



A Study of Knowledge on Consequences and Practices about Environmental Pollution of Secondary level Students' in Bangladesh

Mirza Md. Moyen Uddin

Institute of Education and Research, Rajshahi University, Rajshahi 6205, Bangladesh

Corresponding author: mirzamoyen76@gmail.com

Abstract:

The article examined mainly the environmental knowledge on consequences and practice regarding environmental pollution of the students of secondary level formal education. Data were collected from 220 students of secondary level education of Dhaka and Rajshahi division of Bangladesh purposively through questionnaire between March to June 2013. In the study assessment was conducted using a questionnaire. Results showed that in several cases the students have the misconception of environmental knowledge regarding pollution. But most of cases, they have the rational and positive thinking about environmental knowledge on impact and practice. Finally the article concluded that there was a need to intensify students' awareness regarding environmental knowledge on consequences and practices for the better management, protect from pollution and gain expected sustainable development of present and future Bangladesh.

Keywords: Consequences of Pollution, Environmental Practice, Formal Secondary Education, Bangladesh.

1.1 Introduction:

Climate change has become a growing concern and threat for world ecosystem. The environment is changing due to depletion of ozone layer, the warming of the earth's surface, air pollution, desertification, water pollution and so on. Irresponsible human activities are mainly responsible for creating all these threats to life support system both locally and globally (Meenakshi, 2009; Ara, 2001). The environmental condition of the world is deteriorating at an alarming rate due to changes in human activities triggered by inappropriate economic activities and rapidly changing demographics and socio-economic patterns. The problems are the outcome of dynamic interaction of poverty, population growth and its changing distribution and the misuse of resources, wasteful production and human greed. Paradoxically, underdevelopment as well as haphazard development processes are also responsible for its precarious situation (Chowdhury, 2004). For the geographical location, Bangladesh suffers from frequencies of hazards arising from

drought, flood, soil erosion and other natural calamities (Chowdhury, 2007). An emerging issue of great concern in the cities and towns is the high concentration of lead in the air from vehicular exhausts. The high level of concentration of lead is very harmful for human health especially for child health. Another important issue is polluted water which has a great concern mainly in urban areas and high level arsenic contamination in ground water is a national problem. The polluted water causes many diseases like diarrhea, dysentery, arsenicosis etc. The quality of soil has deteriorated due to reckless use of agrochemicals (Parveen and Nakagoshi, 2001), unplanned use of land, undesirable encroachment on forest areas for agriculture and settlements and indiscriminate disposal of hazardous industrial wastes. As a result in those areas the fertility and productivity of land is decreasing day by day. The depletion of biodiversity is the result of various kinds of human interventions that impinge on it through destruction and degradation of land, forest and aquatic habitats. These activities encompass the sectors of agriculture, forestry, fisheries,

urbanization, industry, transport, tourism, energy, chemicals, and minerals (GOB, 2010; 2011).

In Bangladesh, environmental education is a recent phenomenon particularly in the formal higher education sector where few universities teach environmental studies. Recently popular environmental movements have heightened awareness of environmental issues as well as the need for education and skilled environmental management in Bangladesh (Salequzzaman and Davis, 2003). To face the environmental challenges it is important to acquaint our younger generation with appropriate knowledge, skills and attitudes relating to environment, because this generation will affect and be affected by the environment management policy undertaken today (Muttaqui, 1983; Bradley, et al. 1999; El-Salam, et al. 2009; Sarkar, 2011; Aminrad, et al. 2013). A significant program of environmental education and development of local expertise is needed for massive changes in behavior with respect to the environment (Rahman, 2008). If the sea level rises for the negative climate change, then one third portion of Bangladesh will submerged by sea water and salinity problem will be a great problem for agricultural production. Already 830,000 hectare cultivable land of south-west part of Bangladesh has been unable to cultivate due to salinity problem from Ayla and Sidor. Information is that the average temperature of the world may increase 1.1-6.4°C by 2100 and the sea level may increase up to 34 c. m. by 2080. In this circumstances, many countries like Bangladesh will totally submersed by sea water (Tapon et al., Secondary Science Textbook, NCTB, 2012). In this respect, the formal education system provides a ready framework for reaching a large part of the existing population and can help make future generations conscious of the importance of environmental conservation. Students are receptive and curious, making them appealing to motivate. Practical approaches that involve the students in solving local environmental problems have more influence, develop skills and give reinforcement to the idea that people can make a difference. It is fundamental for raising awareness and preparing the citizens of the future. It must be given consistently throughout the curriculum and cross disciplinary boundaries (Ribeiro et al. 2012).

