RESEARCH ARTICLE

ASSESSMENT OF STUDENTS KNOWLEDGE AND PERCEPTIONS ABOUT BIODIVERSITY AND CONSERVATION METHOD IN HARARI REGIONAL STATE, EASTERN ETHIOPIA

Yeneayehu Fenetahun[1]* and Girma Eshetu[2]

Ethiopia Biodiversity Institute (EBI), Harar Biodiversity Center
Email: yeneayehu07@gmail.com

Abstract: The term biodiversity refers the number and variability of living organisms on the plant and it is the heart of sustainable development and the life insurance in itself. The main objective of this study was to assess students' level of knowledge and perception about biodiversity conservation techniques, hence strengthening and developing students' level of knowledge and perception towards biodiversity conservation has a great role to protect the variety of all species in the ecosystem. The study has employed both qualitative and quantitative methods such as individual interview, FGD and structured questionnaire. A total 360 students from two target groups (grade 10 and 12) selected from 6 secondary and preparatory schools were involved. The results showed that students' level of knowledge and perception towards biodiversity conservation was varied. Accordingly, above 50% and 70% of the students of grade 12 were found above mastery level in their knowledge and had shown favorable perception respectively regarding biodiversity conservation whereas students from grade 10 above 50% were found below mastery level regarding their knowledge and above 50% of the students also had shown favorable perception about conservation of biodiversity resource. This indicated that the students were not more awareness about biodiversity and conservation methods due to different factors like teaching learning of biodiversity conservation was found ineffective due to lack of facilities, lack of effective implementation of the stated methodology in their text book and large class size. Thus, it can be concluded that the students has not get the expected change in knowledge and perception among students about conservation of biodiversity resources particularly in grade 10 with in the school. Therefore, fulfilling of the necessary facilities, awareness creation on the concerning body and implementing effectively the teaching methods of biodiversity conservation that included in their text book such as field exposure, group discussion active classroom session and continues assessment in the study area is highly recommended.

Keywords: Biodiversity, Conservation, Harari, Students, Perception

INTRODUCTION

The term biodiversity refers the number and variability of living organisms. It includes diversity within species (genetic diversity), between species (species diversity), and between ecosystems (ecosystem diversity). Biodiversity also incorporates human and cultural diversity, which can be affected by the same drivers as biodiversity, and which has impacts on the diversity of genes, species and ecosystems (Niles, 2009). Biodiversity is the heart of sustainable development and the life insurance in itself (Mc Neil and Shei, 2002, cited in Sajise, 2005). According to FAO (1995) cited in Young (1997), sustainable development is the management and conservation of the natural base in such a manner as to ensure the attainment and continued satisfaction of human needs for the present and the future generations.

Since it is crucial to the sustainability of sectors as diverse as energy, agriculture, forestry, fisheries, wildlife, industry, health, tourism, commerce, irrigation and power the conservation of biodiversity is fundamental to achieving sustainable development. Ethiopia's development in the future will continue to depend on the foundation provided by living resources and conserving biodiversity (NBSAP,

*Corresponding Author

2005). Biodiversity conservation in Ethiopia will be better served, at least initially, by a distinctive and focused action plan. Such a plan can promote awareness, knowledge and perception of the society. According to Getachew and Berihun (1996 E.C), especially countries like Ethiopia that have people whose life is directly connected with the biodiversity (natural resources) would know the benefit of the biodiversity. Since Ethiopia is characterized by wider ranges of landscapes starting from below the sea level at Afar Depression up to 4200 m a s l at Ras Dashen and different climatic zones, the combination of which has contributed much to the diversity of both plant and animal communities (Getachew and Berihun, 1996, Lavrenchenko *et al.,* 2004). In addition, Ethiopia is also a home of many nations and nationality which possess experiences, diverse culture and knowledge that can play a great role in conserving the biodiversity of the nation (Getachew and Berihun, 1996). Ethiopia is an important center of biodiversity and endemism on the African continent. An inventory of fauna and flora in Ethiopia indicates that there are more than 277 species of terrestrial mammals, 862 species of birds, 201 species of reptiles, 63 species of amphibians, 150 species of fish and 7000 species of higher plants. Among these, 11% of mammals, 3.3% of birds, 4.5%

of reptiles, 38% of amphibians, and 12% of higher plants are endemic (EFAP, 1994). The contracting parties of 1992 UNCBD in Riode Janeiro recognized that the general lack of information and knowledge about biodiversity has been one of the leading causes for reduction and loss of biodiversity.

Since Ethiopia is one of the contacting parties of the convention that endorsed and ratified the convention protocol (UNCBD, 1992), the government of Ethiopia has been carrying out many activities to control and overturn the situation that is to conserve and develop biodiversity. One of the control measures that have been under taken by the government is to educate citizens through formal school program about concepts, benefits and problems of biodiversity in the hope that individuals will recognize the long-term values of biodiversity for survival and get involved in conservation activities. To promote this, biodiversity contents, objectives, instructional methods and materials are integrated with biology syllabi of grade 7 to 11 (Wendye, 2009). Recently it also included in grade 12 biology textbook (MoE, 2009). Several authors such as Humston and Ortiz-Barney (2007); Leeming *et al*., (1993); Rickinson (2001) and Zelezny (1999) have shown that content coverage of environmental issues and ecological principles increases student awareness, and positively affects attitudes, behaviors, and values regarding conservation issues. According to Ammannuel (2014) peoples having low level of knowledge and perception of biodiversity conservation are the major threats of biodiversity. The IUCN's (2007) Red List shows that Ethiopia has 6 species that are critically endangered, 22 endangered and 70 vulnerable. And lack of awareness and knowledge on the part of the people about biodiversity is one of the major factors that contribute for loss of biological resources (MoE, 1988). The loss of biodiversity like logging, hunting, fire wood collection, forest fire because of fire for a honey collection or caused due to smoking cigarettes carelessly and timber felling occurred due to low knowledge and perceptions of peoples towards biodiversity conservation (Manuel *et al.,* 2006).

