Greening our Future and Environmental Values: An Investigation of Perception, Attitudes and Awareness of Environmental issues in Zambia

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ABSTRACT

The visibility of environmental problems and the increasing awareness of associated consequences have made environmental issues salient in Zambia. The purpose of this study was to investigate correlations between the social and psychological influences affecting college students in Zambia, and the behaviours perceived by them to be appropriately environmentally friendly. The underlying social and psychological factors that would determine individuals' attitudinal responses toward appropriate environmental behaviour were assessed. The study attempted to measure behavioural tendencies towards environmental conservation. Behaviour involving energy and water conservation (EW) was consistently rated as the most important, and appropriate category of environmental behaviour, whereas social and political action (SP) was viewed as the least favourable behaviour according to the respondents in Zambia. The respondents who were older in the graduate level of the study and had frequently contact with environmental education activities and courses were more likely to hold positive behavioural tendencies toward environmental conservation in general.

KEYWORDS

Environment, degradation, awareness, self-efficacy, behaviour, barrier

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1. INTRODUCTION

Today, at the beginning of the twenty-first century, issues relating to environmental education, conservation and management have emerged on the world's policy stage (Palmer, 2003; Balmford, 2002). Most international declarations and conventions for combating global environmental problems and their consequences demand a strengthening of environmental awareness among the population and measures relating to environmental education (GBGU, 2002; Nath, 2005). Global environmental politics will only fulfil its tasks if the decision-makers in individual nations are supported by populations whose environmental awareness and willingness to behave in an environmentally appropriate way permits them to demand and assert the solutions to global environmental problems. Not until the idea of sustainable development is firmly anchored in the consciousness of people can strategies for behavioural change be effective. What is required, therefore, are worldwide and far-reaching measures of environmental education (NAS, 2004; GBGU, 2002). People's perception of environmental problems is one important requirement for changes away from environmentally harmful forms of production and consumption. Environmental education is an important tool for abandoning environmentally harmful forms of behaviour, and for learning environmentally appropriate behaviour (Nath, 2005; GBGU, 2002). Criteria for sound environmental education involve learning from personal and conveyed experience in everyday situations (situational orientation), learning in connection with one's own direct actions (action orientation), and incorporation of the subject matter into the socio-political context (problem orientation) (GBGU, 2002). Many ecosystems are dominated directly by humanity, and no ecosystem on earth's surface is free of pervasive human influence. Most aspects of the structure and functioning of Earth's ecosystems cannot be understood without accounting for the strong, often dominant influence of humanity (Vollebergh and Kemfert, 2005; Hare, 2005; Banzhaf, 2003). Likewise, Redman (1999) and Nath (2008), noted that although most ecologists acknowledge that there are fundamental 'drivers' behind biological processes, they have little familiarity with the 'drivers' behind human action. Without taking into account these drivers and the interactions they engender, our understanding of ecosystem dynamics both at local and global level will be limited, as will be our ability to apply these insights to public policy and environmental management decisions.

For individuals to express concern regarding environmental issues, they must first be aware that environmental problems exist. Without this awareness in place, society will not understand the need for change; it will tend not to

support it, and may be unwilling to participate in the process. Much of the environmental degradation that has occurred in the past, and continues today, is the result of the failure of our society and its education systems to provide citizens with the basic understandings and skills needed to make informed choices about people and environmental interactions and interrelationships (Nath, 2005). Environmental degradation is often the result of thoughtless activity of most economic systems operative today (Aggarwal, 2006; Nath 2008). It is critical that society be made aware of environmental risks and about the importance of responding to reduce or eliminate those risks. The objective is to attain environmental literacy throughout all economic sections across all regions in the world. For many years, most people had neither the idea of the extent of environmental degradation nor an accurate sense of how rapidly the problems were becoming worse. As a result, society unwittingly continued to contribute to the problem (Reid and Nickel, 2008). Learning from our mistakes, we now understand that environmental literacy, achieved through environmental education, is part of an effective strategy to protect the earth's resources (Callan and Thomas, 2000; Royal Society, 2005; Hare, 2005; Turner et al., 2003).

The main aim of any technological diffusion process is to bring about change in individual behaviour with respect to the adoption of new practices. Two broad categories of change are often presented in the literature: technological change and social change (Binswanger, 2001; Bressers, 2004; Dietz et al., 2003). Tracing back to three decades ago, Maloney and Ward (1973) pointed out that our beliefs regarding the roots of environmental crisis must be redefined: the solution to environmental problems does not lie in traditional technological approaches but rather in the alteration of human behaviour. We must go to the people in an attempt to understand their behaviour. We must determine what the population knows regarding ecology, the environment and pollution; how they feel about it; what commitments they are willing to make; and what commitments they do make. These are the necessary antecedent steps that must be made before an attempt can be made to modify critically relevant behaviour. In essence, for approaching environmental sustainability in society, attitudes toward the state of the environment, and views of progress and economic growth should be reformed (Gowdy, 2005; O'Brien, 2002; Redman, 1999; Royal Society, 2005; Vezzoli and Manzini, 2008). And these 'answers' are dependent upon people's decisions and behaviour.

There has been little research on patterns of behaviour and relationships between human behaviour(s) and the environment in Zambia. The need for interdisciplinary approaches to solving environmental problems

has been increasingly recognised; this trend encourages an emphasis on social-psychological perspectives applied to research on improving the understanding of human-environment dynamics. It is often argued that the promotion of responsible environmental behaviour, which has been largely approached through environmental education processes and methodologies, is inconsistent at best in its research and practice. With the recognition that human behaviour is inherently complex, value-laden, and particularly situation-specific, a broad spectrum of psychological, social, and cultural analyses for its understanding is discussed in this paper.

2. COMPONENTS OF APPROPRIATE ENVIRONMENTAL BEHAVIOUR

Appropriate Environmental Behaviour refers to a category of conscious and/or unconscious actions derived from a subjective choice based on the cultural, social, and psychological situations in which an individual perceives as appropriate, which is performed by one's own self to help preventing and/or resolution of environmental problems (Nickerson, 2003; Koger and Winter, 2004). How a person would be expected to act in any way given situation is often different from what this person actually does. A number of self-report techniques have been largely used to assess a variety of specific environmental behaviours. However, it has been argued that the outcome of self-report behaviour is always incongruent with actual performance (Ajzen and Fishbein, 1980). Further, some researchers even claim that actual behaviour cannot possibly be measured or predicted in its reality except via proper assessment methods (e.g., direct observations and experiments). Accordingly, this present study does not propose to measure people's actual behaviour; instead, it is designed to understand behavioural tendencies based on the evidence of respondents' attitudinal responses.

What determines ones' appropriate environmental behaviour is a direct correlate of an individual's attitudinal responses with respect to the social situations in which the person is exposed to related problems, and the personal characteristics with his/her own ability to cope with problems (Loomis and Helfand, 2003; Nickerson, 2003). How any aspect of an environmental problem is perceived as a threat depends upon the personal characteristics of the individuals involved. One person, because of his past experience and personality, may view a particular type of pollution as serious, while another person may hardly be aware that it exists. Therefore, the effects of social and psychological contexts on a person's attitudinal state need to

be conceptualised to improve understanding of how such effects influence one's preference for or the avoidance of environmental behaviour. In this study, some underlying social and psychological factors that would determine individuals' attitudinal responses toward tendencies of appropriate environmental behaviour were assessed. These include: perceived severity of the environmental degradation, perceived self-efficacy, environmental awareness, environmental attitudes, environmental benefits, environmental barriers and social demographic characteristics.

