. The data also shows that the respondents wanted to learn more about the environment; this may indicate their concerns about the management and preservation of a healthy and balanced ecology. Also, the respondents strongly wanted to be part of solving environmental problems. They even believe that humans are part of environmental destruction.

Furthermore, the positive environmental attitude of the respondents may have been due to their direct connection with the environment and their desire to help in the reduction of environmental problems. These cadets came from all regions of the country; some started in humble beginnings, coming from a family of farmers and mountain dwellers whose lifestyle is focused on agriculture and forestry. Taking care of the environment is one of the primary lessons taught to them by their parents and relatives. Their influence as future military officers could impact future environmental management, the more they influence their subordinates for positive approach to the environment, the easier it is to reduce future military negative environmental impacts (NATO-CCMS, 2000).

An independent sample t-Test was conducted (Table 9) to determine the level of environmental attitude between male and female respondents. Result of the analysis revealed that there was a significant difference in the environmental attitude of the male respondent (M=3.46; SD=0.74) and female respondent (M=3.71; SD=0.48); t Stat = -4.30, p = 2.56 x 10^{-5}. This data revealed that there is a varying environmental attitude between male and female cadets. Consistent with other studies, gender still influence the specificity of military roles in a workplace environment (Smit and van der Merwe, 2018). The male and female cadets in the PMA as a first stage in a military organization, remains to have a traditional gender military unequal consideration. Other factors which affect the variation could be exposure to environmental issues (Smit, 2009). Women tend to be more of a care-taking individual (Prime, et.al, 2009; Ballew, et.al., 2018; May, et.al., 2018).

Table 9. Independent Sample T-Test Analysis for Environmental Attitude Score of Male and Female Respondents

Variable	Mean	SD	t Stat	P-value (two-tail)
Male	3.46	0.74	-4.30	2.56 x 10^{-5}
Female	3.71	0.48		

A one-way ANOVA was conducted to compare respondents' level of environmental attitude when grouped according to their class (Table 9). The analysis revealed that there is a significant difference in the environmental attitude of the respondents when grouped by class (F value = 3.72 > F critical = 2.62; P-value = 0.01 < a=0.05). Similar to the result in their environmental knowledge, the difference may have been linked with the respondent's exposure to the Environmental Science course offered in the Academy.

Table 10. The Over-All Environmental Attitude of the Respondents

Variable	Mean	Std Dev	Interpretation
1. I like to learn something about the environment (EAQ1)	3.55	0.78	Strong positive environmental attitude
2. I would like to contribute to the solution of problems related to the environment (EAQ2)	3.54	0.78	Strong positive environmental attitude
3. I believe that the most important factor in environmental pollution is human (EAQ3)	3.53	0.81	Strong positive environmental attitude
4. I prefer to buy products that do not harm the environment (EAQ4)	3.48	0.81	Strong positive environmental attitude
5. I believe that environmental problems are the most priorities to solve (EAQ5)	3.46	0.79	Strong positive environmental attitude
6. I believe that garbage thrown by people will damage the world (EAQ6)	3.52	0.79	Strong positive environmental attitude
7. I believe that poaching or illegal hunting is an activity needed to be banned (EAQ7)	3.53	0.78	Strong positive environmental attitude
8. I would like to have more environment-related courses at school to be more environmentally conscious (EAQ8)	3.42	0.81	Strong positive environmental attitude
9. I believe that the reduction of forests and the destruction of plants doesn't mean only cutting trees. It means also destroying animals and the environment (EAQ9)	3.57	0.78	Strong positive environmental attitude
10. I believe that population growth is an environmental problem (EAQ10)	3.42	0.87	Strong positive environmental attitude
Mean	**3.50**		**Strong positive environmental attitude**

Table 11. ANOVA for Environmental Knowledge Score of The Different Classes of the Respondents

Source	df	MS	F	P-value	F critical
Between Groups	3	1.849625	3.721254	0.011376	2.62051
Within Groups	571	0.497044			
Total	**574**				

Relationship Between the Level of Environmental Knowledge and Attitude

In looking at the relationship between the level of environmental knowledge and the variables used in gauging the respondents' overall environmental attitude, no significant relationship was found (r = 0.06 – 0.12). These findings remained the same when the level of environmental knowledge was correlated to the overall environmental attitude of the respondents, r(573)=0.10, p (two-tailed)=0.01 (Table 10). Similar to the study of Kuhlemeier et al. (2010), the relation between environmental knowledge and environmental attitudes, and behavior was very weak. Despite the weak relationship, it can be noted that the willingness and desires of the respondents

as seen in their positive attitudes are highly contributory to their intention to resolve environmental problems.

