



Forest Conservation: Knowledge, Attitudes and Practices of Preparatory School Students

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Author's contribution

The sole author designed, analyzed and interpreted and prepared the manuscript.

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ABSTRACT

The main purpose of this study is to assess students' environmental knowledge, attitude, and practice about forest conservation. Descriptive research method was used for the study. The participants of the study were 85 students from the preparatory school who were in the last year of their study. Results show that students in general, have a fair to a good level of environmental knowledge. However, this held knowledge did not escort them to environmentally responsible behavior. In addition, the findings of the study indicate that there was a positive correlation between knowledge and attitude and a weak relationship between students' level of knowledge and environmental good practices. Similarly, very weak correlation was found between attitude and practice. Analyses of gender effect reveal that female students' environmental participatory behavior was higher than their male counterparts. Results further pointed out that students living in rural area scored significantly higher than their urban counterparts on environmentally responsible action. Nonetheless, sizeable similar studies of this kind have been carried out in different parts of the world, this study is likely to contribute to the knowledge predestined on Ethiopian context that striving to rehabilitate degraded environment. The mismatch between environmental knowledge and environmentally favorable behavior calls for among others use of methodologies in classroom that help students to see their behavior more critically.

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1. INTRODUCTION

Deforestation and soil degradation are serious environmental problems in Ethiopia. Such an alarming picture of deforestation and land degradation has posed a growing threat to the natural environment as well as to the socio-economic performance of the nation as a whole. For example, the annual estimate of deforestation range from 80,000 to 200,000 ha/year, while the loss of soil is about 400 tons/ha [1]. Despite this major difficulty, however, enormous soil conservation and afforestation programs have been going on in Ethiopia since the early 1970's. These programs are undertaken by various agencies of the government through the assistance of many international and bilateral organizations. However, it has long known that knowledge, positive attitude and environmentally responsible behavior towards the environment are crucial for the sustainable environment of any country, especially with fragile ecosystems such as Ethiopia. After the Tbilisi conference held in 1976, to overcome these environmental problems, the international community has made considerable efforts in environmental education (EE) to change the attitude and participatory behavior of people across the globe. Hence, EE should be an indispensable part of the school curriculum in order to create students environmentally literate and develop a positive attitude towards the environment. Similarly, Gedion [2] argued that the Ethiopian Environmental situation could be improved if the issue is taken up by school curricula. An analogous finding was reported by Arcury [3] environmental knowledge, attitudes, values, and practices of the people are the key components towards the improved and sustainable environment. Particularly, young peoples' environmental knowledge, attitudes, and practices are essential as they ultimately play a crucial role in providing knowledge-based solutions to new and unforeseen environmental problems. Therefore, it is crucial shaping the school age students' environmental awareness, attitude, commitment and skill needed to conserve and preserve the environment. According to Strong [4], Ogunbode and Arnold [5], Pearson et al. [6] and Kahriman-Ozturk et al. [7] schools at all levels are perhaps better vehicles for enhancing environmental knowledge than universities. Furthermore, it was also stated by Bryant and Hungerford [8] that the formation

of attitude towards the environment starts at a very early age of human being.