2.1 Environmental awareness

Environmental awareness is a term which has been used frequently in the literature, with varying explanations as to its precise meaning (Reilly, 1990). Awareness must be more than mere familiarity – most people have heard of global warming, but they may not perceive it as a threat because they do not understand the consequences. This awareness of consequences is suggested by Schwartz's theory of altruism (see Stern et al., 1993), which states that pro-environmental behaviour becomes more probable when an individual is aware of harmful consequences to others from a state of the environment and when that person ascribes responsibility to themselves for changing the offensive environmental condition.

2.2 Environmental attitudes

Attitudes are viewed as a product of cognitive and affective responses in combination to objects, and the relationship of this product is thought to function as partial motivators to behaviour. This to say, when an individual's beliefs and feelings are congruent with the issues in nature and/or the objects in the purpose, the person would be more likely to produce the corresponding patterns of behaviour (Ajzen and Fishbein, 1990; Axelrod and Lehman, 1993). As Ajzen and Fishbein (1990) noted, the level of consistency and prediction between attitudes and behaviour can be increased when the attitude being measured is more directly related to the action(s) in question. Therefore, in this study, it was important to identify the attitudinal responses pertaining to people's beliefs and feelings toward an appropriate attitude object that indicated the theme being of particular interest/threat to individuals.

How do Zambian people feel about the potential shortages of water and energy resources? Are the citizens in favour of improving air quality and transportation control by limiting availability of privately own vehicles? Are

people willing to pay additional tax dollars to set aside land now available for development and preserve it as protected space?

2.3 Perceived self-efficacy toward action

In this current study, knowledge about individuals' perceived self-efficacy is important in understanding people's beliefs about what people can do, and predicting the relevant behaviour. A consistently high association was found between the degree to which persons are more likely to engage in environmental behaviour and their perceived self-efficacy (Bandura, 1993; Simmons and Widmar, 1990). In this view, diverse strategies of behaviour change exert beneficial effects mainly by enhancing the individual's sense of self-efficacy; therefore, the individual would be encouraged to perform actions that previously were not possible.

2.4 Environmental barriers

This study considered two types of barriers. The first is internal barriers existing within individuals. For example, lack of appropriate information and knowledge or commitment could possibly decrease the incidence of acting for the environment. The other one is external barriers, which exist outside the individual, such as one's background, social forces, economic and technological constraints, etc; these could also disrupt the formation of positive attitudes toward appropriate environmental behaviour (Arcury et al., 1996; Skrentny, 2003).

2.5 Socio-demographic variables

Pro-environmental attitudes have been found to have a positive correlation with educational attainment (Hines, et al. 1987; Arcury et al., 1996) and social class (Arcury, 2000). Axelrod and Lehman (1993) and Skrentny (2003) also drew attention to the possibility of interactions between environmental concern, education and social class, while Arcury (1996) and Hines et al. (1987) found a weak relationship between income and environmental concern. This current study attempted to correlate demographic characteristics such sex, age, area of homeland, status of study (level of education attained), membership to environmental organisations, experience with environmental education and environmental courses completed with appropriate environmental behaviour.

The study attempted to examine patterns of and relationships between human behaviour(s) towards the environment in Zambia. By means of measuring individuals' social and psychological influences relating to their environmental behaviour, it is hoped that a culturally adaptive model for better understanding individuals' appropriate environmental behaviour could be developed. Results of this study would serve to provide decision-makers a knowledge foundation upon which environmental policies, educational programs, and communication strategies can be adequately established.

The study first evaluates students' awareness, attitude toward environmental degradation and their self-efficacy beliefs and behaviour. Then, the beliefs that may influence their concerns and consciousness of the problem are evaluated. Causal relationships among those constructs are statistically analysed. The study also examines a culturally adaptive model involving appropriate patterns of environmental behaviour among respondents. In the model, the underlying social and psychological factors that would determine individuals' attitudinal responses toward tendencies of appropriate environmental behaviour were assessed. Seven major scales of variables were measured: socio-demographic characteristics, situational factors, personality variables, perceived external and internal barriers to action, environmental attitudes, perceived self-efficacy toward action, and appropriate environmental behaviour. Stepwise multiple regression analyses were performed to identify the most parsimonious set of the determinants that will best predict environmental behaviour, as well as to recognise the most important behaviour(s) that were appropriate to the respondents.

3. AIM

The aim of this study is to examine patterns of and relationships between human behaviour(s) toward the environment perceived by university and college students in Zambia. This study was proposed to measure the behavioural tendencies toward environmental conservation derived from individuals' attitudinal responses.

The following are the research questions addressed in this study:

- What are the social-demographic characteristics of selected University and College students in Zambia with respect to sex, age, area of home town, status of study, membership in environmental organisation, experience with environmental education and environmental courses completed?
- Is there any significant relationship between the respondents' ap-

propriate environmental behaviour and their socio-demographic characteristics?

- Is there any significant relationship between barriers (external and internal), perceived self-efficacy, and environmental attitudes?
- What is the integrated model that concludes the most parsimonious set of the determinants which will best predict appropriate environmental behaviour?

4. HYPOTHESES

The following are the hypotheses for the study:

1. Respondents who had gained experience in Environmental Education and had taken environmentally relevant courses are more likely to encourage appropriate environmental behaviour.
2. The more environmental behavioural patterns are viewed as important in producing the desired environmental outcome, the more the Zambian students are willing to carry out or adopt them.
3. Respondents who are older in either undergraduate or graduate program levels of their study, who have membership in environmental organisations and have done relevant environmental courses are more likely to hold positive behavioural tendencies toward environmental conservation.
4. Respondents who perceived high levels of environmental barriers are more likely to hold negative attitudes towards environmental conservation.
5. Perceived severity of environmental degradation, susceptibility, and benefit factors are positively related to environmental awareness and attitude.
6. Respondents who have positive attitudes toward an appreciation of the primitive natural environment, as well as the preservation of environmental artefacts of the past tend to act more appropriately for the environment.

5. MATERIALS AND METHODS

A self-administered questionnaire was distributed to a sample in a school setting of University and College students. A set of 50 actions that could be performed *regularly/sometimes/seldom/never/do not know* was used to measure responsible and appropriate environmental behaviour. Here the instrument was designed to identify structures of personal responsibility and value which are individually or collectively directed towards prevention and resolution of environmental problems. This refers to a category of conscious or unconscious actions, perceived from a subjective choice based on cultural, social and psychological situations in which an individual perceives as appropriate, which is performed by one's own self to help prevent or resolve environmental problems. The five categories of environmental behaviour which included resource recovery and waste management (RW), energy and water conservation (EW), transportation and air quality control (TA), natural resources management (NR), and social/political actions (SP) were selected because they are the most pressing environmental problems in Zambia. In this study, social actions referred to any behaviour which was not consciously or directly designed to benefit the individual taking the action, but which instead benefits others. Political action referred to any action that was of self-interest to an individual or a group of individuals characterised by utilising political means (e.g. political processes, party activities, etc.) to express particular appeals concerning environmental problems. Social and political actions include: voting for a pro- environment candidate; signing a petition in support of pro-environmental policies; communicating with others about the significance of environmental protection, etc. The scales of these variables demonstrated a high level of reliability coefficient of $\alpha = 0.98$.