According NBSAP (2005) the biodiversity conservation is very important since the human being is widely benefited from the biodiversity and it is fundamental for the development of socio-economic and stable environment. Students that have good knowledge and perceptions about the benefit of the biodiversity will develop good attentions for the conservation of biodiversity. According to Wendeye (2009) study the case of some preparatory school in South Wollo Zone particularly in grade 11, the majority of the students' knowledge to biodiversity is scored below the required level or mastery level (50%) for students in preparatory school particularly grade 11 and this indicate that, it needs to work hard to develop students' knowledge towards biodiversity which help to conserve the biological resources. In harari regional State eastern Ethiopia so far no obvious research has been done regarding students' level of knowledge and perceptions about biodiversity and conservation methods. Therefore, the purpose of this study was to assess students' level of knowledge and perceptions and to suggest further recommendation about biodiversity, its threating factors as well as appropriate conservation methods in Harari Regional state eastern Ethiopia.

MATERIAL AND METHOD

Study Area

The study was conducted in Hareri regional state, East Ethiopia (Fig 1.). Harari is one of nine national regional states in Ethiopia having nineteen kebeles (lower administrative level).The study area was located 525km far from Addis Ababa which is the capital city of Ethiopia. Geographically, the area is located between $42^0 03'$ $30''$- $42^0.16'$ $24''$E and $9^0.11$-$9^0,24^{oE}$ N with an altitude ranging from 1300-1600 m.a.s. l. The mean annual rainfall the area is 636.7mm and the mean annual temperature is $19.C^o$. The total population of the region is estimated to 238,000 which of 120,000 males 118,000 females. Generally the region has a total area of $334km^2$. It also home to diverse ethnic groups. The Oromo, Amhara and Adare are the major ethnic group living in the study area. Each ethnic group has their own composition of with distinctive language (e.g., Oromifa, Amharic and Harari), and cultural diversity. Islam is the predominant religion with 69% of the population reporting themselves as adherents of the religion, followed by Orthodox Christianity (27%) (Zelezny; 1999).
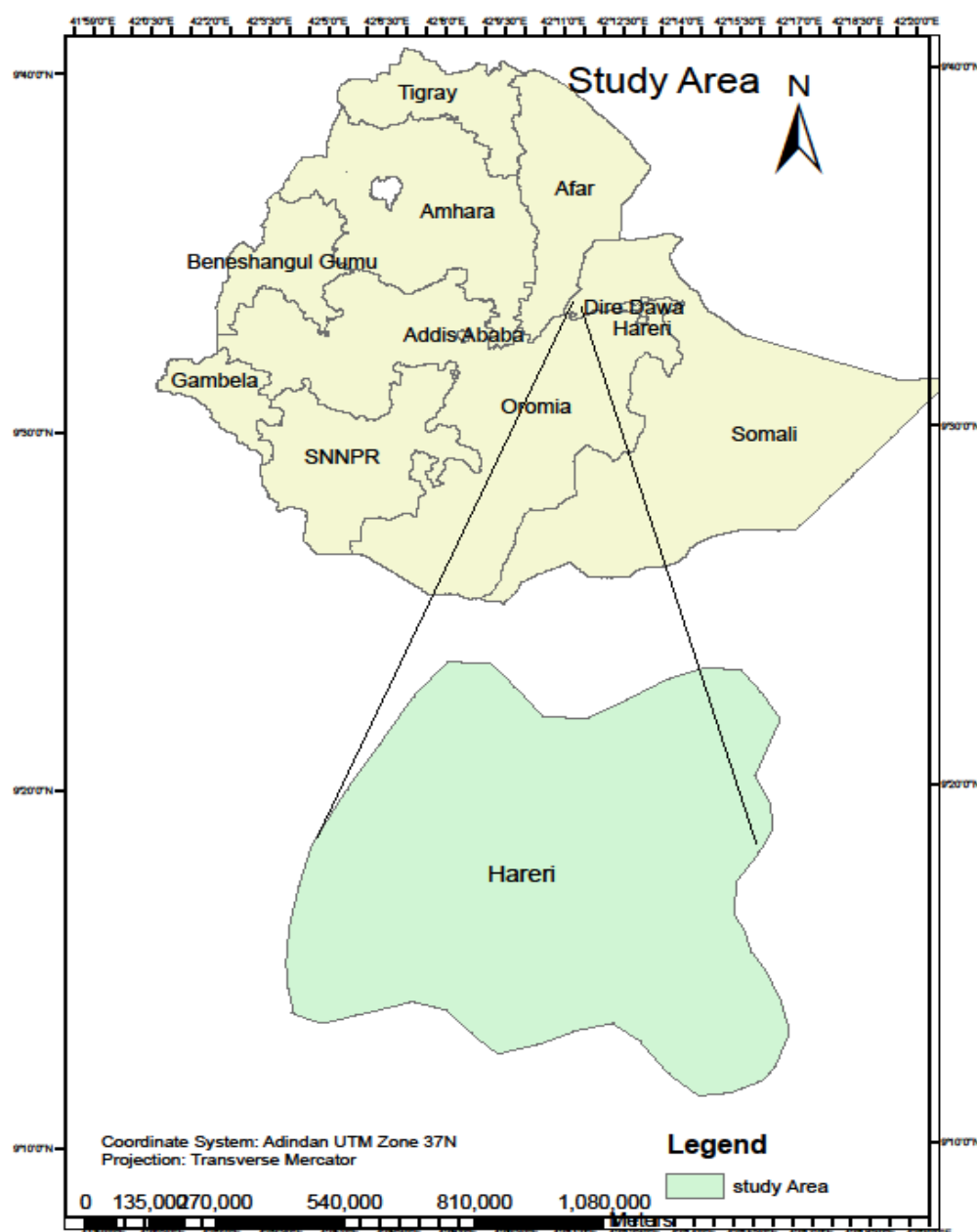
Fig 1. Map of study area, Hareri, Ethiopia

Design of the Study

The design of the study was a mixed methods design (cross-sectional descriptive survey). The descriptive survey was used to collect information from the respondents and assess student's knowledge and perception about biodiversity conservation.