There are plenty of research available regarding environmental knowledge, attitude and practice. However, the geographic distribution of the studies mainly confined to USA, Europe, Asia and Australia and mostly concerned with national environmental issues and problems. These studies have been reported in the literature about elementary school students', high school students' and college students', environmental knowledge, attitudes and practice either exclusively or in conjunction or comparison with other environmental issues. Studies on children's and high school students' environmental attitudes by Eagles and Demare [9] revealed that no gender differences in environmental attitudes while Salmivalli [10], Alp et al. [11], Ugulu and Erkol [12], Jenkins and Pell [13], Tuncer et al. [14], Kose et al. [15], Yilmaz et al. [16] and Ozsoy [17] reported females had a more positive attitude towards the environment than males. In the study by Bradley et al. [18], students having better knowledge scores had more positive environmental attitudes. Makki et al. [19], Kuhlemeier et al. [20] and Gambro and Switzky [21] found that high school students held identical and encouraging attitudes towards the environment, but meager knowledge of environmental issues. However, studies of Kaplowitz and Levine [22], Korhonen and Lappalainen [23] and Ivy et al. [24] reported opposing results that state high school students' possess high level of environmental knowledge. Moreover, Gambro and Switzky [21] and Makki et al. [19] disclosed that students from the more educated family had substantially higher environmental knowledge than their counterparts. In a study of Michigan State University students' level of environmental knowledge Kaplowitz and Levine [22], found the existence of differences in environmental knowledge among different colleges of the university. Alp et al. [11] asserted that grade level also has a significant effect on environmental knowledge and attitude of the students. Tuncer et al. [14] pointed out that there was a statistically significant effect of gender and school type attended on the environmental attitudes of young people in Turkey. Furthermore, the study carried out by Ostman and Parker [25] revealed a positive correlation between environmental knowledge, concern, and

behavior. Roth and Perez [26] showed a significant interrelation between students' environmental knowledge and attitudes, arguing that better environmental knowledge could ultimately lead to positive attitudes toward the environment. This finding is supported by the conclusion of Mansaray and Ajiyoye [27] who came up with result that reveals a lack of knowledge leads to bad attitudes and practices. They further argued that students' environmental knowledge and attitude offer the support to their major practices. Thus, it was evident that education appears to have a capacity to predict environmental knowledge and consequently behavior.

From the findings of the above studies, one can hence conclude that the need in Ethiopia for integrating environmental education into different subjects or integrating different subjects so that they formulate environmental education practical at all levels of education from the first cycle up to university. Similarly, studies conducted by Aklilu, [28] and Gedion [2] showed also that the greater the environmental education attainment of the community the more sustainable utilization of natural resource and better understanding human-environment interaction. If appropriate knowledge, attitude and willingness to take action to solve environmental problem are instilled in learners, they can provide knowledge-based solutions for the prevailing environmental degradation in general and forest degradation in particular in Ethiopia. Furthermore, by including stand-alone environmental education in the curriculum it is possible to create environmentally knowledgeable and skilled learners who are willing to work individually and collectively toward achieving and maintaining a dynamic equilibrium between fast economic growth and sustainable development. Thus, firstly environmental education should itself, use a problem solving (inquiry-based) approach. Secondly, it is important to note that environmental education must be concerned with the development and, importantly, a quality of human life and a quality environment – closely of the same kind to the overriding concept of “sustainable development”.

Hence, to achieve in tackling the environmental problems in Ethiopia through developing the right attitude, knowledge and participatory behavior at every level of education necessitates a study and analysis of students' awareness, knowledge, attitude, behavior and intention about the environment. This study, therefore, was designed to fill this gap, since education is the most

powerful instrument to send a correct message concerning the complex nature of environmental degradation and the way how to rehabilitate it. Moreover, no published similar studies were found in Ethiopia that dealt with aforementioned environmental problem resolving approaches at any level, let alone with preparatory school students.

To conduct the present survey and achieve the intended objectives, the study sought to provide answers to the following leading research questions.

- What is the level of students' knowledge regarding forest resource?
- What is the attitude of students toward conserving forest?
- What is the level of students' intention to act against deforestation?
- Are there statistically significant differences among students' gender, academic stream and the residential area towards curbing deforestation?
- What is students' environmental knowledge-responsible environmental action and attitude-responsible environmental action relationship towards forest conservation?

The main objective of this study was to assess the level of preparatory school students' environmental knowledge, attitude and practice (KAP) about forest degradation. Specifically, the study was conducted to determine the relative strength of the relationships between 2 variables (environmental knowledge and attitude) and environmental practice towards controlling deforestation, to identify the level of students' knowledge regarding forest resource and to compare the similarities and difference in students' knowledge, attitude and participatory behavior towards deforestation based on gender, academic stream and growing up areas.