Socio-demographic characteristics were measured by seven items, which included: sex, age, area of home town, status of study, membership to environmental organisations, experience with environmental education and environmental courses completed.

Environmental attitudes were measured by five item questions, which were rated based on a six-point scale from 1 = *none* to 6 = *a great deal*. The attitude scale (including the cognitive and affective) was designed to measure the extent of the subjects' consciousness, beliefs, and feelings toward concern about specific environmental issues in Zambia. Specifically, how do Zambian people feel about the potential shortage of water and energy resources? Are the citizens in favour of air quality and transportation control? Are people willing to pay for the sake of improving the environment? Attitudes were also measured by 19 statements, each of which scored 0–5

on a Likert-like scale of *strongly agree/agree/neither agree nor disagree/ disagree/strongly disagree/do not know answers*. The items together had a coefficient of reliability of $\alpha = 0.64$

Perceived self-efficacy toward action was measured by15 item questions which were rated on a six-point scale ranging from 1= *not at all* to 6 = *very*. Knowledge about individuals' perceived self-efficacy is important in understanding people's beliefs about what people can do, and predicting the relevant behaviour. This section of the questionnaire was designed to induce people's beliefs about their own ability for acting environmentally. Cronbach's alpha coefficient for perceived self-efficacy was $\alpha = 0.93$, indicating a strong internal consistency.

The scale of perceived barriers (both extrinsic and intrinsic) to action was measured by 12 statements in the survey instrument to asses the extent of the subject's reluctance to act for the environment, such as economic forces, absence of information and knowledge etc. The factor had a good internal consistency with reliability coefficient of $\alpha = 0.72$.

'Pastoralism' was measured by items designed to study the respondents' attitudes toward an appreciation of and sensitivity to primitive natural and a desire to preserve it. These were rated on a five-point scale ranging from 1 = *strongly disagree* to 5 = *strongly agree*. E.g. 'the idea of walking into the forest and 'living off the land' for a week appeals me'; 'our nation's forests should be preserved in their natural state, with roads and buildings prohibited'; 'I like to care for animals', etc.

'Antiquarianism' was measured by items designed to study the respondents' attitudinal orientations toward the preservation and appreciation of environmental artefacts of the past (e.g. antiques or historical houses/places). These were rated on a five-point scale ranging from 1 = *strongly disagree* to 5 = *strongly agree*. E.g. 'I enjoy browsing in antique shops'; 'I like places that have the feeling of being old', etc.

A sample (n = 196) was randomly drawn from University and College students currently enrolled at the University of Zambia, Zambia Adventist University, Mulungushi University, David Livingstone College of Education, and Charles Lwanga College of Education. It was especially important to gather information from students who were soon to be the major leaders of society and whose environmental concern and decisions would significantly guide the future of our environment. The procedure of data collection took place from July to September 2008.

The statistical program used in this study was Statistical Package for Social Sciences (SPSS 16.0 for windows). All relationships between variables were quantified by the use of the Product Moment or Pearson's Correlation

Coefficient (r). Despite the fact that this is the most powerful type of correlation analysis, correlation studies are very limited (George and Mallery, 2005). They can show relationships, but not cause and effect, so a Stepwise Multiple Regression Analysis MODEL using MINITAB was also performed to determine which factors were the most important predictors of environmental behaviour on the determination of any hypothetical factor variable. In other words, as a result of running this model, the most parsimonious set of determinants that best predict appropriate environmental behaviour could be produced. The following model was used for this study:

$$AEB = \beta 1 + \beta 2*PEB + \beta 3*PS + \beta 4*SS + \beta 5*PA + \beta 6*IB + \beta 7*AQ + \beta 8*NGO + ERROR\ TERM$$

Dependent variable: Appropriate environmental behaviour (AEB); *Independent variables:* Perceived importance of environmental behaviour (PEB), Perceived self-efficacy (PS), Status of study (SS), Pastoralism (PA), Internal barriers (IB), Antiquarianism (AQ), and Membership in environmental organisation (NGOs).

t-tests were used to give additional insight into the differences between male and female respondents. Simple, or one-way, analysis of Variance (ANOVA) was used to determine whether or not there were significant differences found in the mean scores on each factor variable and appropriate environmental behaviour by socio-demographic characteristics. A reliability calculation was done by using Cronbach Alpha (α) to produce a test of homogeneity. In this study, Alpha values for clusters of the items and/or the scale were set at the level of not less than 0.60.

6. RESULTS

6.1 Demographic characteristics

The results show that 93 (47.5%) respondents were males and 103 (52.5%) where females. The major portion of the respondents (70.1%) was under 23 years old. About 23.4 per cent of selected students were in the range 23–31 years, followed by 5.2 per cent in the range of 32–40 years old, and only 1.3 per cent were 41 and above years old. Of the respondents interviewed, 28.5 per cent thought their home areas were city suburb and city centre (26.5%). The remaining respondents described themselves as from rural areas, such as rural but not a farm (33.2%) and rural farm (11.8%). Most of the respondents (78.3%) were in their undergraduate level of the study, which also corresponds to their age range of under 23. Of the remainder, 20.2 per cent were students in a master's program and 1.5 percent were pursuing

their doctoral degree. Most of the respondents (90.1%) did not belong to any environmental organisation, while only 9.4 per cent did.

The results further show that although only a small portion of the respondents were actively involved in environmental organisations, a higher percentage of respondents (60.7%) answered that they had participated in an organised environmental activities such as environmental education workshops, environmental conferences and other outdoor environmental activities. About one third (32.3%) of the respondents had never had experiences in environmental activities. About two-thirds of the respondents (65.3%) had taken courses concerning environmental studies such as environmental science, environmental engineering, environmental conservation, environmental education and natural resource management while the rest (34.7%) had not.

6.2 Significance differences in environmental knowledge between males and females

Table 1 in Appendx A shows that women are more likely to be environmentally responsible than men. Women were also significantly more likely than men to express concern about environmental issues according to the mean scores. A further *t*-test to investigate gender differences in environmental concern gave a mean score for men of 326.41 and a mean score for women of 341.48. The *t* value of -2.813 was highly significant, showing that women tend to exhibit more of the personality characteristics associated with environmental concern than men. However, men tend to have more theoretical environmental knowledge than women, particularly about global issues.

6.3 Measure of perceived importance of environmental behaviour

Thirty items in the questionnaire were used to represent a broad range of environmental behaviour. The items were presented as 'how important do you think each behaviour is to solving environmental problems?' Responses were based on a four-point Likert-type format from 1 = *not at all* to 4 = *very important*. Further, other items stated as 'how appropriate do you think each behaviour is for your life?' responses were based on a four-point format shown as: 1= *you do not expect to do it in future*, 2 = *you are uncertain and may not do it*, 3 = *you think about doing it*, 4 = *you currently engage in it*. For the purpose of this study, the items of environmental behaviour have been grouped into five categories corresponding to the most pressing environmental problems of Zambia. These were resource recovery and waste management (RW), energy and water conservation (EW), transportation

and air quality control (TA), natural resource management (NR), and social/political actions (SP). A summary of the respondents' score statistics for this scale is shown in Table 2 (Appendix A). The mean score for the overall items was 156.16 out of 180, which indicated that the beliefs perceived by selected college students about all the behavioural patterns toward solving Zambia's environment problems tended to be fairly positive.