Study Population Sampling Technique

This assessment was addressed to students from six (6) secondary and preparatory school and from this Four (4) of them were government school (2nd model,Abubeker,Junnier and Yeshimebet secondary and preparatory school)and Two (2) of them were private school(Betelehem and Zoomin secondary and preparatory school) in Harari Regional State eastern Ethiopia. Two target groups were considered in this study :(1) grade 10 students and (2) grade 12 students. The assessment data were collected from students through semi-structure questionnaire, face to face interview and focus group discussion based methods given by (Halford *et al* ;2011). First Stratified random sampling was used based on their grade level to group in to two strata then Random sampling technique was used to select those study participants among grade 10 and 12 natural science students. The sample size was depends on

availability of time and budget rather than the total population.

A total of 360 assessment data were collected from 360 interviewers (240 male and 120 female) from each school 60 students (40 male and 20 female) and 30 from grade 10 (20 male and 10 female) and 30 from grade 12 (20 male and 10 male). The assessment was conducted from Jan, 2016 to May, 2017 at respondent's school.

Data analysis

To answer the research questions of this study, quantitative and qualitative data were collected and analyzed using both quantitative and qualitative data techniques. The quantitative data were, tabulated and analyzed using frequency and percentage. The description of the data collected by interview, class room observation and focus group discussions were incorporated into the quantitative data where they support each other and the content analysis was analyzed qualitatively using the identified key concepts.

Photo during explanation about the question and its target to students and during students answer the question (photo taken by Yeneayehu Fenetahun, Feb/2017)

RESULT AND DISCUSSION

All the data that assessed students' level of knowledge and perception towards biodiversity and conservation techniques were summarized and presented in table form.

Assessment of Students 'Level of Knowledge about Biodiversity Conservation (both open and closed ended question)

To assess the level of knowledge about biodiversity respondents were asked to respond both the close ended questionnaire by selecting Yes/No/Not sure and open ended knowledge questions such as defining biodiversity and biodiversity conservation, Identifying threats to biodiversity, describing the importance of biodiversity conservation etc. To identify the level of knowledge of the students about biodiversity conservation below mastery level (i.e. below 50%) and above mastery level (above 50%) was used (Wendeye, 2009). This means if almost all the items are responded by majority of the students, the majority students' level of knowledge (i.e. above 50% of the students) are above the mastery levels (i.e. above 50%) and if almost all the question items are responded incorrectly by majority of the students, the majority students' level of knowledge (i.e. above 50% of the students) are below the mastery level (i.e. below 50%).

Closed ended question result data

Table 1. Grade 10 students' (N=180) level of knowledge about biodiversity conservation (close ended questionnaire).

Question type	Respondent responses		
	Yes	No	Not sure
	F (%)	F (%)	F (%)
1. Biodiversity is the extent to which an ecosystem contains different species	101 (56.1)	72 (40)	7 (3.9)
2.Biodiversity uses as a human well-being	131(72.8)	45(25)	4 (2.2)
3. Biodiversity conservation refers to the practice of protecting and preserving the abundance and variety of all species.	79 (43.9)	96 (53.3)	5 (2.8)
1. Deforestation has negative impact on the biodiversity resources.	151(83.9)	28 (15.5)	1 (0.6)
2. It is always better to repair an ecosystem rather than to replace it.	83 (46.1)	76 (42.2)	21 (11.7)
3. Climate change cannot control through biodiversity conservation	111 (61.7)	60 (33.3)	9 (5)
4. Protection of species and varieties of species will not support biodiversity.	119 (66.1)	49 (27.2)	12 (6.7)
5. Conservation of biodiversity resource has negative effect on human development.	117 (65)	50 (27.8)	13 (7.2)
6. Food security and Biodiversity resource conservation does not have any Relation.	104 (57.8)	57 (31.7)	19 (10.5)
7. Maintaining habitat is fundamental to conserve species.	99 (55)	73 (40.6)	8 (4.4)
8. Loss of biodiversity in one area destroys the natural balance elsewhere.	67 (37.2)	87 (48.3)	26 (14.5)
9. Conservation means keeping and protecting a living environment.	136 (75.6)	36 (20)	8 (4.4)
10. Loss of biodiversity causes flooding, shortage of food, air pollution and global warming.	82 (45.6)	71 (39.4)	27 (15)

Table 2. Grade 12 students' (N=180) level of knowledge about biodiversity conservation (close ended questionnaire).

Question type	Respondent responses		
	Yes	No	Not sure
	F (%)	F (%)	F (%)
1. Biodiversity is the extent to which an ecosystem contains different species	128 (71.1)	49 (27.2)	3 (1.7)
2.Biodiversity uses as a human well-being	146 (81.1)	34 (18.9)	-
3. Biodiversity conservation refers to the practice of protecting and preserving the abundance and variety of all species.	160 (88.9)	19 (10.5)	1 (0.6)
4. Deforestation has negative impact on the biodiversity resources.	171 (95)	9 (5)	-
5. It is always better to repair an ecosystem rather than to replace it.	109 (60.6)	56 (31.1)	15(8.3)
6.Climate change cannot control through biodiversity conservation	53 (29.4)	122 (67.8)	5 (2.8)
7. Protection of species and varieties of species will not support biodiversity.	75 (41.7)	103 (57.2)	2 (1.1)
8. Conservation of biodiversity resource has negative effect on human development.	81 (45)	99 (55)	-
9. Food security and Biodiversity resource conservation does not have any	80 (44.4)	93 (51.7)	7 (3.9)

Relation.			
10. Maintaining habitat is fundamental to conserve species.	117 (65)	63 (35)	-
11. Loss of biodiversity in one area destroys the natural balance elsewhere.	77 (42.8)	95 (52.8)	8 (4.4)
12. Conservation means keeping and protecting a living environment.	141 (78.3)	38 (21.1)	1 (0.6)
13. Loss of biodiversity causes flooding, shortage of food, air pollution and global warming.	79 (43.9)	90 (50)	11 (6.1)

As we can see the result from the above two tables (1 and 2) the same closed ended question were forwarded both grade 10 and 12 students. And when we see the understanding of the students about the knowledge and biodiversity conservation method grade 10 students much less understood as compared to grade 12 students. And as we have seen from table 1 only items number 1(56.1%), 2(72.8%), 10(55%) and 12 (75.6%) were responded correctly by majority of the students (above mastery level) from grade 10 but the rest question items were answered incorrectly by majority of the students from grade 10 (i.e. above 50% of the students answered incorrectly). But when we see grade 12 students (table 2) almost all the items except item 11 and 13 were responded correctly by majority of the students (i.e. above 50% of the students). And this is in agreement with the study conducted in kebribeyah secondary and preparatory School, somali regional state, Ethiopia most of the grade 10 student have no knowledge and awareness about Biodiversity and conservation method as compared to grade 12 students (Amanuel A., 2014). From this we can understand that still there is a big gap on student's general knowledge about biodiversity, its value, threating factors, conservation method as well as relationship with environment and human wellbeing.