1.1 Environmental Knowledge, Attitude and Practice

According to Arnold et al. [29] knowledge, attitudes, values and practices of the community are basic components towards the sustainable environment. This is why, to measure public's knowledge, attitude and practice on issues related to environment KAP surveys have been widely used by researchers. Environmental knowledge refers to the gaining of broader know-how and internalization of fundamental understanding regarding the environment and

associated problems to it. According to Arcury [3], the basic postulation is that the more we are environmentally knowledgeable; we then become motivated to act toward the environment in more responsible ways. Thus environmental knowledge is a prerequisite for environmental attitude and environmental attitude is a pre-condition for suitable environmental practice. Environmental attitude describes to individuals' perception to the surrounding environment and their inclination to react to environmental issues. Bradly et al. [18] asserted that environmental attitude of young generation is crucial, as they eventually play a leading role in providing knowledge-based solutions to existing as well as the incoming environmental problem. Similarly, on the other study Kuhlemeier et al. [20] concluded that environmental attitudes are pre-conditions for students' ecological behavior. Environmental practice focuses on individuals' practices and contribution to environmental conservation. Mansaray and Ajiboye [27], Ivy et al. [24] and Arnold et al. [29] explained that it is greatly influenced by attitude and factual environmental knowledge.

1.2 Secondary Education System of Ethiopia in Brief

According to the current system of education in Ethiopia, secondary education is divided into two cycles: the first (Grades 9 and 10) or general secondary education, and the second cycle (Grades 11 and 12) or preparatory education. Since the education reform of 1994, completion of Grade 10 leads to the National Educational Assessment and Examinations (NEAE). It used to be at the end of Grade 12 before the 1994 reform. About one-fifth of the students who complete the general education get into preparatory schools whereas the balance join colleges that prepare students for various professions (e.g. teaching) and technical and vocational colleges. The second cycle, on the other hand, prepares students for studies at higher education institutions, after having selected their field of interest (social science and humanities; natural and computational science; etc.)

1.3 Significance of the Study

For curricula designers and policy makers, the study can contribute to demonstrate the literacy level of high school students about environmental knowledge, attitude, and practices, that may help to fill the gap, if any, in

the policy in general and curricula materials in particular. In addition, it gives information that may initiate other researchers to investigate deeply on the problem. Furthermore, this study is significant in that it can contribute a valuable source of information that may be considered by any environmental protection organizations which aim to have an interest in making learning institutions more productive to address such environmental problems.

1.4 Limitations

The study may lack external validity since the sample size was small in relation to the total population of the preparatory school students across the country. In addition, selected variables that were believed to have a strong effect on forest conservation concern in the study area were used. However, not all variables that have been employed in previously conducted international studies were included. Furthermore, in the course of the study, the researcher had encountered a lack of published research outputs in the country that focused and discussed on the related study problem.

2. MATERIALS AND METHODS

2.1 Population, Sample and Sampling Technique

The research design was a descriptive type of study employing survey method. The study was conducted at Gebre Gurach preparatory school located in Central Ethiopia. The reason behind the selection is that it is situated in more environmentally degraded area than others. By employing stratified sampling method the population under study which comprised grade 12 students were divided into strata based gender (male and female), academic stream (natural science and social science) and place of residence (urban and rural). Same sampling fraction was used for all strata to ensure proportionate representation in the sample. Hence, the number of subjects selected from these strata is proportional to the total number of subjects in each stratum. Finally, by using simple random sampling technique a total of 85 (43 social science stream and 42 natural science stream students) were selected from a total population of 566 students. They were targeted for the study for three reasons. Firstly, to examine the effect of attained high school environmental education lessons on their conceptual knowledge. Secondly, they are the

graduates of general secondary education at a national level and pre-university students. Thirdly, since they are living in the deforested district it was believed that their environmental concern and action will appear to be much stronger.