1.2 Environmental Education in Context of Formal Education of Bangladesh

In Bangladesh, the education system consists of three major levels: Primary, Secondary and Higher education. Secondary education has three sub stages: junior secondary (grade vi-viii), secondary (grade ix and x) and higher secondary (grade xi and xii) (GOB, 2010). In the secondary level (grade ix and x), students choose their future study direction from the group of Science, Humanities and Business Studies. Student of science group study three units of Science-Physics, Chemistry and Biology separately, while students of the other groups study an integrated science unit named General Science (NCTB, 1996). The introduction of environmental education (EE) was started in Bangladesh following the Qudrat-E-Khuda Commission Report on 1974, which lead to the introduction of new curricula and syllabus for various stages of school education by 1978 (Chowdhury, 2004).

In secondary level environmental education is provided to students through different subjects, such as Language, Agriculture, Social Science, General Science, Geography and Environment, Agriculture Study and Biology. These subjects deal with various themes relating to environment, even though no general objectives of secondary education explicitly states any direct emphasis on environmental education (NCTB, 1996b and 2012). Environment related themes are emphasized in the General Science unit at secondary level which is studied by the students from both the Humanities and Business Studies group, which consists of almost 75% of the total students at secondary level (BANBEIS, 2006). The General Science curriculum includes four specific objectives relating to environment. These are as

- to understand regarding fossil fuel, its production, various uses, alternative sources of energy and its conservation
- to acquire knowledge regarding energy; its sources, classifications, various needs ad uses and its conservation.
- understand the elements of ecosystem; its classifications, plants and animals and their inter-dependency, flow of energy and balance of the environment.
- understanding about inter-relationship between population and environment, effects of growth of population on environment, nature and danger of greenhouse effects and importance for the control

of population growth (NCTB, 1996b). Reflection of the above objectives is found in the General Science textbook. Five chapters in the text book present environment related content: Population and Environment, Energy, Fuel, Ecology and Disaster Management and Bangladesh (Haque et al., 2007). In the Science text book (NCTB, 2012) where one chapter present environment related content: Living with Hazards. This chapter discussed about effect of climate change: Bangladesh and international perspective, environmental hazard, global warming, carbon pollution, various technique of nature's protection (Tapon et al., 2012). The Geography and Environment text book present five chapters relating to environment which is consistent with what is presented as objectives for the General Science curriculum. These are as below

-Atmosphere; its composition, importance, elements and global warming.

-Hydrosphere; its concepts, ocean current and its effects.

-Population; over population and its effect on natural resources, distribution of population, population problem and its solution.

-Development Activities of Bangladesh and Environmental Balance; pollution, consequences of environmental imbalance, and the way to keep the balance of environment.

-Natural Disaster of Bangladesh; kinds of disaster, disaster management and development (Shajahan et al., 2012).

In the Biology text book, one chapter discussed about themes relating to environment namely Environment of Living being where discussed about ecosystem, food chain, biodiversity, way and importance of environmental conservation (Haider et al., 2012; Muttaqi, Banu, Hasan, and Ahmed, 2007)

In the Social Science text book for secondary students, three chapters discuss, themes relating to the environment namely atmosphere, humidity and rainfall, temperature, growth of population and its effects on economic development, disaster management and Bangladesh (Begum et al., 2011). Also in the Agriculture Study text book for class ix-x, there two chapters discussed about agriculture and climate, climate change and its effects on agriculture, adaptation technique, forestation, its protection (Ashrafuzzaman et al., 2012). In addition, in the language (English) text book, which is designed as compulsory for all students, two chapters present various environment related content under the themes of climate change,

environmental pollution, save the planet, renewable energy and its sources (Shams et al., 2012). An overview of the above discussion presented appear to indicate that although is no separate environmental education course in the secondary education in Bangladesh, environment related ideas are intended to provide to all students from both the science and non-science groups through different subject areas. The objective of the study is to find out the students' knowledge on consequences and practice about environmental pollution of formal secondary level in Bangladesh.

2. Materials and Methods

The research for this study includes exploratory type. Exploratory in the sense that the awareness of the students who are educated in formal education at secondary level regarding environmental pollution (especially air, water, soil and sound), knowledge on consequences and practice of environmental pollution and alternative way to control the pollution has explored and described in this study (Kothari, 2010).