This is due to biodiversity conservation education which is currently given in school has not brought the expected change in student's knowledge particularly grade 10 as compared to grade 12 with regard to issue biodiversity and its conservation methods . So developing the knowledge of student's towards biodiversity conservation through education and different awareness creation mechanism is a key to conserve our biodiversity resources.

Open ended question result data

Table 3. Grade 10 students (N=180) written statements regarding their knowledge about Biodiversity Conservation.

Question item	Respondents response			
	CA	PA	WA	NA
	F (%)	F (%)	F (%)	F (%)
1. What is biodiversity and how to conserve it?	60 (33.3)	27 (15)	72 (40)	21 (11.7)
2. List threats of biodiversity in your area?	42 (23.3)	19 (10.6)	92 (51.1)	27 (15)
3. List the importance that we obtain from biodiversity?	73 (40.6)	29 (16.1)	69 (38.3)	9 (5)
4. What type of strategies used in biodiversity conservation?	33 (18.3)	31 (17.2)	97 (53.9)	19 (10.6)
5. List the site that used for conservation of biodiversity in your local area?	58 (32.2)	26 (14.4)	55 (30.6)	41 (22.8)
6. Please name at list five endemic plants and animals of Ethiopia?	89 (49.4)	18 (10)	59 (32.8)	14 (7.8)
7. What is your information about Ethiopian biodiversity institute before?	4 (2.2)	2 (1.1)	131 (72.8)	43 (23.9)
8. Describe your future plan with regard to biodiversity?	31 (17.2)	17 (9.4)	70 (39)	62 (34.4)

Table 4. Grade 12 students (N=180) written statements regarding their knowledge about Biodiversity Conservation

Question item	Respondents response			
	CA	PA	WA	NA
	F (%)	F (%)	F (%)	F (%)
1. What is biodiversity and how to conserve it?	109 (60.6)	24 (13.3)	40 (22.2)	7 (3.9)
2. List threats of biodiversity in your area?	89 (49.4)	26 (14.5)	48 (26.7)	17 (9.4)
3. List the importance that we obtain from biodiversity?	121 (67.2)	23 (12.8)	29 (16.1)	7 (3.9)
4. What type of strategies used in biodiversity conservation?	95 (52.8)	37 (20.6)	30 (16.6)	18 (10)
5. List the site that used for conservation of biodiversity in your local area?	78 (43.3)	49 (27.2)	42 (23.3)	11 (6.2)

6. Please name at list five endemic plants and animals of Ethiopia?	115 (63.9)	39 (21.6)	23 (12.8)	3 (1.7)
7. What is your information about Ethiopian biodiversity institute before?	24 (13.3)	17 (9.5)	77 (42.8)	62 (34.4)
8. Describe your future plan with regard to biodiversity?	91 (50.6)	27 (15)	47 (26.1)	15 (8.3)

*Note: - **CA** = Correct Answered; **PA**= Partially Answered; **WA** = Wrong Answered; **NA**= Not Answered*

From the above table 3 and 4 we can understand that the understanding level of Students at both grade level by providing the some type of question item. And when we see the understanding level of the student's grade 10 students were not more understanding about the general concept and in all items that indicated in the table (i. e. below mastery level). But when we see grade 12 student's level of understanding about the issue raised in the table they have more understanding than grade 10. Even if the students of grade twelve were better in their knowledge about biodiversity conservation still we can understand that there is a gap with in the knowledge about biodiversity. Focal group discussion which was stated by both grade level students supports the data that was gathered through close ended and open ended questionnaire which also used to evaluate students' knowledge in different aspect about biodiversity conservation. In general from the above result of table 2 and 4 both in close ended and open ended question items respectively indicated that above 50% of the students' from grade 12 responded correctly to almost all question items of the close ended and open ended. Accordingly, the result implied that above 50% of the grade 12 students were above mastery level (i.e. above 50%).

Assessment of Students' Perception towards Biodiversity Conservation
Result of assessment of students' perception towards biodiversity conservation are summarized and presented in table 5 to 8.
The analysis of the items was made in terms of issues related with use of biodiversity resource, issue of responsibility, issue of reasons of biodiversity loss and issue of sustainable development about biodiversity conservation and the results of perception items are analyzed using frequency and percentage score.
Results of Assessment of grade 10 students' perception towards biodiversity conservation particularly issue related to use and responsibility of biodiversity conservation are summarized and presented in table 5.
Table. 5. Grade 10 students' (N=180) perception about biodiversity conservation (issue of related to use and responsibility of biodiversity conservation).

Question Items	Response		
	SA/A	SD/D	U
	F (%)	F (%)	F (%)
1. I believed that planting of trees use to protect climate change and biodiversity conservation	109(60.6)	68(37.8)	3(1.6)
2. I believe that the loss of biodiversity would affect our survival of life since Biodiversity is critical to human survival.	103(57.2)	43(23.9)	34(18.9)
3. I perceive that Forest clearance for agriculture or development is justifiable even if it affects Biodiversity resources.	19(10.6)	123(68.3)	38(21.1)
4. I think no need to bother about biodiversity resources as far as we secure our food from any source.	63(35)	92(51.1)	25(13.9)
5. I believe that Biodiversity resource loss does not have any impact on the socioeconomic and stability environment of Ethiopia.	27(15)	119(66.1)	34(18.9)
6. I agree that Biodiversity Conservation should mainly be the responsibility of the government rather than the local community.	51(28.3)	120(66.7)	9(5)
7. I believe that Students should not spend time to control biodiversity resources.	42(23.3)	127(70.6)	11(6.1)
8. According to my opinion individuals should be paid if they participate in biodiversity conservation activity.	21(11.7)	111(61.7)	48(26.6)
9. Conservation of biodiversity is not a matter that concerns me.	24(13.3)	117(65)	39(21.7)
10. As the students have little capacity to conserve their Biodiversity resources they should not be blamed.	77(42.8)	84(46.7)	19(10.5)
11. Once the biodiversity is exposed for reduction, it is wastage of time to conserve and Protect it.	68(37.8)	95(52.8)	17(9.4)
12. As citizens you have responsibility to participate voluntarily activities that are concerned with conservation of biodiversity.	115(63.9)	44(24.4)	21(11.7)