2.2 Data Collection and Analysis

In this study, textbook analysis, multiple choice knowledge tests, and attitude and performance Likert scale items were used as the main data gathering instrument. To determine the items the researcher assessed the current grade 9-12 geography and biology textbooks through content analysis with educational experts and biology and geography teachers as panels of an expert. This was because in Ethiopia environmental education is not a stand-alone subject but concepts related to environmental issues are mentioned in different subjects (by using multidisciplinary approach) mainly in geography and biology subjects.

A pilot study was carried out to determine the reliability of the instrument used. Accordingly, to check and ensure their content validity the instruments were given to 2 environmental education professors of Addis Ababa University, 2 geography and biology textbook writers and 4 preparatory school geography and biology teachers. Based on their comments and suggestions items modification were made. In addition, analysis of pilot data was conducted to judge the relevance of each item in order to answer research questions. The value of reliability coefficient (Cronbach's Alpha) for environmental knowledge was 0.74 while for environmental attitude was 0.77 and for participatory behavior was 0.75 respectively is thus acceptable.

2.2.1 Knowledge inventory

Multiple-choice knowledge inventory questions that consist of 25 questions were developed in which the correct responses have weighted a score of one and incorrect responses as a score of zero. The lowest possible total score is zero and the highest total score is 25 (25 X 1) which was converted into 100% for the sake of valuation convenience.

2.2.2 Attitude inventory

The attitude inventory consists of 20 questions rated on a Likert-type of scale that ranges from strongly agree to strongly disagree to measure

the extent to which the students' environmental concerns were favorable or unfavorable with respect to forest conservation and towards taking environmental action. In assigning values to favorable items the scale were weighted going from strongly agree, agree, undecided, disagree, strongly disagree, having 5, 4,3,2,1 values respectively. But, in the case of unfavorable items these values were reversed in the scale strongly disagree, disagree, undecided, agree, strongly agree, having 5, 4,3,2,1 values respectively. The items were worded both positively and negatively to reduce the risk of obtaining false responses. A neutral score occurred if students answered primarily in the mid-range of 3.0. thus, a score of 60 (3 X 20) had taken as a neutral position.

2.2.3 Participatory behavior inventory

To weight up students' participatory behavior for the sustainable environment 15 statements were written on a five-point Likert scale. In this scale, zero was assigned for response Never; 1 to rarely, 2 to sometimes, 3 to often and 4 to always based on students' responses to each item. Hence, the highest score would be 60 (15 X 4) shows, the best performance of students in environmental practical actions, while the lowest possible score zero indicates environmentally irresponsible behavior. The responses "often" and "always" were considered as acceptable whereas "never" and "rarely" response considered as unacceptable participatory actions. Since environmental knowledge and attitude assessed out of 100, for the sake of simplicity in correlation, the environmental practice score also converted to 100.

The data collected from respondents were analyzed using inferential statistics like independent sample t-test and descriptive statistics such as percentages, frequency distributions, mean scores, and standard deviations. In addition, a correlation coefficient was employed to scrutinize the association between respondents' environmental knowledge, attitude and participatory behavior.

3. RESULTS AND DISCUSSION

3.1 Level of Students' Environmental Knowledge, Attitude and Participatory Behavior

To determine social science and natural science students' environmental knowledge about causes, effects and potential solutions to curb