2.1 Study area

The two divisions in Bangladesh, Dhaka and Rajshahi have been selected purposively for this study. From Dhaka division two districts, Dhaka and Gazipur have been selected. From another Rajshahi division, there are also two districts Rajshahi and Sirajgonj have been selected for this research purposively. Dhaka is the capital city of Bangladesh. A lot of people and vehicles gather here. Many factories and industries are also grown up improperly in this city and nowadays Dhaka is called one of the most polluted city of the world. Gazipur is mainly factory and industry oriented district and from where Industrial garbage, chemicals, smoke, transport etc. are important in this respect. Rajshahi is often referred to as Education city and is situated in the north-west of the country and on the banks of the river Padma. Another district Sirajgonj is the transit route to the northern area with the most of the part of the country. Sirajgonj also situated on the western banks of the river Jamuna. So the selected areas have the research implication in view of the environmental pollution.

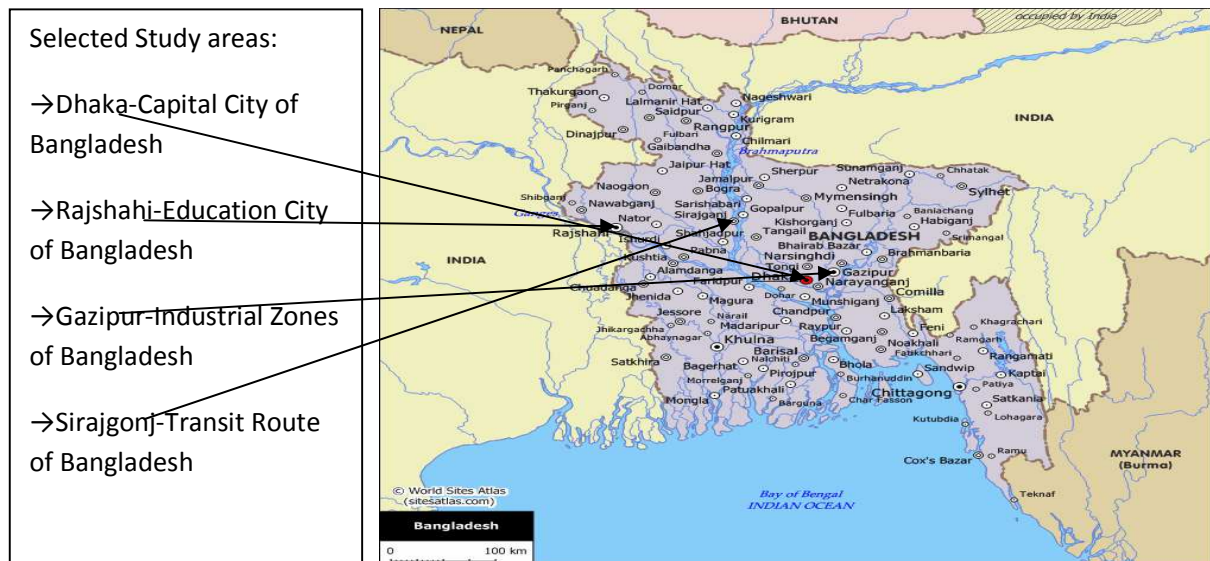


Figure 1: Map of the study area

2.2 Sample Techniques and Selection of Respondents

In order to participant selection, two districts of Dhaka division named Dhaka and Gazipur district and two districts of Rajshahi division named Rajshahi and Sirajgonj district in Bangladesh were purposively selected due to researcher's proximity and convenience. The secondary schools in these districts were divided into urban and rural category according to their geographical location. Three secondary schools from each district of Dhaka and Rajshahi and two schools from each district of Gazipur and Sirajgonj (three of the each urban division sadar and two of the rural areas in each district) were selected and twenty two students from each of these schools were then randomly selected. In this manner, 220 participants were included altogether with equal number of boys (n = 110) and girls (n = 110). Mittelstaedt et al., (1999) found that there is significant sex difference in students' environmental knowledge and attitudes, that is why both boys and girls students were included.

2.3 Data Processing and Analysis Procedure

The collected data is reviewed, scrutinized and edited to avoid inconsistency and error in the light of objectives. At the same time edited data is classified and coded. Quantitative data is analyzed by using Tables and graphs. However, qualitative data and comments which are collected through open and

close ended questionnaire are considered to enhance legitimacy and validity of the findings.