This result indicates that the behaviour patterns marked as the most important in solving Zambia's environmental problems were those in the category of energy and water conservation (Mean = 36.54), followed by resource recovery and waste management (mean = 34.85), transport and air quality control (Mean = 33.65), natural resources management (Mean = 32.79), and lastly, social/political actions (Mean = 30.99).

6.4 The relationship between respondents' perceived importance of and perceived appropriateness of environmental behaviours

It was hypothesised that the more the behavioural patterns are judged to be important in producing the desired environmental outcome, the more appropriate those behaviours are perceived to be. Therefore, this research question was designed to understand how close the statistical associations would be between importance of a given behaviour and appropriateness of such behaviour perceived by the respondents. To measure the extent to which these two sets of data were related, a Pearson's Product-moment Correlation (r) was computed. (See Appendix B for Statistical Analysis.)

The results show that the associations between importance of and appropriateness of given environmental behaviours grouped in the five categories plus the total scale were all highly correlated. In the previous section, the results showed that the behavioural patterns the respondents felt the most appropriate to adopt were those under the category of EW, followed by RW, NR, TA and SP. In addition, the level of behavioural tendencies which the respondents self-reported in the five categories of environmental conservation was quite positive on the basis of '*plan to do*' while only the behavioural category 'social/political actions' was exceptionally marked as '*might do*'. This result also corresponds to the measure on perceived importance of environmental behaviour; in which the behavioural patterns marked as the most important in solving Zambia's environmental problems were EW and less important ones were SP. The data herein supports the theoretical assumption that the higher the behavioural patterns are judged as important of producing the expected outcome, the more appropriate the behaviours are perceived to be adopted.

6.5 Significance difference between the respondents' appropriate environmental behaviour(s) and their socio-demographic characteristics

An analysis of variance (ANOVA) was used to determine whether there was a significant difference in the sample means on appropriate environmental behaviour affected by the socio-demographic constructs (e.g. sex, age, area of home town, status of study, membership in NGOs, experience with EE and environmental courses completed. The ANOVA technique was conducted to test the null hypothesis (all means are equal) against the alternative hypothesis (at least one mean value is different with alpha level .01. A summarised result of the ANOVA test on the overall scale of appropriate environmental behaviour factored by the nine socio-demographic characteristics is shown in Appendix C.

The results show that area of home town is not of particular concern for adoption intent of appropriate environmental behaviour within the group of Zambian students. Other relevant socio-demographic characteristics were shown to have some degree of influence in affecting individuals' self-reports on each of the distinct behavioural categories.

The overall behaviour scale (including the total scale, RW, EW, TA, NR and SP), age, status of study, and membership environmental organisations were consistently recognised as the most significant indictors resulting in different means of the behavioural responses. Students who were older (23–41 years) in the Master's program and had membership in environmental organisations had significantly stronger tendencies toward acting appropriately for the environment in general than those whose ages were 22 years or less at the undergraduate level. In addition, the respondents who had experience in environmental education and completion of environmental related courses also had significantly higher scores in appropriate environmental behaviour than those who did not. It is important to note that experience in EE had a positive effect to contribute toward higher level of the environmental behavioural means in all the behaviour scale, apart from EW. This observation suggests a further effort required through EE processes to improve individuals' behavioural patterns for energy and water conservation.

6.6 Relationship among barrier, perceived self-efficacy and environmental attitudes

This section assessed the extent of the subject's reluctance to act for the environment, due to factors such as economic forces, absence of information and knowledge. Thus it takes into account barriers that inhibit performance of an action by hampering one's attitudes or efficacy (except for personal efficacy,

which focuses on possibilities of individual action or behavioural change). The results explain a three-way interaction among barriers, self-efficacy and attitudes. The study concludes that the more positive the environmental attitudes in question are, the greater the perceived self-efficacy toward action can be, and vice versa. The results show that perceived environmental barriers have a negative causal effect on environmental attitude, supporting the hypothesis that respondents who perceived high levels of environmental barriers are more likely to hold negative attitudes towards environment conservation. All coefficients were generated by means of Pearson's product-moment correlation (See Appendix D for statistical analysis).

6.7 The most parsimonious set of determinants to best predict appropriate environmental behaviour

Thirteen variables with higher correlation were included in the multiple regression equation. These were, perceived importance of environmental behaviour, environmental attitudes, perceived self-efficacy, external barriers, internal barriers, situational factors, pastoralism, environmental adaptation, environmental trust, antiquarianism, age, status of study, and membership to environmental organisations. By means of stepwise selection and analysis among the entered variables (criteria: PIN < = .05, POUT > = .10), seven of the factors (perceived importance of environmental behaviour, perceived self-efficacy, status of study, pastoralism, internal barriers, and antiquarianism) remained significant and determined for the best fit of the regression model. (See Appendix E for statistical analysis).

The study concludes that the more positive the value judgment on importance of the environmental behaviour(s) in response to solution of the relevant problems, the higher the senses of personal perceived efficacy; and the less the obstacles and constraints existing inside individuals, the stronger the tendency of appropriate environmental behaviour. The study also shows that two socio-demographic characteristic factors such as status of study and membership to environmental organisations were also essential predictors of appropriate environmental behaviour. People who obtained higher level of education and were actively involved in environmental organisations would have a higher possibility of adopting appropriate patterns of environmental behaviour. Under the personality variables in the psychological dimension, the results imply that individuals who have positive attitudes toward an appreciation of the primitive natural environment, as well as the preservation of environmental artefacts of the past tend to act more appropriately for the environment.

7. DISCUSSION

The relationships between perceived importance and perceived appropriateness of environmental behaviour on the five categories as well as the total behaviour scale were all highly correlated. Especially, the behaviours involving energy and water conservation (EW) was consistently rated as the most important and appropriate category of environmental behaviour, whereas social and political actions (SP) was viewed as the least favourable behaviour to the respondents in Zambia. Resource recovery and waste management (RW) as well as energy and water conservation (EW) are the most pressing environmental problems affecting people in Zambia. Consistent with other studies (Loomis and Helfand, 2003; Nickerson, 2003), respondents felt affected most by issues involving their nearness to the environment than those focusing on macro or political levels. The perception of severity internalised may improve their awareness of the problems, which can lead to a more positive environmental behaviour. These findings imply that policy-makers need to develop strategies to point out the importance of the severity of other environmental problems such as global warming and climate change which are not seen to be of immediate concern by the population. In this case, not only is it important to stress the extensiveness of environmental damages, but also the consequences of not taking appropriate and immediate actions to stern the process of environmental degradation. The findings support the hypothesis that perception of severity of the degradation of the environment was positively and significantly related to awareness (see also Hawthorne and Alabaster, 1999). Awareness must be more than mere familiarity – most people have heard of global warming, but they may not perceive it as a threat because they do not understand the consequences. Vezzoli and Manzini (2008) observed that pro-environmental behaviour becomes more probable when an individual is aware of harmful consequences to others from a state of the environment and when that person ascribes responsibility to himself for changing the offensive environmental damage.