forest degradation 25 items which later on converted to 100% for computing convenience were administered. The results of the study show that the average score of the students' environmental knowledge regarding deforestation for both social science and natural science academic stream was 60 (Table 1). The majority of social science students (63%) and more than half of natural science students (57%) score above average which shows their environmental knowledge is medium and not encouraging. Even though more than half of students scored above average, the majority of students appear to have very general, fragmentary and uncritical knowledge about the forest resource. Students lacked knowledge on items, such as forest resource dynamics of Ethiopia; major forest regions of Ethiopia; direct and indirect causes of deforestation in Ethiopia; ecological values of a forest; impacts of deforestation on globe climate and steps to successful forest resource management. For example, regarding indirect uses of forest disappointingly only very few social science (12%) and natural science (18%) students could give correct responses. Similarly, a large percentage of social science (70%) and natural science (80%) students answered incorrectly about the major ways in which forests affect the global climate. This finding is supported by the conclusion of Makki et al. [19], Kuhlemeier et al. [20] and Gambro and Switzky [21] who came up with results that reveal high school students' held the same and promising attitudes towards the environment, but insufficient environmental knowledge. Furthermore, the existence of knowledge gap between students of social science and natural science streams was observed clearly. This significant mean difference between two streams might be because of the fact in which the environmental issues more or less better treated in geography curriculum than in biology curriculum.

To evaluate environmental concern/attitude students hold toward conserving forest 20 inventory items were conducted. To determine the positive or negative attitude of the respondents' cut-off point was set before the administration of the test. As a result, using the score given to "undecided" as a dividing line score greater than 60 are considered as favorable attitude and score less than 60 unfavorable towards forest degradation. According to the attitude test score of the students (Table 1), mean score of for both social science and natural science academic stream

was 67. Nearly more than half of social science students (51%) and natural science students (55%) score above average which shows their attitude is moderate. One can hence conclude that most of the students have a positive attitude towards forest conservation. Similarly, a study conducted by Makki et al. [19] revealed that the high school students possessing positive attitudes towards the environment including those possibly lack good environmental knowledge.

As shown in Table 1, students' environment-friendly participatory practice score was 50 for social science students and 52 for natural science students with the large standard deviation. From this result, one can conclude that students' environmental practice is low since more than half of the natural science students and about half of social science students' score below mean. Unfortunately and disappointingly in this study students did not show positive inclination and commitment towards pro-environmental behavior. Among others, the probable reasons for this result are a lack of activities in environmental clubs, parents' low socio-economic and educational background, workload at home (exploitation of child labor in Ethiopia is higher than any developing countries), lack of environmental education field trip, and the unpopular and forced government imposed environment rehabilitation campaign. This finding contradicts conclusion made by Mansaray and Ajiboye [27] that argued students' environmental knowledge and attitude offer the support to their major environmental practices since students in this study exhibited a moderate level of environmental knowledge and attitude. In their study, they pointed out the positive relationship among students' knowledge, attitudes and practices. One concern of this study is that despite the evidence exhibited regarding environmental practice, it was not identified which factor appear to be stronger in motivation students to take responsible environmental action in Ethiopia. Hence, to ensure more robust statistical findings and to get in-depth information all potential and appropriate research methods of data collection and analysis should be used in the future study.

3.2 Analysis of Gender Effect on the Environmental Practice

As shown in (Table 2), female social science and natural science students scored slightly higher ($M=53.34$, $SD=16.94$) than their

male counterparts (M=48.34, SD=14.82) on environmental practice inventory; MD=5.00, t (83) 1.43, P=0.001, α=0.05. These results suggest that sex has an effect on the level of students' environmental practice. This insignificant mean difference between two sexes might be because of the fact that females are more concerned about the environment than males because they are potentially environmentally responsible than males due to their caring nature. This finding is supported by findings of Salmivalli [10], Alp et al. [11], Ugulu and Erkol [12], Jenkins and Pell [13], Tuncer et al. [14], Kose et al. [15], Yilmaz et al. [16] and Ozsoy [17] that asserted females had a more favorable manner towards the environment than males.