3. Results and Discussion

Formal education system provides a ready framework for reaching a large part of the existing population and can help make future generations conscious of the importance of environmental conservation. Students are receptive and curious, making them appealing to motivate. Practical approaches that involve the students in solving local environmental problems have more influence, develop skills and give reinforcement to the idea that people can make a difference. Environmental education is a running process. So, it needs for establishing 'Environmental Education and Training Centre' belonging the infrastructure of environment directorate for the better management of the environment (Faruk, 2001). Improvement of environmental quality by education is critically important for the sake of human health as well as for the economic growth (Ranis, 1997). In this respect the environmental pollution awareness of the teachers' of the respective institutions are also very important. Researcher (Larijani, 2010) found that female teachers have higher levels of environmental awareness to male teachers in the age group 31 to 50 years compared to other age groups. With the pedagogical strategies teachers need to use variety of innovative teaching strategies such as cooperative learning, participatory approach which explored

here seems more viable than the conventional face to face classroom practice in teaching environmental education. (Josiah et al., 2008; Yousuf and Bhutta, 2012). Data of primary survey collected from the students of secondary level formal education about their knowledge on consequences and practice regarding environmental pollution. Following Tables and graphs reveal their knowledge on consequences and practice regarding environmental pollution.

Questions were asked about the consequences of air pollution. In Table 1, among them 65.91% respondent viewed atmosphere will extreme hot,

61.36% respondents mentioned that many diseases like asthma, skin cancer etc. will increase, 15% respondents mentioned carbon dioxide and carbon monoxide will decrease, 18.18% mentioned deforestation will increase, 30% students said that sea level will increase, and 23.64 % mentioned industrial and agricultural productivity will decrease. According to the respondents, the most important impact of air pollution is 'atmospheres will extreme hot and many diseases like asthma, skin cancer etc. will increase' that is shown in bar diagram A and C in Figure 2.

Table 1: Consequences or impact of air pollution

Consequences or impact	No. of Respondents	%
A) Atmosphere will extreme hot	145	65.91 %
B) Atmosphere will be extreme cold	4	1.82 %
C) Many diseases like asthma, skin cancer etc. will increase	135	61.36 %
D) Carbon dioxide and carbon monoxide will decrease	33	15.0 %
E) Rain fall will increase	3	1.36 %
F) Deforestation will increase	40	18.18 %
G) Sea level will rise	66	30.0 %
H) Growth of Population will increase	2	0.91 %
I) Industrial and agricultural productivity will decrease	52	23.64 %

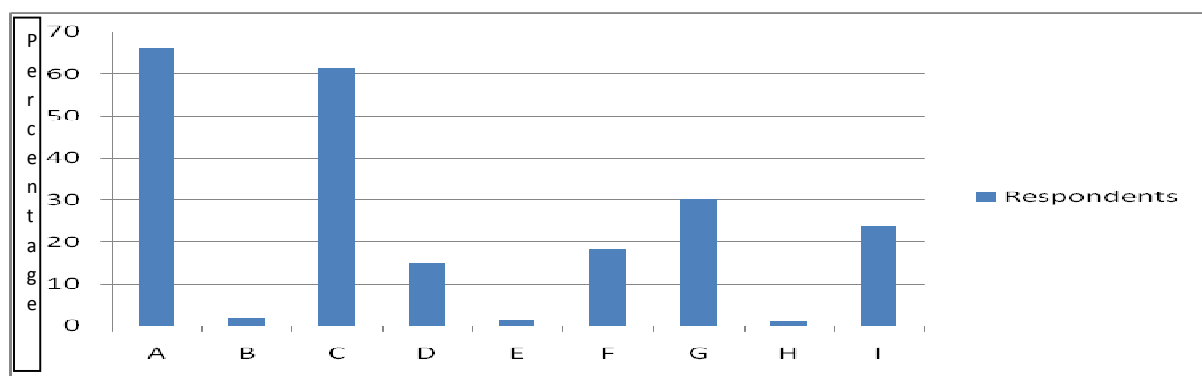


Figure 2: Consequences or impact of air pollution, Note: A, B, C, D, E, F, G, H, and I are defined in Table 1