*Note: - **SA/A** = strongly agree/agree, **SD/D** = strongly disagree/disagree, **U**= undecided*

Planting trees have a great role in making stable the environment through taking in carbon dioxide from the atmosphere in the line of this, the result from table 5, indicated 37.8% of students from grade 10 were found not perceived that the contribution of planting trees to biodiversity conservation and

climate change protection where as 1.6 % of the students were not certain on the issue. On the other hand 23.9% respondents from grade 10 believed that the loss of biodiversity cannot affect our quality of life and not critical to human survival and 18.9% of the students still not understand the value of biodiversity.

It is clear that forest resources are important to protect variety of species and to make stable the environment in line of this 10.6% of students from grade ten in the study agreed that agricultural productivity is impossible without clearing a forest where as 21.1% of students from grade ten were not certain about the issue. In addition 35% of the students also agreed that we do not bother about biodiversity resources as far as we secure our food from any source where as 13.9% of the students' undecided on these issue. Item 5 indicated that 15% of the students of grade ten believed that biodiversity loss do not have any impact on the socioeconomic and stability environment of Ethiopia. On the other hand 18.9% of students were not certain on the issue.

Every citizens of the country have responsibility to care and conserve the biodiversity resources in the point view of this from the table 28.3% of the students from grade ten agreed that the biodiversity conservation is mainly the responsibility of the government while 5 % of students undecided about the responsibility of biodiversity conservation and it is observed that 23.3% of grade ten students in the study believed that the students should not spend time to control biodiversity resources. In addition to this again 11.7% of students from grade ten agreed that individuals should be paid if they participate in biodiversity conservation activity. 13.3% of the students from grade ten believed that the conservation of biodiversity resources do not concerns me and 42.8% of the students agreed that as the students have little capacity to conserve their Biodiversity resources they should not be blamed. 37.8 % of the students from grade ten agreed that

once the biodiversity is exposed for reduction, it is wastage of time to conserve and protect it. Furthermore 24.4% of students disagreed that as citizens you have responsibility to participate voluntarily and actively in activities that are concerned with conservation of biodiversity.

The result in table 5, item 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12 indicated that above 50% of the students had favorable perception regarding the use and responsibility of biodiversity conservation. Even if above 50% the students had favorable perception in the above mentioned item, but also above 30% of the students in question item 1, 4, 10, and 11 had shown unfavorable perception regarding the use and responsibility of biodiversity conservation and still some of the are undecided about the use and responsibility of biodiversity conservation This could be attributed to poor provision of biodiversity conservation awareness creation and education, the place given to biodiversity conservation education or other factors.

The basic knowledge and understanding of biodiversity; conservation of biodiversity resources and associated problems will help students to develop social value, strong feeling and responsibility for the environment and biodiversity conservation. Thus schools are responsible to address such an issue so that students will be knowledgeable of and concerned about the biodiversity conservation in which they live.

Results of Assessment of grade 10 students' perception towards biodiversity conservation particularly issue related to contribution of biodiversity conservation for sustainable development and reasons of loss of biodiversity are summarized and presented in table 6.

Table. 6. Grade 10 students' (N=180) perception about biodiversity conservation (issue of regarding sustainable development and reasons of loss of biodiversity).

Question items	Response		
	SA/A	SD/D	U
	F (%)	F (%)	F (%)
13. Human are superior to other species, for this reason they have the right to manipulate biodiversity to their will.	58(32.2)	99(55)	23(12.8)
14. As far as Charcoal is needed the community need not worry about Biodiversity resources.	47(26.1)	126(70)	7(3.9)
15. There is no harm in clearing forest land as far as the present generation satisfies its own need and as far as technology is progressing.	69(38.3)	97(53.9)	14(7.8)
16. As Ethiopia is rich in biodiversity resource there is no need to worry about biodiversity conservation.	76(42.2)	99(55)	5(2.8)
17. Conservation of biodiversity is far more important to care for the present generation than to think for the benefit of future generation.	54(30)	105(58.3)	21(11.7)
18. Biodiversity resources should be exhaustively utilized for human advantage at any cost.	66(36.7)	108(60)	6(3.3)
19. I believe that Biodiversity loss is not an environmental threat in Ethiopia.	80(44.5)	94(52.2)	6(3.3)

20. I do not want forest lands and parks to be regulated. People should be able to do what they want to do with this biodiversity resource.	64(35.6)	98(54.4)	18(10)
21. Biodiversity conservation does not have any economical value for our country.	59(32.8)	113(62.8)	8(4.4)
22. Different species are valued only because they are economically valued.	82(45.6)	88(48.9)	10(5.5)

Every species(starting from micro up to macro organism) where found in the world have equal right with the human being to live and the human being is not superior on other species in the line of this table 6, indicated 32.2% students from grade ten agreed that human are superior to other species, for this reason they have the right to manipulate biodiversity to their will and 26.1% of students from grade ten were also agreed that as far as Charcoal is needed the community need not worry about Biodiversity resources while 3.9% of students from grade ten undecided about this issue.

It is obvious that the present generation has responsibilities to transfer stable environment for the next generation but if the present generation do not give any attention to save and care our biodiversity resource, the future generation will be endanger in the line of this 38.3 % of students from grade ten agreed that there is no harm in clearing forest land as far as the present generation satisfies its own need and as far as technology is progressing and also 42.2% of student from grade ten believed that as Ethiopia is rich in biodiversity resource there is no need to worry about biodiversity conservation. And 30% of students from grade ten agreed that the conservation of biodiversity conservation is more important for the present generation than future generation.