3.3 Analysis of Place of Residence Effect on the Environmental Practice

(Table 2), depicts that students living in rural area scored significantly higher (M=54.24, SD=13.94) than their urban counterparts (M=47.29, SD=16.38) on environmental practice; MD=6.95, t (83) 2.01, P=0.001, α=0.05. These results suggest that place of residence has an effect on the act of students' environmental participatory behavior because environmental concern and practice were much stronger in deforested rural areas than in urban. This is consistence with findings by Korhonen and Lappalainen [23] that reported students from

deforested areas who had attained some forms of environmental education were more environmentally sensitive and tending to deal with environmental issues.

3.4 Analysis of Academic Stream Effect on the Environmental Practice

Analysis of academic stream found no statistically significant difference between social science and natural science students towards environmentally friendly participatory behavior. As indicated in (Table 4), social science and natural science students demonstrated identical results (M=48.54, SD=16.35) and (M=51.95, SD=15.07) on environmental practice test; MD=3.41, t (83) 1.00, P=0.001, α=0.05. These results hint that an academic stream has no effect on the performance of students' environmental-friendly action. However, this finding contradicts with the conclusions of Kaplowitz and Levine [22], who reported the existence of differences in environmental knowledge and practice among different colleges of the Michigan State University. They disclosed that College of Agriculture and Natural Resource (M=8.84, SD=2.03 and Natural Science (M=8.48, SD=2.24) scored higher in environmental knowledge and practice test than College of Human Ecology (M=7.25, SD=2.35), Nursing (M=7.48, SD=2.06) and Education (M=7.99, SD=2.43).

Table 1. Mean scores of students knowledge, attitude and practice towards forest degradation

Academic stream	N	Variables	Mean	Above mean		Below mean		Std. deviation
				N	%	N	%	
Social science	43	Knowledge	60	27	63	16	37	1.399
		Attitude	67	22	51	21	49	7.894
		Practice	50	22	51	21	49	16.355
Natural science	42	Knowledge	60	24	57	18	43	1.158
		Attitude	67	23	55	19	45	9.207
		Practice	52	20	48	22	52	15.073

Table 2. An independent samples t-test analyses of gender effect on the environmental practice

Gender	N	Mean	Std.Deviation	df	t	Si (2-tailed)	Mean difference
Male	53	48.34	14.82	83	1.43	0.157	5.00
Female	32	53.34	16.91				

Table 3. An independent samples t-test analyses of place of residence effect on the environmental practice

Place of residence	N	Mean	Std.Deviation	df	t	Si (2-tailed)	Mean difference
Urban	52	47.29	16.38	83	2.01	0.047	6.95
Rural	33	54.24	13.94				

Table 4. An independent samples t-test analyses of academic stream effect on the environmental practice

Academic stream	N	Mean	Std.Deviation	df	t	Sig. (2-tailed)	Mean difference
Social science	43	48.53	16.35	83	1.001	0.320	3.41
Natural science	42	51.95	15.07				

Table 5. Pearson correlation of students' environmental knowledge, attitude and practice

Variables	Attitude	Sig. (2-tailed)	Practice	Sig. (2 tailed)
Knowledge	.485**	0.000	0.054	0.627
Attitude	-----		0.001	0.505

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

3.5 Relationship of Environmental Knowledge, Attitude and Practice

From the analysis of the relationship of environmental knowledge, attitude and practice one can conclude that there was a positive correlation between knowledge and attitude, $r = 0.485$, $n = 85$, $P = 0.000$ (above Table 5). However, no statistically significant correlation between knowledge and practice, $r = 0.054$, $n = 85$, $P = 0.627$. In addition, very weak correlation was found between attitude and practice, $r = 0.001$, $n = 85$, $P = 0.505$. These results are inconsistent with findings of many studies (Ostman and Parker [25], Roth and Perez [26] and Mansaray and Ajiboye [27]) that argued positive association between environmental knowledge, concern, and behavior. In their study, they offered data and arguments in support of a causal flow from knowledge to attitude and lastly to action. Subsequently, to understand and to come up with a sound scientific conclusion the discrepancy of these three variables (knowledge-practice and attitude-practice) should be further comprehensively investigated in the Ethiopian context.