Table 2: Consequences or Impacts of water pollution

Consequences or Impact	Number of Respondents	%
A) Atmosphere will extreme hot	4	1.82 %
B) Many diseases like diarrhea, dysentery, arsenicosis etc. will increase	207	94.09 %
C) Sea level will increase and agricultural productivity will decrease	22	10.00 %
D) Deforestation and soil erosion will increase	26	11.82 %
E) Many diseases like asthma, cancer will increase	21	9.55 %
F) Cyclone and tidal waves will increase	11	5.00 %
G) Biodiversity will increase	4	1.82 %

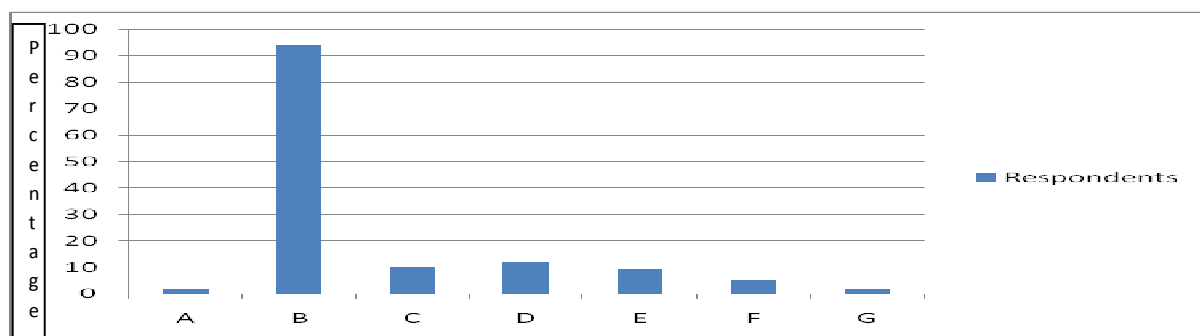


Figure 3: Consequences or Impacts of water pollution, Note: A, B, C, D, E, F, and G are defined in Table 2

Table 2 shows that the most of 94.09 % respondents viewed as many diseases like diarrhea, dysentery, arsenicosis etc. will increase for water pollution. Among the respondents 10 % told that sea level will increase and agricultural productivity will decrease, 11.82 % respondents said deforestation and soil erosion will increase for water pollution and 9.55 % students mentioned that many diseases like asthma, cancer will increase due to water pollution. So, most of the respondents viewed in right way that many diseases like diarrhea, dysentery etc. will increase due to pollution of water which is shown in bar diagram B in Figure 3.

Table 3 shows the views of respondents regarding the diseases which are created from noise pollution. Among them 77.27 % respondents mentioned that the impairment of hearing, 75 % said that high blood pressure and heart diseases, 25 % said that headache and fever, 6.36 % said the stomach pain, 4.09 % mentioned that bronchitis, asthma, throat irritation causes from noise pollution. So, impairment of hearing, high blood pressure and heart diseases are the most significant effects of noise pollution that are shown in diagram A, D in Figure 4.

Table 3: Diseases that are created from noise pollution

Diseases	Number of Respondents	%
A) Impairment of hearing	170	77.27 %
B) Respiratory problem	18	8.18 %
C) Cancer and genetic effects	10	4.45 %
D) High blood pressure and heart diseases	165	75.00 %
E) Headache and fever	55	25.00 %
F) Stomach pain	14	6.36 %
G) Bronchitis, asthma, throat irritation	9	4.09 %

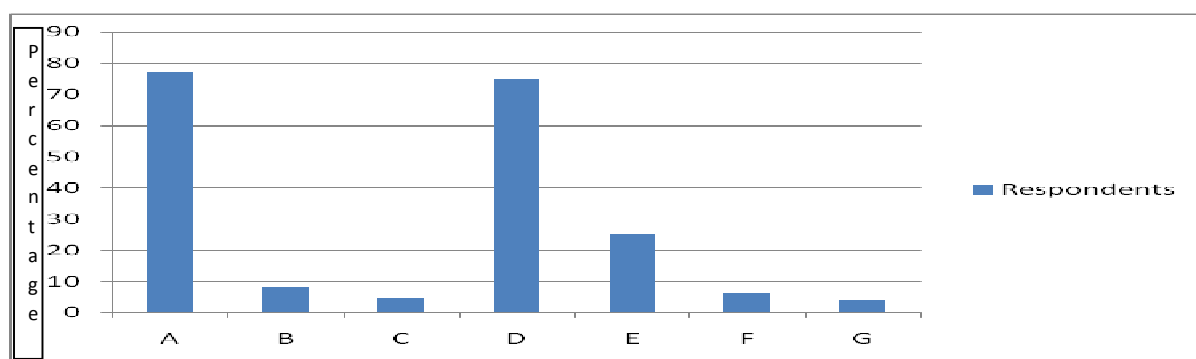


Figure 4: Diseases created from noise pollution, Note: A, B, C, D, E, F, and G are defined in Table 3