For the socio-demographic characteristics, the study show that the respondents who are older (23–41 years old) in the graduate level of the study and had obtained membership in social organisations as well as frequently contact with environmental education activities and courses were more likely to hold positively behavioural tendencies toward environmental conservation in general. However the relationship between environmental concern and age is uncertain. Arcury et al. (1996) concluded that increased age brought about an increasingly ecological worldview. Later research by the same author found that younger people were more concerned about the

environment (Arcury, 2000). In the UK, a Department of the Environment (1999) survey found that those most likely to be taking action were in the 45–64 age group, while an international study by Skrentny (2003) covering the UK, US, Australia, Austria and West Germany found that environmental concern was correlated with youth.

Researchers have similarly disagreed about the relationship between pro-environmental attitudes and gender. Stern et al. (1993) concluded that women tend to be more pro-environment than men, while Skrentny (2003) concluded that no relationship existed. This study, however, found that women were more likely to be environmentally responsible than men. Women were also significantly more likely than men to express concern about environmental issues according to the mean scores. Many women in Zambia are deeply concerned with environmental problems that either already do, or in the future may affect their children.

In this study, significant correlations were found between environmental attitudes and three of the social structural variables: external barriers ($r = -.14$), experiences with EE ($r = .15$), and environmental courses completed ($r = .15$). This result indicates that the respondents who perceived lower levels of external barriers and higher levels of the cognition on environmental education and the relevant courses were more likely to hold positive attitudes toward the environment. Positive, significant correlations were found between environmental attitudes and four of the psychological-dimension variables in environmental dispositions: pastoralism ($r = .17$), environmental trust ($r = .14$), antiquarianism ($r = .21$), and mechanical orientation ($r = .21$). A moderate, positive correlation was found between environmental attitudes and perceived self-efficacy ($r = .38$). This result explains a significant three-way interaction between perceived self-efficacy, environmental attitudes, and behavioural tendencies. People's perception of environmental problems was one important requirement for changes of environmentally harmful forms of activities. Environmental education is an important tool for abandoning environmentally harmful forms of behaviour, and for learning environmentally appropriate behaviour.

For the most parsimonious model of the overall model behavioural tendencies toward environmental conservation, this study indicates that the more positive the value judgment on the importance of a given behaviour in response to a solution of the relevant problem, the higher the senses of personal perceived efficacy; and the less the obstacles and constraints existing within individuals, the stronger the tendencies toward appropriate environmental behaviour. Respondents who perceived high levels of environmental barriers are more likely to hold negative attitudes towards environmental

conservation. Perceived barriers have a negative causal effect on attitude towards environmental conservation. People who obtained higher level of education and actively involved in environmental organisations would lead to a higher possibility of adopting appropriate patterns of environmental behaviour. The results are similar to those of previous research which have indicated that people who find environmental protection very important are more informed about environmental issues, have personal experiences of environmental problems and are more likely to make environmentally friendly choices (Ziervogel and Taylor 2008). According to Hawthorne and Alabaster (1999), awareness of environmental degradation is a significant precursor of environmental self-efficacy and behaviour. Greater awareness of environmental degradation enhances peoples' capacity in making decisions to improve the situation. Greater environmental awareness leads to greater involvement in environmental management programs. It is also important to note that although age was not found to be an affective predictor for the model, based on the data, age and status of study appeared to be covaried, so these two factors might carry a similar effect on environmental behaviour. Under the personality variables in the psychological dimension, the results imply that individuals who have positive attitudes toward an appreciation of the primitive natural environment as well as the preservation of environmental artefacts of the past tend to act more appropriately for the environment.

8. CONCLUSION AND RECOMMENDATIONS

The most appropriate patterns of environmental behaviour that the Zambian students are willing to carry out are those for energy and water conservation. On the other hand, the behavioural patterns the subjects were less likely to adopt or might think about doing are those concerning social and political actions. Membership of NGOs has less influence on the patterns of environmental behaviour. There is a need to set up programs to encourage Zambians to participate in social environmental organisations to exercise personal skills for carrying out social political actions towards the environment. The overall findings of this study indicate some important implications for both theoretical research and the pursuit of environmental education. Primarily, education and communication programs should be more effective when their approaches are linked with psychological principles of awareness and directly address specific environmental behaviour that is compatible with people's values of desired outcomes. Research on people's desired goals for performing various types of environmental behaviour should be well understood in order to develop rational communications with which

educational programs can adapt to support and reinforce people's intrinsic justifications for the desired behaviour.

Knowing that there is an environmental problem such as global warming would seem to be a logical precondition for action. Differently put; if we don't know that there is a problem, why go through the hassle of changing our ways? This is precisely the rationale that has motivated countless education and outreach campaigns. The goal of such educational efforts is to provide the information that will increase knowledge and thus change people's attitudes. Individuals need to know not only about the problem, however, but also about solutions such as alternative methods of transportation to be motivated to behave environmentally responsible. For example, a truck driver may be conscious that his automobile is a contributor to the present pollution problems, but may not be fully aware that biodiesel – a cleaner-burning alternative made from natural, renewable sources such as vegetable oils – can be used in the truck and reduce some pollution.

However, the fundamental claim of this paper is that better environmental information dissemination, more environmental knowledge, or more environmental communication alone will not necessarily lead to desirable social change. While we strongly believe that better understanding has an important role to play, environmental knowledge that does not keep barriers to behaviour and social change in mind is unlikely to be effective or sufficient. We see that education can change attitudes and beliefs, but that many environmental barriers can keep pro-environmental attitudes from being expressed in action. More important, in this study, although it is noted that knowledge of the environmental problem is a prerequisite for appropriate environmental behaviour, abilities alone, such as awareness, knowledge, skills and others, are not sufficient to guide one's actions, unless an individual possesses a desire to act.

In summary, changing to environmentally responsible behaviour is possible only when programs are designed to overcome barriers impeding a desired behaviour. Lack of skills or sense of personal competence, missing information, and resources can all be such barriers. Successful environmental policies that mobilise action on environmental degradation, therefore, must also take into account the options that people have for action and their social and cognitive characteristics. In other words, what can they effectively do with the information they are given? Global environmental politics will only fulfil its tasks if decision-makers in the individual nations are supported by populations whose environmental awareness and willingness to behave in an environmentally appropriate way permits them to demand and assert the solutions to global environmental problems.

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APPENDIX A

TABLE 1. Environmental knowledge between males and females

Knowledge variables	Mean score (M)	S.D.	Mean score (F)	S.D	*t*- statistic
Awareness	32.810	.297	32.137	.262	2.267*
Global abstract	11.028	.267	10.105	.251	2.525*
Recycling	14.253	.420	15.512	.399	-2.193*
Energy saving	57.246	1.412	59.947	1.352	- 1.376
Waste disposal	38.231	1.221	37.120	1.123	- 1.214

* p = < 0.05

TABLE 2. Summary of Score Statistics on Measure of Perceived Importance of Environmental Behaviour/awareness

Behaviour category	Valid N	Mean	Median	S.D	Min.	Max
RW	196	34.85*	33.0	4.74	18	36
EW	196	36.54*	35.0	4.66	19	36
TA	196	33.65*	34.0	4.47	16	36
NR	196	32.79*	34.0	4.89	17	36
SP	196	30.99*	31.0	6.12	4	36
Total scale	196	156.16**	157.0	22.94	83	180

Note: * 9 = not important at all, 18 = somewhat important, 27 = important, 36 = very important, ** 45 = not important at all, 90 = somewhat important, 135 = important, 180 = very important.