Table 12. Pearson's Correlation Analysis Between the Level of Environmental Knowledge and Attitude

	Envt'l Knowledge	EA Q1	EA Q2	EA Q3	EA Q4	EA Q5	EA Q6	EA Q7	EA Q8	EA Q9	EAQ 10	Envt'l Attitude
Envt'l Knowledge	1											
EAQ1	0.12	1										
EAQ2	0.11	0.87	1									
EAQ3	0.08	0.75	0.80	1								
EAQ4	0.06	0.79	0.81	0.78	1							
EAQ5	0.07	0.77	0.79	0.76	0.80	1						
EAQ6	0.10	0.80	0.84	0.77	0.79	0.78	1					
EAQ7	0.11	0.77	0.79	0.76	0.77	0.78	0.81	1				
EAQ8	0.07	0.75	0.74	0.69	0.72	0.76	0.76	0.75	1			
EAQ9	0.11	0.78	0.80	0.79	0.78	0.78	0.80	0.82	0.75	1		
EAQ10	0.08	0.67	0.69	0.69	0.70	0.69	0.73	0.71	0.67	0.74	1	
Envt'l Attitude	0.10	0.90	0.92	0.88	0.89	0.89	0.91	0.90	0.86	0.91	0.82	1

CONCLUSION

The study revealed the level of environmental knowledge and attitudes of cadets in the Philippine Military Academy during the First Semester of the Academic Term 2019-2020 to be very good and strong positive. The knowledge of respondents about the environment is not influenced by gender. Still, it differs in terms of class. This may be attributed to their exposure to the environmental course in the academic curriculum. There is a significant difference in environmental attitude when grouped according to sex and class. This may be due to the varied perception of respondents across sex and group classification and may have been influenced by a varied exposure to environmental information. Furthermore, regardless of sex and class, the connection of environmental knowledge and attitude of cadets is found not significant $r(573)=0.10$, p (two-tailed)$=0.01$. Hence, environmental knowledge of cadets does not necessarily translate to environmental care. Also, based on the data gathered, the respondents display a strong positive attitude and outlook towards environmental protection regardless of their environmental knowledge. It shows that cadets generally care for the environment despite low scores in environmental knowledge assessment. Other factors may have influenced their attitudes such as exposure to environment-related news and programs on televisions, and awareness of environmental issues.

RECOMMENDATION

A study that will gauge the respondents' attitudes using different quantitative data (ratio data) is recommended to see if the correlation between the variables investigated in this research will show a different result. Also, it is recommended for the Academy to continue with the environmental science course in the curriculum not just to comply with Republic Act No. 9512 but also to foster a sense of environmental stewardship among the cadets.

NOTES

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Annex-A

We are the 2CL Cadets of the Philippine Military Academy. We are conducting a study entitled, "Assessing Environmental Knowledge and Attitude of Cadets in the Philippine Military Academy, Baguio City, Philippines" as part of our course Environmental Science 332 (ES332).

In this regard, may we request you to participate in answering this short questionnaire? We will assure you that all answers from this instrument will only be used for this study. Thank you for your participation!

Name: _____ **Class:** ___ 1CL, ___ 2CL, __ 3CL, __4CL

Company: __A, __B, __C, __D, __E, __F, __G, __H,   **Sex:** __ M, __ F   **Age:** ___

PART 1: ENVIRONMENTAL KNOWLEDGE. This section will gauge the cadets' environmental knowledge.

INSTRUCTIONS: Following is a 10-item question. There is only one correct answer per question. Please answer each item and do not leave a blank answer. Encircle the choices which you feel correct.

1. Environmental Problems can be solved through.
a) Shared efforts of the government and the society
b) Legislation alone
c) Local-level
d) International level

2. Ecological balance refers to
a) Survival of plant life
b) Survival of Animal life
c) Appropriated form of each element of the environment
d) Survival of the Human race

3. Environmental degradation occurs due to
a) Rainfall
b) Solid waste
c) Uncontrolled human activities
d) Technological developments

4. Green House Effect is a natural phenomenon because
a) It keeps the atmosphere warm
b) It causes global warming
c) It depletes the ozone layer
d) It makes the land fertile

5. Sanctuaries and National parks can be established by
a) Private individuals
b) Social organizations
c) Public companies
d) Government

6. Tsunami is caused by
a) hurricane
b) Heavy rainfall in the ocean
c) Marine pollution
d) Earthquakes below the ocean surface

7. Ultraviolet rays of the sun are filtered in the atmosphere by
a) Nitrogen
b) Hydrogen
c) Ozone
d) Carbon

8. The main source of water pollution is the following except:
a) Industrial effluents
b) Domestic wastes
c) Spray
d) Pesticides, insecticides, and fertilizers used in the agricultural fields

9. The coral reefs, a valuable natural resource of the coast is exploited for:
a) Seafood
b) Synthetic fiber
c) Cement
d) Plastic goods

10. The best way to manage our solid waste is through:
a) Reduction of waste at source
b) Recycling
c) Reuse
d) None of the above

PART 2. ENVIRONMENTAL ATTITUDE. This section will gauge the Environmental Attitude of the cadets

SCALE	DESCRIPTION	INTERPRETATION
1	Strongly Disagree (SD)	I strongly disagree about the statement.
2	Disagree (D)	I disagree about the statement
3	Agree (A)	I agree about the statement
4	Strongly Agree (SA)	I strongly agree about the statement

INSTRUCTIONS: Using the Likert scale above, kindly put a checkmark (/) on how you agree on the following statements:

STATEMENTS	SD	D	A	SA
1. I like to learn something about the environment.				
2. I would like to contribute to the solution of environmental problems.				
3. I believe that the most important factor in environmental pollution is human.				
4. I prefer to buy products that do not harm the environment.				
5. I believe that environmental problems are the most priorities to solve.				
6. I believe that garbage thrown by people will damage the world.				
7. I believe that poaching or illegal hunting is an activity needed to be banned.				
8. I would like to have more environment-related courses at school to be more environmentally conscious.				
9. I believe that the reduction of forests and the destruction of plants doesn't mean only cutting trees. It means also destroying animals and the environment.				
10. I believe that population growth is an environmental problem.				