Such perception can lead to exhaustive utilization of biodiversity resource without considering future development. For instance 36.7% of students of grade ten agreed that Biodiversity resources should be exhaustively utilized for human advantage at any cost and 44.5% also students from grade ten agreed that the Biodiversity loss is not an environmental threat in Ethiopia. Further 35.6% of the students agreed that i do not want forest lands and parks to be regulated. People should be able to do what they want to do with these biodiversity resources. On the other hand 32.8% of the respondents agreed that Biodiversity conservation do not have any

economical value for our country. Furthermore 45.6% of students believed that different species are valued only because they are economically valued.

The result showed that above 50% of the students from grade 10 had favorable perception to item number 13, 14, 15, 16, 17, 18, 19, 20, 21 and 22 with regard to issue of biodiversity conservation regarding its contribution for sustainable development and reasons of loss of biodiversity but also above 30% of the students had shown unfavorable perception towards items of number 13, 15, 16, 17, 18, 19, 20, 21 and 22 regarding sustainable development and loss of biodiversity.

This could either be due to level of maturity that grade ten students or having poor provision of biodiversity conservation education and awareness in schools and in the community or other related factors. Education as means to promote sustainability, students should be provided with information about their biodiversity, its utilization and conservation of biodiversity resources.

Increased knowledge and understanding of about biodiversity conservation and related issues help students to develop and promote perceptions of a conservation culture in biodiversity resources. Education should bring up citizen who can take care of the biodiversity resources and utilize resource wisely. It can also help students to develop sense of responsibility regarding use and management/conservation of biodiversity resource there by motivating them to actively and willingly participate in conservation of biodiversity programs.

Results of Assessment of grade 12 students' perception towards biodiversity conservation particularly issue related to use and responsibility of biodiversity conservation are summarized and presented in table 7.

Table.7. Grade 12 students' (N=180) perception about biodiversity conservation (issue of regarding use and responsibility of biodiversity).

Question Items	Response		
	SA/A	SD/D	U
	F (%)	F (%)	F (%)
1. I believed that planting of trees use to protect climate change and biodiversity conservation	144(80)	26(14.4)	10(5.6)
2. I believe that the loss of biodiversity would affect our survival of life since Biodiversity is critical to human survival.	149(82.8)	19(10.6)	12(6.6)
3. I perceive that Forest clearance for agriculture or development is justifiable even if it affects Biodiversity resources.	27(15)	138(76.7)	15(8.3)
4. I think no need to bother about biodiversity resources as far as we secure our food from any source.	37(20.6)	141(78.3)	2(1.1)

5. I believe that Biodiversity resource loss does not have any impact on the socioeconomic and stability environment of Ethiopia.	49(27.2)	119(66.1)	12(6.7)
6. I agree that Biodiversity Conservation should mainly be the responsibility of the government rather than the local community.	21(11.7)	151(83.9)	8(4.4)
7. I believe that Students should not spend time to control biodiversity resources.	33(18.3)	137(76.1)	10(5.6)
8. According to my opinion individuals should be paid if they participate in biodiversity conservation activity.	53(29.4)	116(64.4)	11(6.2)
9. Conservation of biodiversity is not a matter that concerns me.	27(15)	138(76.7)	15(8.3)
10. As the students have little capacity to conserve their Biodiversity resources they should not be blamed.	77(42.8)	97(53.9)	6(3.3)
11. Once the biodiversity is exposed for reduction, it is wastage of time to conserve and Protect it.	59(32.8)	104(57.8)	17(6.4)
12. As citizens you have responsibility to participate voluntarily activities that are concerned with conservation of biodiversity.	152(84.4)	27(15)	1(0.6)

Plants can prepare their own food by the process of photosynthesis using light from the sun by the action of chlorophyll, water from the soil and carbon dioxide from the atmosphere. Carbon dioxide is one of the molecules that increase the world temperature now days. Therefore planting trees are very important to reduce the amount of carbon dioxide from the atmosphere and also uses to conserve biodiversity and to protect climate change in the line of this the above table showed that 14.4% of students from grade twelve disagreed that the contribution of planting trees to save different species and to reduce global warming where 5.6% of grade twelve students were not certain on the issue. On the other hand 10.6% and 15% of respondents from grade twelve believed that the loss of biodiversity cannot affect our quality of life and not critical to human survival and Forest clearance for agriculture or development is justifiable even if it affects Biodiversity resources respectively whereas 6.6 and 8.3% of the students respectively undecided about the issue. Furthermore 20.6% of agreed that we do not need to bother about biodiversity resources as far as we secure our food from any source where as 1.1% of students undecided on this issue.

It is clear that the loss of biodiversity can causes flooding, global warming, shortage of food, climate change, disease and lack of medicines and every citizens of the country have responsibility to care and conserve the biodiversity resources in the point view of this from result table 7, 27.2% and 11.7% of the students perceived Biodiversity resource loss does not have any impact on the socioeconomic and stability environment of Ethiopia and Biodiversity Conservation should mainly be the responsibility of the government rather than the local community respectively where as 6.7% and 4.4% of the students' undecided about the issue respectively. In addition 18.3% and 29.4% of the students believed that Students should not spend time to control biodiversity resources and individuals should be paid if they participate in biodiversity conservation activity where as 5.6% and 6.2% of the students' undecided about the issue respectively. On the other hand 15% of students from grade twelve believed that the conservation of biodiversity resources is not

a matter that concerns me. 42.8% and 32.8% of students from grade ten agreed that as the students have little capacity to conserve their Biodiversity resources they should not be blamed and once the biodiversity is exposed for reduction, it is wastage of time to conserve and protect it. Furthermore 15% of students disagreed that as citizens you have responsibility to participate voluntarily and actively in activities that are concerned with conservation of biodiversity.