4. CONCLUSION

Determination of the gap in students' environmental knowledge, attitude, and practice is critical in order to evaluate their attentiveness to bring sustainable development. The evidence from this survey exhibits that both social science and natural science students had a fair and general environmental knowledge but lacking a critical understanding about forest resource. For example, the incorrect association of ecological service provided by forest to recreation and ecotourism, biochemical and genetic resources, fuel wood and fiber, fresh water and food. The environmental attitudes of students were positive

towards curbing deforestation. However, disappointingly, in this study, students did not show encouraging inclination and commitment towards pro-environmental behavior. The probable reasons for this result are a lack of activities in environmental clubs, parents' low socio-economic and educational background, students' workload at home, lack of environmental education field trip, the unpopular and forced government imposed environment rehabilitation campaign. Similarly, Palmer [30] in his study noted that environmentally responsible behavior may be improved in the course of active participation in environmental related activities such as participation in school environmental clubs, environmental campaigns and commence outdoor activities. A finding of this study also disclosed that place of residence and gender have significant differences regarding environmentally responsible action and practice while no statistically significant difference was found between the academic streams towards environmentally friendly behavior. Furthermore, the test of the linear relationship between variables found that students' environmental knowledge had significant positive correlation with attitude while their environmental knowledge and attitude had significant weak correlation with responsible environmental practice. These results show the complex interrelationships between students' environmental knowledge, attitude, and practice. The overall findings presented in this study are either not encouraging or totally disappointing. For the most part, such information is crucial for its potential in terms of supplying a sound practical foundation on which to design appropriate curricula and teaching-learning strategies for the development of environmentally responsible and active pupils. For these reasons, environmental education issues should be revised in detail and the contents of the courses and classroom

instructional approach should be revisited at all levels of education. In particular, to guarantee the successful realization of environmental education to the young age group, their teachers need to equip themselves with sufficient environmental knowledge, attitude and environmentally responsible behavior through the in-service training program. It might be also useful to encourage the involvement of students in environment-related activities (such as environmental club and min-media) at the school; establish linkage between the school and NGOs that have environmental concern and organize an educational field trip to forested and deforested areas. Future study are required to assess appropriate school curriculum and teaching methods as variable that might motivate individuals to take responsible environmental action in Ethiopia.

COMPETING INTERESTS

Author has declared that no competing interests exist.