Table 4: Students were asked how they can reduce air pollution

Initiatives for reducing air pollution	Respondents	
	Number	%
A) By political speech	00	00 %
B) Avoiding the use of vehicles	6	2.73 %
C) Adopting various environmental rules and regulations	165	75.00 %
D) Less use of motor vehicles	56	25.45 %
E) Avoiding vehicles older than 20 years	112	50.91 %
F) Using proper lubricants	105	47.73 %
G) Reducing the number of vehicles on streets	5	2.27 %
H) Using CNG and LPG	92	41.82 %
I) Imposing extensive penalties on polluters	67	30.45 %

J) Relocating hazardous industries like brick kilns away from human habitations	110	50.00 %
K) Destruction of pathogens by proper treatment.	25	11.36%

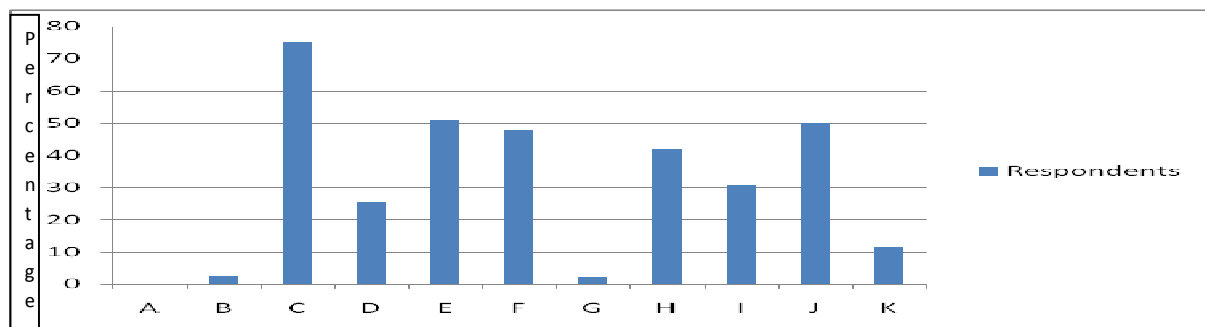


Figure 5: Students’ initiatives for reducing air pollution, Note: A, B, C, D, E, F, G, H, I, J and K are defined in Table 4

Students were asked how air pollution can be reduced. Table 4 shows that 75 % respondents mentioned adopting various environmental rules and regulations, 25.45% respondents mentioned less use of motor vehicles, 50.91 % students told that avoiding vehicles older than 20 years, 41.82 % said that using CNG and LPG, 47.73% students said that using proper lubricants, 30.45% mentioned imposing extensive penalties on polluters and 50% respondents mentioned relocating hazardous industries like brick kilns away from human habitations as the measures for reducing air pollution that is shown in Figure 5.

Table 5: Measures for reducing water and soil pollution

Initiatives or Measures	Number of Respondents	%
A) Proper planning of industrial areas like zoning	115	52.27 %
B) Reducing the number of vehicles on streets	12	5.45 %
C) Creating high boundaries of water bodies	82	37.27 %
D) Relocating of hazardous industries like brick kilns to areas away from human habitations	24	10.91 %
E) Using Organic fertilizers	88	40.00 %
F) Destruction of pathogens by proper treatment	31	14.09 %
G) Imposing extensive penalties on polluters	64	29.09 %
H) Industrial and house hold wastes must not be disposed in river or lack	155	70.45 %
I) Integrated pest management and not using of harmful chemical and pesticides	116	52.73 %

J) Establishing Effluent Treatment Plant (ETP) in industry	152	69.09 %
K) Recycling papers, plastics and other materials	155	70.45 %
L) By planting trees and reforestation	135	61.36 %