APPENDIX B

Statistical analysis to explain relationship between respondents' perceived importance of and perceived appropriateness of environmental behaviours

TABLE 3. Correlation Matrix of the scores between importance of and Appropriateness of Environmental Behaviour

Importance of Appropriateness of Environmental Behaviour	Appropriateness of Environmental Behaviour					
	RW	EW	TA	NR	SP	Total scale
RW	.57**					.54**
EW		.56**				.55**
TA			.55**			.55**
NR				.62**		.61**
SP					.71**	.62**
Total scale	.49**	.47**	.55**	.54**	.58**	.65**

Note: ** Correlation is significant at the 0.01 alpha level

Key: **RW** – Resource Recovery and waste management, **EW** – Energy and water conservation, **TA** – Transport and air quality control, **NR** – Natural Resources management, **SP** – Social and Political Actions

The results in Appendix B show the matrix of correlations between the two variables. The entry in each cell is the correlation coefficient; and the level of significance is marked with a star (*) symbol with the decision made by the *t*-statistic. The results show that the associations between importance of and appropriateness of given environmental behaviours grouped in the five categories plus the total scale were all highly correlated. The data herein supports the theoretical assumption that the higher the behavioural patterns are judged as important of producing the expected outcome, the more appropriate the behaviours are perceived to be adopted. Surprisingly, the result shows that the highest correlation found among all pairs of the data was social/political actions (r =0.71); which indicates that the behaviours related to this category were identified as a relatively low level of importance and appropriateness.

APPENDIX C

Statistical analysis to explain significance difference between the respondents' appropriate environmental behaviour(s) and their socio-demographic characteristics

TABLE 4. Summary of ANOVA on the five distinct categories of Appropriate Environmental Behaviour by Socio-Demographic characteristics

Socio-demographic factor	Appropriate Environmental behaviour (F ratio)					
	AEB scale	RW	EW	TA	NR	SP
Sex	3.099	11.883*	1.832	.516	.004	2.045
Age	12.365*	8.975*	6.001*	6.767*	9.456*	8.362*
Area of home town	2.350	1.525	1.544	2.348	2.178	1.412
Status of study	25.321*	21.408*	10.460*	12.472*	18.378*	16.761*
Membership to NGO	21.114*	10.511*	10.767*	6.761*	24.810*	17.056*
Experience with EE	15.807*	9.304*	.920	7.814*	20.264*	19.011*
Environmental courses	10.473*	13.532*	2.104	1.370	10.772*	9.716*

Note: * significant difference(s) between variables at alpha 0.01

The ANOVA technique was conducted to test the null hypothesis (all means are equal) against the alternative hypothesis (at least one mean value is different with alpha level .01. A summarised result of the ANOVA test on the overall scale of appropriate environmental behaviour factored by the nine socio-demographic characteristics is shown in appendix C. The overall behaviour scale (including the total scale, RW, EW, TA, NR, and SP), age

(F = 12.365), status of study (F= 25.321), and membership environmental organisations (F=21.114) were consistently recognised as the most significant indictors resulting in different means of the behavioural responses. Students who were older (averagely between 23-41 years) in the Master's program and had membership in environmental organisations had significantly stronger tendencies toward acting appropriately for the environment in general than those whose ages were 22 years or young in the undergraduate level. In addition, the respondents who had experiences with environmental education (F= 15.807), and completion of environmental related courses (F= 10.473) also had significantly higher scores in appropriate environmental behaviour than those who did not have. It is important to note that experience in EE had a positive effect to contribute toward higher level of the environmental behavioural means in all the behaviour scale, apart from EW (F= 0.920). This observation suggests a further effort required through EE processes to improve individuals' behavioural patterns for energy and water conservation.

APPENDIX D

Statistical analysis to explain relationship among barrier, perceived self-efficacy and environmental attitudes

TABLE 5.: Correlation Matrix of the scores on Perceived Barriers, Self-efficacy and Environmental attitudes

Variables	EA	PSE	EB	IB
EA	----			
PSE	.59**	-----		
EB	- .24*	- .43**	-----	
IB	- .12	- .36**	.49**	----

Note. * Correlation is significant at .05 alpha level (p< 0.5), ** Correlation is significant at the 0.1 alpha level (p< .01). EA = Environmental attitudes, PSE = Perceived self-efficacy, EB = External barrier, IB = Internal barrier

Appendix D shows a matrix of the correlations indicating a moderate association between environmental attitudes and perceived self-efficacy (r = .59) and a moderately low correlation between attitudes and external barriers (r = -.24). Perceived self efficacy scale was found to significantly correlate with both external barriers (r = -.43) and internal barriers (r = - .36). The results explain a three- way interaction among barriers, self-efficacy, and attitudes. The study concludes that the more positive the environmental attitudes in question are, the greater the perceived self-efficacy toward action can be and vice versa. All coefficients were generated by means of Pearson's product-moment correlation.

APPENDIX E

Integrated model that determines the most parsimonious set of determinants to best predict appropriate environmental behaviour

TABLE 6 Stepwise Multiple Regression for the significant Predictors of Appropriate Environmental Behaviour

Predictor	R^2	R^2 change	F change	β	*t*
Perceived importance of Environmental behaviour	.47	.45	169.17***	.43	8.47***
Perceived self-efficacy	.57	.13	49.04***	.23	4.68***
Status of study	.59	.06	23.94***	.19	3.45***
Pastoralism	.61	.05	17.92***	.16	3.17**
Internal barrier	.72	.03	7.84*	- .11	- 2.21
Antiquarianism	.63	.02	5.76*	.10	2.18*
Membership in NGOs	.64	.01	4.39*	.11	2.11*
Overall model R^2 =.67, Adjusted R^2 =.62, F = 53.24***					

Note: * p < .05, ** p < .01, ***p < .001

Thirteen variables with higher correlation were included in the multiple regression equation. These were, perceived importance of environmental behaviour, environmental attitudes, perceived self-efficacy, external barriers, internal barriers, situational factors, pastoralism, environmental adaptation, environmental trust, antiquarianism, age, status of study, and membership to environmental organisations (See Appendix E for statistical analysis). By means of stepwise selection and analysis among the entered variables (criteria: PIN <= .05, POUT > = .10), seven of the factors (perceived importance of environmental behaviour, perceived self-efficacy, status of study, pastoralism, internal barriers, and antiquarianism) remained significant and determined for the best fit of the regression model. The model that was used is presented below:

$$AEB = \beta 1 + \beta 2*PEB + \beta 3*PS + \beta 4*SS + \beta 5*PA + \beta 6*IB + \beta 7*AQ + \beta 8*NGO + ERROR\ TERM$$

Dependent variable: Appropriate environmental behaviour (AEB);

Independent variables: Perceived importance of environmental behaviour (PEB), Perceived self-efficacy (PS), Status of study (SS), Pastoralism (PA), Internal barriers (IB), Antiquarianism (AQ), and Membership in environmental organisation (NGOs).

Based on the results of the overall regression model above, the statistical interpretation is that the null hypothesis is that $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = 0$, or the change in R^2 is equal to 0 was rejected ($F = 53.24$, $p < .001$); as a result, those seven of the significant predictors have a combined effect on

prediction of appropriate environment behaviour. The coefficient of determinism of R^2 (0.67) found in Table 7 indicates that appropriate environmental behaviour is not influenced only by seven factors advanced in this study. Combining the effects derived from these social psychological indicators, a total of 67% of the variance was explained for the model. Other factors account for 33 percent.