REFERENCES

1. EPA (Environmental Protection Authority). State of Environment Report for Ethiopia: The Federal Democratic Republic of Ethiopia, Environmental Protection Authority, Addis Ababa, Ethiopia; 2003.
2. Gedeon A. Program brief and introductory remark, environment and environmental change in Ethiopia. Forum for Social Studies, Civil Society and Environmental Policy Dialogue, Consultation Paper on Environment. 2003;1:4-8.
3. Arcury T. Environmental attitude and Environmental Knowledge. Human Organization. 1990;49:300-304.
4. Strong C. The impact of environmental education on children's knowledge and awareness of environmental concerns. Market Intell Plann. 1998;16:349-355.
5. Ogunbode C, Arnold K. A study of environmental awareness and attitudes in Ibadan, Nigeria. Hum Ecol Risk Assess. 2012;18:669-684.
6. Pearson S, Honeywood S, Toole M. Not yet learning for sustainability: The challenge of environmental education in a university. Int Res Geogr Environ Educ. 2005;14:173-186.
7. Kahriman-Ozturk D, Olgan R, Tuncer G. A qualitative study on Turkish preschool children's environmental attitudes through ecocentrism and anthropocentrism. Int J Sci Educ. 2012;34(4):629-650.
8. Bryant C, Hungerford H. An analysis of strategies for teaching environmental concepts and values clarification in kindergarten. Journal of Environmental Education. 1977;9:44-49.
9. Eagles P, Demare R. Factors influencing children's environmental attitudes. Journal of Environmental Education. 1999;30:33-35.
10. Salmivalli M. Children's environmental response inventory among Finnish adolescents. Journal of Environmental Education. 1998;3(29):49-54.
11. Alp E, Ertepinar H, Tekkaya C, Yilmaz A. A statistical analysis of children's environmental knowledge and attitudes in Turkey. International Research in Geographical and Environmental Education. 2006;3(15):210-223.
12. Ugulu I, Erkol S. Environmental attitudes of biology teacher candidates and the assessments in terms of some variables. NWSA-Education Sciences. 2013;8(1):79-89.
13. Jenkins E, Pell R. The relevance of science education project (ROSE) in England: A summary of findings. Centre for Studies in Science and Mathematics Education. London: University of Leeds; 2006.
14. Tuncer G, Ertepinar H, Tekkaya C, Sungur S. Environmental attitudes of young people in Turkey: Effects of school type and gender. Environmental Education Research. 2005;2(11):215-233.
15. Kose S, Savran-Gencer A, Gezer K, Erol G, Bilen K. Investigation of undergraduate students' environmental attitudes. Int Electron J Environ Educ. 2011;1(2):85-96.
16. Yilmaz O, Boone W, Andersen H. Views of elementary and middle school Turkish students toward environmental issues. Int J Sci Educ. 2004;26(12):1527-1546.
17. Ozsoy S. A survey of Turkish pre-service science teachers' attitudes toward the environment. Eurasian J Educ Res. 2012; 12:121-140.
18. Bradley J, Waliczek T, Zajicek J. Relationship between environmental knowledge and environmental attitude of high school students. Journal of Environmental Education. 1999;3(30):17-21.

19. Makki M, Abd-El-Khalick F, Boujaoude S. Lebanese secondary school students' environmental knowledge and attitudes. *Environmental Education Research*. 2003; 1(9):21-33.
20. Kuhlemeier H, Huub Van Den B, Nijs L. Environmental knowledge, attitudes and behavior in Dutch secondary Education. *Journal of Environmental Education*. 1999; 2(30):4-11.
21. Gambro J, Switzky H. A national survey of high school students' environmental knowledge. *Journal of Environmental Education*. 1996;3(27):26-28.
22. Kaplowitz M, Levine R. How environmental knowledge measures up at a big ten university. *Environmental Education Research*. 2005;2(11):143-160.
23. Korhonen K, Lappalainen A. Examining the environmental awareness of children and adolescents in the Ranomafana region, Madagascar. *Environmental Education Research*. 2004;2(10):197-216.
24. Ivy T, Lee C, Chuan G. A survey of environmental knowledge, attitudes and behavior of students in Singapore. *International Research in Geographical and Environmental Education*. 1998;3(7): 181-202.
25. Ostman R, Parker J. Impact of education, age, newspapers, and television on environmental knowledge, concerns, and behaviours. *The Journal of Environmental Education*. 1987;19(1):3-9.
26. Roth R, Perez J. Twelfth grade student knowledge and attitudes toward the environment in the Dominican republic: An assessment. *The Journal of Environmental Education*. 1989;20(3):10-14.
27. Mansaray A, Ajiboye J. Environmental education and Nigerian students' knowledge, attitudes and practices (KAP): Implications for curriculum development. – *The International Journal of Environmental Education and Information*. 1997;16(3): 317-324
28. Aklilu D. Natural resource degradation and famine in Ethiopia: Assessment of students' awareness and view. Flensburg University: Germany; 2001.
29. Arnold H, Cohen F, Warner A. Youth and environmental action: Perspectives of young environmental leaders on their formative influences. *The Journal of Environmental Education*. 2009;40(3):27-36.
30. Palmer J. Research matters: A call for the application of empirical evidence to the task of improving environmental education. *Cambridge Journal of Education*. 1999;29 (3):379-396.

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