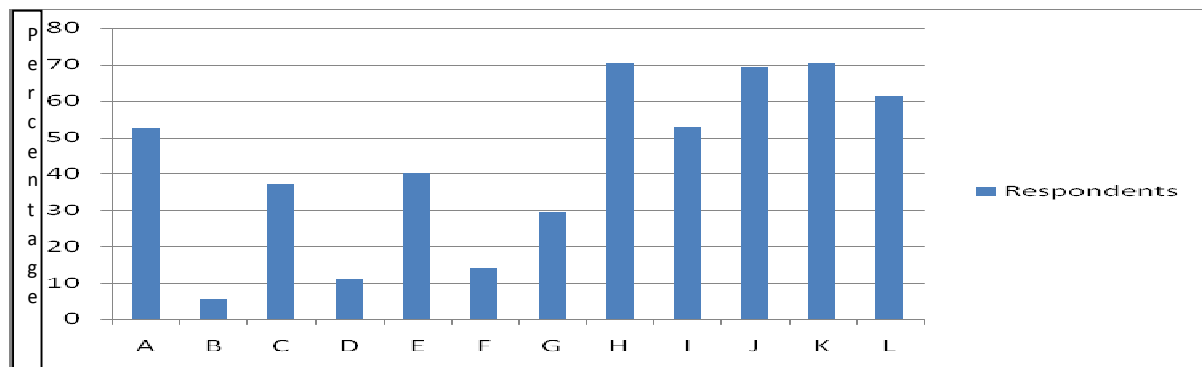


Figure 6: Measures for reducing water and soil pollution, Note: A, B, C, D, E, F, G, H, I, J, K and L are defined in Table 5

Table 5 describes that 52.27 % students viewed, measures for reducing water pollution as the proper planning of industrial areas like zoning, 70.45 % respondents mentioned industrial and house hold wastes must not be disposed in river or lack, 52.73 % students said integrated pest management and not using of harmful chemical and pesticides as a measure of reducing water pollution and 69.09 % respondents told that establishing effluent treatment plant (ETP) in industry is an another measures for reducing water pollution. 70.45% respondents mentioned that recycling papers, plastics and other materials are the measures for reducing soil pollution and 61.36% respondents said that planting trees and reforestation are the measures for reducing soil pollution. So, initiatives

A, H, I, J, K and L are the more effective way to reduce water and soil pollution mentioned by the students in Table 5 and Figure 6.

The students were asked for the initiatives of environmental protection from pollution. Table 9 shows that 81.82 % respondents mentioned creating awareness through education, 60.45 % respondents said by reducing the growth of population, 46.36 % said by recycling of the materials, 59.09 % students said by implementation of environmental laws and 20.45 % respondents mentioned that threatening among people not to pollute the environment for the protection of environment. Their views are rational.

Table 6: Initiatives for environmental protection from pollution

Initiatives	Number of Respondents	%
A) creating awareness through education	180	81.82 %
B) By reducing the growth of population	133	60.45 %
C) By recycling of the materials	102	46.36 %
D) By implementation of environmental laws	130	59.09 %

E) By political speech	4	1.82 %
F) Threatening among people not to pollute the environment	45	20.45 %

Table 7: Students were asked which source of water do they use for drinking, other works at home and do they wash their clothes in the pond or river practically.

Source of water/activities	Number of Respondents	%
A) Tap water	72	32.73 %
B) Tube well water	135	61.36 %
C) Pond and River water	9	4.09 %
D) From other sources (for example rain)	4	1.82 %
E) Don't wash in the pond/river water	76	34.55 %
F) Never wash in the pond/river water	69	31.36 %
G) Sometimes wash in the pond/river	45	20.45 %
H) Not applicable	30	13.64 %

Students were asked which sources of water they use for drinking and other works at home. Table 7 illustrates, 33.18% respondents use water tap water, 61.36% mentioned tube well water, and 4.09% respondents mentioned the sources of pond and river water and the rests 1.82% respondents use water from other (rain) sources for drinking and other household works. The respondents were asked do they wash their clothes in pond or river. About 34.54% respondents mentioned that they don't wash in the pond/river water, 31.36% mentioned

that they never wash in the pond/river water, 20.45% respondents sometimes wash in the pond/river and 13.63% think it is not applicable for them.

Respondents were asked what they do with the waste of their family. In Table 8, concerning 3.18 % respondents mentioned that they through it here and there, 75 % respondents put it at the fixed place and 21.82 % said that they bury it in the ground.