The study concludes that for the most parsimonious model of environmental behaviour, the more positive the value judgment on importance of the environmental behaviour(s) in response to solution of the relevant problems ($\beta = .43, p < 0.001$), the higher the senses of personal perceived efficacy ($\beta = .23. p < .001$); and the less the obstacles and constraints existing inside individuals ($\beta = -.11, p < .05$), the stronger the tendency of appropriate environmental behaviour. The study also shows that two socio – demographic characteristic factors were also essential predictors (status of study with $\beta = .19, p < .001$ and membership to environmental organisations with $\beta = .11, p < .001$). People who obtained higher level of education and actively involved in environmental organisations would lead to a higher possibility of adopting appropriate patterns of environmental behaviour. Under the personality variables in the psychological dimension, the results imply that individuals who have positive attitudes toward an appreciation of the primitive natural environment ($\beta = .16, p < .01$), as well as the preservation of environmental artifacts of the past ($\beta = .10, p < .05$) tend to act more appropriately for the environment.

APPENDIX F

DATA COLLECTION SHEET I

Section A. Socio-demographic Characteristics

Please answer the following Demographic questions. You are promised complete confidentiality, so there has no need for your name on this sheet. Thank you for your cooperation!

1. Your sex: ☐ male ☐ female

2. Your age _____

3. How would you describe your home area in which you grew up? (Please check the one answer which describes you most closely).

☐ rural farm ☐ rural (not a farm) ☐ town (not a suburb)

☐ city suburb ☐ city center

4. What is your student status at present?

☐ undergraduate ☐ graduate in Master's program

☐ graduate in Doctoral program ☐ other (specify):

5. Do you belong to any environmental organizations? ☐ yes ☐ no

6. Have you ever participated in any **organized** environmental activities (e.g. environmental education workshops, environmental conservation conferences, outdoor learning, *etc.*) either in or outside of school? ☐ yes ☐ no

7. Did you take any courses pertaining to environmental studies (e.g., environmental science, environmental engineering, environmental conservation, environmental education, environmental communications, natural resource management, *etc.*)?

☐ yes☐ no

Section B. Personality Variables

This part of the questionnaire comprises a series of statements on eight subjects that describe various aspects of life. These descriptions are of differing attitudes to different people. Please read each statement and circle the one appropriate number that best describe the extent of your feelings.

	Strongly Disagree				Strongly Agree
(1) The idea of walking into the forest and "living off the land" for a week appeals to me.	1	2	3	4	5
(2) Our nation's forests should be preserved in their natural state, with roads and buildings prohibited.	1	2	3	4	5
(3) It is important for me to feel (that I am) in harmony with the forces of nature.	1	2	3	4	5
(4) I like to care for animals.	1	2	3	4	5
(5) Life in the city is more interesting than life on a farm.	1	2	3	4	5
(6) Cities are too noisy and crowded for me.	1	2	3	4	5
(7) The cultural life of a big city is very important to me.	1	2	3	4	5
(8) Fertilizers improve the quality of food.	1	2	3	4	5
(9) A person has a right to modify the environment to suit one's needs.	1	2	3	4	5
(10) I'd be afraid to live in a place where there were no people nearby.	1	2	3	4	5
(11) I enjoy browsing in antique shops.	1	2	3	4	5
(12) I like places that have the feeling of being old.	1	2	3	4	5
(13) It would be fun to own some old-fashioned costumes.	1	2	3	4	5
(14) Old buildings are usually depressing.	1	2	3	4	5
(15) I prefer to live in an area where neighbors keep to themselves.	1	2	3	4	5
(16) It's annoying to have to share an office or workspace with someone.	1	2	3	4	5
(17) I often have trouble getting the privacy I want.	1	2	3	4	5
(18) I usually enjoy having lots of people around.	1	2	3	4	5
(19) Electricity fascinates me.	1	2	3	4	5

Section C. Perceived Barriers to Action

Below is a list of 12 statements regarding various reasons why people might not be doing more for the environment. No matter how much effort you personally have made to help the environment, please imagine the following situations and check the one appropriate box for each item to indicate whether it would be a "substantial barrier", "somewhat of a barrier", or "not a barrier" that might interfere with your behavioral choices.

How much of a barrier would the following situations be?	Not a Barrier	Somewhat of a Barrier	Substantial Barrier
(1) The environmental safe/friendly alternatives for many of the products that I want to buy were just too expensive.	☐	☐	☐
(2) I didn't feel that I could solve any environmental problems alone.	☐	☐	☐
(3) My family/dwelling partners didn't do and wouldn't accept any change.	☐	☐	☐
(4) I didn't really believe that a lot of products labeled "environmentally safe" are any better for the environment than other regular products; thus I don't buy them.	☐	☐	☐
(5) I didn't think it is worth of sacrificing my personal freedom (e.g., hunting, wildlife collections) for environmental protection.	☐	☐	☐
(6) I didn't perceive myself having enough information, skills, and/or knowledge on most of environmental actions that I want to perform.	☐	☐	☐
(7) I thought that pursuing my own lifestyle and habits is more important to me than changing myself for environmental protection.	☐	☐	☐
(8) I found that environmental problems are caused primarily by Industrial companies and I think it's these companies who should solve the problems.	☐	☐	☐
(9) I found that I am too busy to take part or action.	☐	☐	☐
(10) I found that it is just too inconvenient for me to take action.	☐	☐	☐
(11) I found that in our society there is no channel accessible for taking environmental actions.	☐	☐	☐
(12) I found that acting for the environment is not of interest at all to me	☐	☐	☐

Section D. Perceived Self-efficacy toward Action

Listed below are the statements regarding beliefs about your own performance expectations. Please imagine the feelings you might have in each situation and circle the one appropriate number that best describes the extent of your confidence of doing each task.

	Confidence				
	Not at all				Very
(1) As an individual, my own actions could have an effect on the Environment	1	2	3	4	5
(2) I personally could influence the solution of specific environmental issues that are of particular importance to me.	1	2	3	4	5
(3) If I wanted to, I could change my misbehavior pattern(s), for example: not drinking while driving, not littering.	1	2	3	4	5
(4) If I wanted to, I could make efforts to reach my planned goal(s), such as exercising leadership in a group.	1	2	3	4	5
(5) When encountering difficulties, I could make my own decisions to cope with problems.	1	2	3	4	5
(6) I could attend a social gathering at which there is no one I know.	1	2	3	4	5
(7) I could discuss a controversial topic (political, social, economic, or environmental issues) with people whose views differ greatly from mine.	1	2	3	4	5
(8) In a dispute, I would never give up my part until there is a solution.	1	2	3	4	5
(9) In a public place, I would ask a stranger to stop doing something that annoys me, such as littering, picking wildflowers, or smoking in a non-smoking area.	1	2	3	4	5
(10) I could ask people to correct a problem for which they are responsible, such as making noise at night, dumping trash illegally, or not controlling flows of water or electricity properly.	1	2	3	4	5
(11) I could commit time, energy, and money to influence the solution of **waste management**.	1	2	3	4	5
(12) I could commit time, energy, and money to influence the solution of **water and energy conservation.**	1	2	3	4	5
(13) I could commit time, energy, and money to influence the solution of **transportation and air quality control.**	1	2	3	4	5
(14) I could commit time, energy, and money to influence the solution of **natural resource management**.	1	2	3	4	5
(15) I could commit time, energy, and money to influence the solution of **social and political issues**.	1	2	3	4	5

Section E. Appropriate Environmental Behavior

This section is a list of environmental behaviors comprising five categories of environmental issues. Please read each statement and indicate your best answers on both sides of the response scales by using the following system:

On the left side of the statement, you are asked:

How important do you think each behavior is to solve environmental problems?