The result in table 7 above 70% of the students had favorable perception to items number 1, 2, 3, 4, 6, 7, 9, and 12 regarding the use and responsibility of biodiversity conservation. This implying that as the grade level increase perception towards biodiversity also increases. As far as the use conservation of biodiversity resources is concerned the assessment of student text book indicated that the diversified uses conservation of biodiversity resource were included widely in grade twelve .Clear understanding of the use of conservation biodiversity resource is instrumental to develop strong perception of concern for the biodiversity conservation and for actively participating in protecting and improving the biodiversity resources. To this end education is an important tool and schools are one of the places and should provide students with information about the use and responsibility of biodiversity conservation. With regard to issue of the use and responsibility the result in terms of their grade level showed that grade twelve students had more favorable perception than students of grade ten. This implying that the learning experience and increasing grade level have its own contribution on the development of student's perception towards biodiversity conservation.

Results of Assessment of grade 12 students' perception towards biodiversity conservation particularly issue related to contribution of biodiversity conservation for sustainable development and reasons of loss of biodiversity are summarized and presented in table 8.

Table. 8. Grade 12 students' (N=180) perception about biodiversity conservation (issue of regarding sustainable development and reasons of loss of biodiversity).

Question items	Response		
	SA/A	SD/D	U
	F (%)	F (%)	F (%)
13. Human are superior to other species, for this reason they have the right to manipulate biodiversity to their will.	38(21.1)	133(73.9)	9(5)
14. As far as Charcoal is needed the community need not worry about Biodiversity resources.	36(20)	140(77.8)	4(2.2)
15. There is no harm in clearing forest land as far as the present generation satisfies its own need and as far as technology is progressing.	37(20.6)	141(78.3)	2(1.1)
16. As Ethiopia is rich in biodiversity resource there is no need to worry about biodiversity conservation.	21(11.7)	152(84.4)	7(3.9)
17. Conservation of biodiversity is far more important to care for the present generation than to think for the benefit of future generation.	48(26.7)	124(68.9)	8(4.4)
18. Biodiversity resources should be exhaustively utilized for human advantage at any cost.	27(15)	149(82.8)	4(2.2)
19. I believe that Biodiversity loss is not an environmental threat in Ethiopia.	33(18.3)	143(79.5)	4(2.2)
20. I do not want forest lands and parks to be regulated. People should be able to do what they want to do with this biodiversity resource.	17(9.4)	160(88.9)	3(1.7)
21. Biodiversity conservation does not have any economical value for our country.	15(8.3)	164(91.1)	1(0.6)
22. Different species are valued only because they are economically valued.	78(43.4)	94(52.2)	8(4.4)

It is obvious that all living species have the right to co-exist with human on earth and humans have no right to cause the extinction or to diminish the quality of life of organism but the result in table 8 it was observed that 21.1% of the students from grade 12 agreed that Human are superior to other species, for this reason they have the right to manipulate biodiversity to their will. In addition to this again 20% of the students agreed that as far as Charcoal is needed the community need not worry about Biodiversity resources. 20.6% and 11.7% of the students were also perceived that there is no harm in clearing forest land as far as the present generation satisfies its own need and as far as technology is progressing and as Ethiopia is rich in biodiversity resource there is no need to worry about biodiversity conservation respectively.

According to Mazengia Shimelis (2010) Sustainable development aims at continuously improving the people's lives through rational exploitation and optimal utilization of natural resources on one hand and maintaining environmental quality and ecological balance on the other hand so that there may be continuous supply of natural resources to the present and future generation without harming the environment in the line of this 26.7% and 15% of students agreed that Conservation of biodiversity is far more important to care for the present generation than to think for the benefit of future generation and Biodiversity resources should be exhaustively utilized for human advantage at any cost respectively where as 4.4% and 2.2% of the students undecided about the issue respectively. 18.3% of the students believed that Biodiversity loss is not an environmental threat in Ethiopia.

National parks and forest land have great role in saving and conserving the biodiversity resources and it is also obvious that the biodiversity resources have great economical value in one country like as a source of food and medicines, to control flooding and global warming and also it uses to maintain stable environment regarding this point of view the result in table 8, indicated that 9.4% of students from grade agreed that i do not want forest lands and parks to be regulated. People should be able to do what they want to do with these biodiversity resources and 8.3% of the students also perceived that Biodiversity conservation do not have any economical value for our country. In addition to this 43.4% of the students believed that different species are valued only because they are economically valued where as 4.4% of the students were not certain about the issue.

The result in table 8 showed that above 70% of the students from grade 12 had favorable perception in question item 13, 14, 15, 16, 18, 19, 20, and 21 regarding the reasons of loss of biodiversity and contribution of biodiversity conservation for sustainable development and this implied that students from grade 12 showed more favorable perception with regard to issue of biodiversity conservation regarding reasons of loss of biodiversity and contribution of biodiversity conservation for sustainable development. According Trong Trai *et al.*, (2001) study indicated that having low perception of one society has negative impact in the conservation of biodiversity resource. Therefore the above results indicated that even if above 50% and 70% of the students from grade 10 and 12 had shown favorable perception towards biodiversity conservation respectively but if only and only all the society have good perception towards biodiversity

conservation to protect our biodiversity resources perfectly.

As resources have diversified values, the rational use of biodiversity resource is instrumental for socio-economic and political wellbeing of a society. Proper management and conservation of biodiversity resources is a means to maintain the balance between natural diversity and human sustainable living. As human beings require biodiversity resources in many ways the rational use of resource is vital for human development. Unwise resources management can lead to resource degradation affecting human life. As sustainability requires ecological sustainability which in turn depend on conservation of biodiversity resources education should provide students with the basic information about the biodiversity there by helping them to have knowledge and develop skill to take care of the biodiversity resources and to live in harmony with it.

CONCLUSION

The review of different literature in this study indicated the diversified value of biodiversity resource for human being. Furthermore biodiversity resource conservation is seen as an important tool for sustainable development and essential issue of biodiversity education. Mainly the loss of biodiversity practiced due to lack of knowledge and perception of the society towards biodiversity conservation. To solve the problem biodiversity conservation education can play an important role in bringing change in the knowledge and perception of student's. As far as the objectives are concerned biodiversity conservation education is meant to help individuals and social groups acquire knowledge of and sensitivity to the total environment and its allied problems. Further to help individuals and social groups acquiresocial value, strong feelings of concern for the biodiversity and the motivation for actively participating in its protection and improvement. Above 50% of the students of grade 12 were found above mastery level knowledge (i.e. 50%) and also above 70% of the students had shown favorable perception regarding biodiversity conservation respectively where as above 50% of students of grade 10 were found below mastery level of knowledge and above 30% of the students of grade 10 had shown unfavorable perception towards biodiversity conservation, although above 50% had shown favorable perception regarding biodiversity conservation. Therefore it can be concluded that the currently given education has not brought the expected change in knowledge and perceptions among students of grade 10 towards biodiversity conservation in the study area due to many problems.