Table 8: Students were asked what they do with the waste of their family

Initiatives mentioned by the respondents	Number of Respondents	%
A) Through it here and there	7	3.18 %
B) Put it at the fixed place	165	75.00 %
C) Bury in the ground	48	21.82 %
D) Others (please write).....	0	0 %

Table 9: Respondents were asked about the activities of Science club, Nature study club etc. in their school and their initiatives in taking participation.

Number of participant	Number of Respondents and their percentage (%)			
	Yes (A)		No (B)	
	Number	%	Number	%
	66	30 %	154	70 %
Initiatives	Number of Respondents		%	
A) Always	37		16.82 %	
B) Randomly	3		1.36 %	
C) Sometimes	57		25.91 %	
D) Never	4		1.82 %	

Respondents were asked about the activities of Science Club, Nature Study Club etc. in their school. Among them, 30 % said 'yes' and 70 % said there are 'no' activities of any Science or Nature Study Club in their school. Table 9 shows that among the 30%

respondents, 16.82% respondents always take part in Club activities, 25.91 % respondents sometimes take participation in that organization, 1.36% randomly and 1.82% never takes participation in it.

Table 10: Execution of following activities by the students

Activities	Always		Randomly		Sometimes		Never	
	Respon dents	%	Respon dents	%	Respon dents	%	Respon dents	%
Keep the switches when it is not required	185	84.09 %	8	3.64%	22	10.00 %	5	2.27 %
Listen to music or T.V with high volume	12	5.45 %	6	2.73%	50	22.73 %	152	69.09 %
Write on the opposite side of used paper	145	65.91 %	7	3.18%	55	25.00 %	13	5.91 %
Take care of the plants	125	56.82 %	5	2.27%	82	37.27 %	8	3.64 %
Smoke	2	0.91 %	0	0 %	6	2.73 %	212	96.3%
Advise others not to smoke	130	59.09 %	6	2.73%	60	27.2%	24	10.9%
Think about the environment deeply	91	41.36 %	17	7.73%	105	47.7%	7	3.18 %

Execution of some activities done by the respondents related to their daily life. Table 10 shows that 5.45% respondents always, 2.73% randomly, 22.73% sometimes and 69.09% never listen to music or T.V. with high volume. In other activities, 65.91% of the respondents write on the opposite side of the used papers always, 3.18% do it randomly, 25% sometimes do it and 5.91% never do these activities. With the activities of taking care of plants, 56.82% respondents do always, 2.27% randomly, 37.27% sometimes do the activity and 3.64% never do that. Among them, 96.36% respondents do not smoke and 1.82% sometimes smokes. Of the respondents, 59.09% always advise others not to smoke and 27.27% sometimes advise others not to smoke. Moreover, 41.36 % respondents think deeply about the environment, 7.735 randomly, 47.73% sometimes and 3.18 % never think about the environment.

4. Conclusion:

It can be concluded that Bangladesh faces a lot of challenges for gaining sustainable development such as ecological imbalance, very high density of population, constant high population growth rate and scarce of natural resources. In this respect, a significant and efficient program of environmental education with the local expertise is needed for massive changes in behavior with respect to environment. With a view to the formal education system formulates and provides a ready framework for reaching a large part of the existing population and that can help to make the future generations conscious of the necessity of environmental preservation because the students are receptive and curious, making them appealing to motivate. But in our formal education system there has the lack of supplementary reading materials for the pupils as well as of appropriate audio-visual support to teaching. The existing curriculum is knowledge based and examination oriented and the secondary level school students do not have the opportunity to develop skills to analyze and evaluate local or national environmental problems or issues. There also a lot of lack of coordination amongst respective organization is a very common problem in Bangladesh. In this respect teacher-training institutions should be included environmental issues in their curriculum. Teachers should be trained up with pedagogical strategies to orient them in such how to teach environmental education to students for critical thinking, problem solving and action

oriented. There also need some modifications to bring out the environmental implications in the existing or in new subjects. Beyond the traditional teaching strategies like-and-talk method, teachers need to use variety of innovative teaching strategies such as cooperative learning while delivering their lessons, techniques of problem solving teaching methods for the development of their significant thinking. Student should be encouraged and appreciated by the teachers for taking part positively in solving the environmental problems. By this process they can acquire confidence that would improve their knowledge towards environmental preservation and sustainable expected development. Finally, though the existing environmental education programs do not seem to be good enough, but the future looks promising.

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