4 = very important, 3 = important, 2 = somewhat important, 1 = not at all

On the right side of the statement, you are asked:

How appropriate do you think each behavior is for your life?

A = You do **not** expect to do it in the future, B = You are uncertain and may **not** do it

C = You do think about doing it, D = You do expect to do it sometime in the future

E = You currently engage in it

Not at all			Very important	Resource recovery and waste management	Will not	May not	Might do	Plan to do	Do
1	2	3	4	(1) Use mugs instead of paper cups, cloth instead of paper napkins, rags instead of paper towels.	A	B	C	D	E
1	2	3	4	(2) Double-side photocopies; use reverse sides of paper.	A	B	C	D	E
1	2	3	4	(3) Bring your own canvas shopping bags to the market, or reuse the bags.	A	B	C	D	E
1	2	3	4	(4) Buy returnable/recyclable glass, metal, or plastic	A	B	C	D	E
1	2	3	4	(5) Separate your recyclables (e.g., newspaper, glass, paper, aluminum, and clothing) from trashes that you cannot reuse and that is being sent to the landfills.	A	B	C	D	E
1	2	3	4	(6) Reduce purchasing items which are over-packaged	A	B	C	D	E
1	2	3	4	(7) Save cardboard boxes for later use.	A	B	C	D	E
1	2	3	4	(8) Return deposit beverage containers to stores.	A	B	C	D	E
1	2	3	4	(9) Maintain and repair appliances, tools, and other equipment to lengthen their lives.	A	B	C	D	E
1	2	3	4	(10) Share, barter, trade, or donate what you no longer need, but which has value to others.	A	B	C	D	E
Not at all			Very important	**Energy and water conservation**	Will not	May not	Might do	Plan to do	Do
1	2	3	4	(11) Switch off lights in any space when not in use	.A	B	C	D	E
1	2	3	4	(12) Use electricity and hot water efficiently.	A	B	C	D	E
1	2	3	4	(13) Set your air-conditioner control to a moderate temperature (about 28 centigrade degrees), and clean air-conditioner filter and coils regularly.	A	B	C	D	E
1	2	3	4	(14) Adjust the temperature of your refrigerator-freezer based on the quantity of contents stored.	A	B	C	D	E
1	2	3	4	(15) Purchase energy-efficient appliances, e.g., refrigerators, air conditioners, washing machines,	A	B	C	D	E
1	2	3	4	(16) Do not let water run when it's not actively in use.	A	B	C	D	E
1	2	3	4	(17) Install sink faucet aerators and water-efficient shower-heads.	A	B	C	D	E
1	2	3	4	(18) Promptly replace rubber washers on leaky water valves	A	B	C	D	E

1	2	3	4	(19) When washing dishes in the sink, plug and fill second sink with rinse water rather than running	A	B	C	D	E
1	2	3	4	(20) Buy non-toxic, phosphate-free, biodegradable soaps and detergents.	A	B	C	D	E
Not at all			Very important	**Transportation and air quality control**	Will not	May not	Might do	Plan to do	Do
1	2	3	4	(21) Use public transportation, carpool, bike, or walk	A	B	C	D	E
1	2	3	4	(22) Save gas by driving smoothly, within the speed limit; have regular tune-ups and emissions checks.	A	B	C	D	E
1	2	3	4	(23) Purchase an energy efficient car, e.g., renewable-energy automobiles.	A	B	C	D	E
1	2	3	4	(24) Encourage the development of electric cars.	A	B	C	D	E
1	2	3	4	(25) Support for taxing gasoline to encourage its more efficient use.	A	B	C	D	E
1	2	3	4	(26) Purchase the ozone-safe products, e.g., coolants for refrigeration, even though the costs of these products are higher.	A	B	C	D	E
1	2	3	4	(27) Eliminate smoking in pubic places, e.g., offices, factories, trains, and buses.	A	B	C	D	E
1	2	3	4	(28) Replace the cars that have old engines and exhaust systems.	A	B	C	D	E
1	2	3	4	(29) Use only unleaded gas.	A	B	C	D	E
1	2	3	4	(30) Plant and care for trees in your own plot,	A	B	C	D	E
Not at all			Very important	**Natural resource management**	Will not	May not	Might do	Plan to do	Do
1	2	3	4	(31) Reduce human population growth by limiting family size.	A	B	C	D	E
1	2	3	4	(32) Reduce consumption wherever possible.	A	B	C	D	E
1	2	3	4	(33) Don't buy endangered plants, animals, or products made from overexploited species, ,such as furs ivory, reptile skin, and tortoise shell	A	B	C	D	E
1	2	3	4	(34) Support consumption of locally produced goods and produce from local farmers.	A	B	C	D	E
1	2	3	4	(35) Buy products from companies that don't pollute or damage the environment and don't test products on animals.	A	B	C	D	E
1	2	3	4	(36) Understand the significance of cultural differences; and respect the nature and living diversity when touring in the cultural, historical, and/or protected areas.	A	B	C	D	E

1	2	3	4	(37) Avoid food whose production endangers wildlife and/or their habitats (e.g., high mountain vegetables and teas).	A	B	C	D	E
1	2	3	4	(38) Avoid buying wood from the tropical rainforests unless you are sure it was propagated bysustainable tree farming methods.	A	B	C	D	E
1	2	3	4	(39) Take part in local conservation research activities (e.g., field works, surveys, monitoring, *etc.*) to help establish a system for protecting natural habitats, ecosystems, and species in the area	A	B	C	D	E
1	2	3	4	(40) Join, support, volunteer your time to organizations working on issues of environmental conservation that are important to you.	A	B	C	D	E
Not at all			Very important	**Social/political action**	Will not	May not	Might do	Plan to do	Do
1	2	3	4	(41) Talk to my family, friends, and other students about what we can do to help solve environmental problems	A	B	C	D	E
1	2	3	4	(42) Encourage others to become involved in some kind of behavior(s) toward environmental conservation (e.g., recycling or reusing resource materials, conserving water and energy, car-pooling, participating in community cleanup projects, etc.)	A	B	C	D	E
1	2	3	4	(43) Communicate with others about the significance of environmental protection.	A	B	C	D	E
1	2	3	4	(44) Report to the authorities in cases where an individual or organization has been violating the environmental law (e.g., illegal hunting/fishing/wild life collections, pollutant, dumping).	A	B	C	D	E
1	2	3	4	(45) Participate in some type of educational program for the purposes of learning more about environmental matters.	A	B	C	D	E
1	2	3	4	(46) Vote for a "pro" environment candidate.	A	B	C	D	E
1	2	3	4	(47) Write to or call elected officials telling them to support environmental protection.	A	B	C	D	E
1	2	3	4	(48) Donate money to an organization or an environmental project in order to help in the	A	B	C	D	E
1	2	3	4	(49) Sign a petition in support of "pro" environmental policies and/or legislation.	A	B	C	D	E
1	2	3	4	(50) Attend a public meeting or political rally/speech on environmental, town or school affairs.	A	B	C	D	E

Your response is all completed.

Sincerely thank you for your time and thoughtfulness!