Recommendations

The study has proved that there were variation in knowledge and perception among the study groups, where as grade twelve students were found better both in their knowledge and perception than students of grade ten. The observed difference could be attributed to different factors and thus the following points are put as recommendations of the study:-

Gaining efficient knowledge about biodiversity conservation and developing positive perception towards the biodiversity conservation is possible through effective biodiversity conservation Education. Thus continued effort should be conducted to raise student's level of knowledge and perception by properly addressing biodiversity conservation issues through effective provision of biodiversity conservation education in schools.

Schools should intensively address biodiversity conservation issues and should mobilize and participate students so as to be knowledgeable of and develop a strong perception towards biodiversity conservation. This could be done by organizing biodiversity clubs, assigning and celebrating biodiversity conservation weeks, facilitating a biodiversity conservation education field trip so that students can have real biodiversity conservation experience and transform their theoretical knowledge in to behavior easily, organizing seminars and workshops on biodiversity issues, sharing and adapting important biodiversity conservation education experience from other schools or other possible mechanisms.

Further investigation should be conducted to find out:-

Whether or not subject teachers are given training on how to integrate biodiversity conservation Education in their subject area.

Whether or not the actual teaching and learning process and methods employed in schools properly address issue of Biodiversity Conservation.

The existing constraints that influence the provision of Biodiversity Conservation Education.

Conflict of interest

The author(s) declare(s) that there is no conflict of interest regarding the publication of this paper.

REFERENCES

Amannule Asmamaw (2014). students' knowledge and perceptions about biodiversity conservation and evaluation of the effectiveness of the teaching method employed: the case of kebribeyah secondary and preparatory School, somali regional state, Ethiopia. *International Journal of Environmental & Science*'s. Vol.4 (4):619-638.

EFAP (1994). *Ethiopian forestry action programme*. EFAP Secretariat, Ministry of Natural Resources Development and Environmental Protection Authority, Addis Ababa, Ethiopia.vol.2.

Food and Agricultural Organization (FAO) (1995). Global forest resources assessment 2005-progress towards sustainable forest management.FAO Forestry Paper 147. Food and

Agriculture Organization of the United Nations Rome. Pp 320.

Getachew, Tesfaye and Berihun, Gebremedihen (1996). E.C. *Methods of Conservation of the Ecocosystem and Biodiversity in Ethiopia*. Ecosystem and Biodiversity richness Protecting and Research Institution, Addis Ababa, Ethiopia. Pp. 5.

He, F. and S.P. Hubbell (2011). Species-area relationships always overestimate extinction rates from habitat loss. *Nature* 473: 368-371.

Humston, R. and E. Ortiz-Barney (2007). Evaluating course impact on student environmental values in undergraduate ecology with a novel survey instrument. Teaching Issues and Experimentsin Ecology,Vol. 5. Retrieved on June 28, 2013 from humston/article.html.

International Union for Conservation of Nature (IUCN) (2007). Red list of endangered species. Available at http// www. Iucnredlist.org/ search/details.php/3748/ Accesed on September 2013.

Lavrenchenko, L.A., Milinshinkov, A.N., Aniskin, V.M., Warshavsky, A.A. and Woldegabriel Gebrekidan (2004). The genetic diversity of small mammals of the Bale Mountains, Ethiopia. *Sinet: Ethiop. J. Sci.* 20: 213-233.

Leeming, F.C., Porter, B.E., Cobern, M.K. and Dwyer, W.O. (1993). Outcome research in environmental education: A critical review. *Journal of Environmental Education* 29: 28-34.

Manuel, B., Imam, B., Piia, K., Douglas, S. and Meilinda, **W.** (2006). Biodiversity and Local Perceptions on the Edge of a Conservation Area, Khe Tran Village, Vietnam. *Center for International Forestry Research (CIFOR),* Bogor, Indonesia .Pp 41-42.

Mazengia, Shimelis (2010**)**. Conservation of Natural Resource for Sustainable Development: Assessing Students Awareness and Attitude in Northern Shewa Zone in Molale and Mehalmeda Schools. MA Addis Ababa University, Addis Ababa, Ethiopia Pp. 15.

MoE (1988). *A Report on environmental Education in Ethiopia*. Ministry of Education, Addis Ababa 8-172.

MoE (2009). *Biology Syllabi of Grade 10*. Federal Democratic Republic of Ethiopia, Ministry of Education.Pp (iii-x).

National Biodiversity Strategy and Action Plan (2005). *Institute of Biodiversity Conservation*. Federal Democratic Republic of Ethiopia, Addis Ababa. Pp 1-3.

Niles, E. (2009). *Biodiversity*. Microsoft Encarta. Accessed on July 2013 from www.extension.org/pages/27534/biodiversity-and-biofuel-production.

Rickinson, M. (2001). Learners and learning in environmental education: A critical review of the evidence. *Environmental Education Research* 7: 207-230.

Sajise, E.P. (2005). Biodiversity research for sustainable development: Can it be achieved? *Journal of Agricultural and development* 2 (1 & 2): 1-14.

UNCBD (1992). Textofconvention.Availableat:http:www.un.org.ecos ocder/goninfo/sustdev.   /deserert.hml Accessed on January 2013.

Wendye, Beshah (2009). Implementation of Biodiversity Instruction and its Impact on Students' achievement in knowledge and attitude; An MEd Thesis Presented to the School of Graduate Studies of Haramaya University. Pp 1-56.

Young, A. (1997). *Agroforestry for soil conservation*. CAB international. Nairobi:/ICRAF.

Zelezny, L.C. (1999). Educational interventions that improve environmental behaviors: A meta analysis. *The Journal of Environmental Education 31*: 5-14.