CHAPTER – 4

ANALYSIS AND INTERPRETATION

“You must be the change you wish to see in the world.”

Mohandas K. Gandhi.

4.0 Introduction

This chapter deals with the process of analysing the data, gathered during the course of the research work and with its interpretation. The data collected is analysed keeping in view the objectives of this study mentioned in Chapter 1. The goal that motivated the researcher to collect data, analyse and interpret the same, was to study the impact of Environmental Education on the social behaviour of students undertaking higher education from the University of Mumbai.

After collecting the requisite data the next step in research is to analyse and interpret the same and to arrive at certain findings and conclusions.

Data collected during the study have been analysed and interpreted in the light of the following objectives.

1. To evaluate the effectiveness of Environmental Education in creating awareness and concern about environmental problems among students of colleges affiliated to the University of Mumbai in Navi Mumbai
2. To find out whether the students and teachers feel capable and empowered to tackle the local environmental problems
3. To verify whether Environmental Education has brought about any change in the lifestyle of some selected sample of students and made them eco-friendly

4. To understand and enumerate the challenges and hardships faced by students and teachers in putting their ideas and plans of conservation and sustainable development into action

5. To review the Environmental Education syllabus of the University of Mumbai and to give suggestions to make it more functional and activity oriented

### 4.1 Data Analysis and Interpretation of the Pilot Study

The pilot study was conducted over a time span of six months between November 2008 and April, 2009. Questionnaire No.1 was used as the tool for the pilot study. The total number of respondents comprising subject experts, senior lecturers and students was 53. The sample was randomly chosen from SIES (Nerul) College of Arts, Science and Commerce, Navi Mumbai.

All the respondents were aware of the importance of Environmental Education in the present time. Analysis of the responses reveals that the respondents strongly favoured induction of the subject by the University of Mumbai into the syllabus of higher education during the year 1992.

However, a major section of the student respondents could not give a convincing and specific answer to Question No.1 from Questionnaire No.1 (Appendix 1a)
Q.1 What does ‘Environmental Studies’ mean to you?

The analysis reveals that though the respondents were aware that Environmental Education being taught in the different courses at the University of Mumbai was an important contemporary subject, they were not sure of its significance in their lives.

The responses to the subsequent questions were more specific and enlightening.

Sample: Subject experts, senior lecturers and students

Q.2 Are you in favour of the University of Mumbai’s decision to introduce Environmental Education in higher education?

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>51</td>
<td>2</td>
</tr>
</tbody>
</table>

Table 1

Are you in favour of the University of Mumbai’s decision to introduce Environmental Education in higher education?

Graph 1
In response to this question, 96% of the respondents supported the decision taken by the University of Mumbai to introduce Environmental Education in the different courses of higher education. From the responses gathered, the researcher interprets that the respondents did not doubt the relevance of the subject nor did it face any opposition regarding its introduction and acceptance. Even in 1992, the government as well as the academia were aware of the growing need to study the dynamics of the environment to understand the cause and effect of rampant resource utilisation and increasing environmental fallouts occurring all around and were looking for measures to help control them.

Q.3

<table>
<thead>
<tr>
<th>Agree</th>
<th>Disagree</th>
<th>Undecided</th>
</tr>
</thead>
<tbody>
<tr>
<td>49</td>
<td>1</td>
<td>3</td>
</tr>
</tbody>
</table>

Table 2

The study of Environmental Education will benefit the students and society at large.

Graph 2
The overwhelming 92% positive response given by the respondents to Question no.3 indicates that teaching Environmental Education to the students of higher education can positively bring about a change in the mindset of the learners creating greater respect and affinity towards the environment. Analysis reveals that if proper value systems and benefits of pro-environment activities are imbibed early in young minds, then gradually a society can be created which is not only considerate towards the environment but also aware of the ways and means to satisfy their own needs and wants without causing irreparable harm to the environment.

Q.4 Do you think the students of Environmental Education will be better equipped to tackle the environmental problems of today?

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>51</td>
<td>2</td>
</tr>
</tbody>
</table>

Table 3

Graph 3

Do you think the students of Environmental Education will be better equipped to tackle the environmental problems of today?
Responses to Question no.4 are an indication that Environmental Education is well structured to update young minds with scientific knowledge and environmental awareness. The respondents believe that the students of Environmental Education, if educated properly, would be able to understand the scientific reasons of the prevailing environmental problems and be able to take positive steps to control them and prevent new ones.

Further during the course of the pilot study the respondents showed awareness regarding the prevailing environmental problems. Air-water-soil pollution, excessive generation of waste lying in huge dumps all over the city and rampant wastage of water and cutting down of trees were a few of the problems enlisted by the respondents. The teachers of Environmental Education were found to be quite enthusiastic to play a role in bringing about a change in the mindset of the students but blamed the policy of admitting large number of students in the classes for their lack of innovative teaching in the classrooms. When it came to making suggestions for new topics to be included in the present syllabus, very few of the teachers, mostly the senior ones had anything to contribute. The researcher felt that the teachers of the subject needed some environmental information and refresher courses to acquaint them with the environmental issues and policies prevailing in other parts of the world before the junior lot of teachers could muster enough confidence to make suggestions for the syllabus. Finally most of the respondents felt that the teachers and students could definitely come together and make an effort to sustain the environment but did not know how the impact could be measured.

At the conclusion of the pilot study the researcher felt that Environmental Education had a lot of potential to bring about a change in the mindset of people and if the teachers teaching this subject could be motivated to convince their students then the positive impact on the environment would be quicker and more extensive.
After the pilot study, the questionnaire was modified for the main study. It was put to the students and staff members of Environmental Education from various colleges of Navi Mumbai, seeking their opinion on the efficacy of Environmental Education. The researcher had acquired prior permission to visit the four selected colleges one after the other within a month to meet the respondents.

4.2 Data Analysis and Interpretation based on the main study. Data were analysed and interpreted keeping in focus the objectives of the study.

Objective 1: To evaluate the effectiveness of Environmental Education in creating awareness and concern about environmental problems among students of colleges affiliated to the University of Mumbai in Navi Mumbai

At the outset of the research work, the researcher had made an interview schedule to meet and interview experts and academicians from the Department of Geography, University of Mumbai. The aim was to comprehend the importance of the subject and its effectiveness in helping reduce environmental problems. When contacted in 2008, a very senior professor Dr. Arunachalam (Retd) University of Mumbai, HOD Geography Department, Member of Board of Studies and Member of Academic Council and another extremely respected and retired member of the Academic Council and former HOD of the Geography Department Dr. Sita Venkateshvarlu had rationalised that awareness about environmental issues had been growing and that the entry of the subject was well-timed to enroll more and more teachers to teach the subject and help curb the environmental problems occurring all around. Thereafter, as the researcher met and interviewed other experts from the Department of Geography and other courses, all of them expressed their
solidarity to the fact that the introduction of Environmental Studies by the University of Mumbai had been a timely need of the hour.

**Focus group discussions** held with teachers of Environmental Education further reiterated that Environmental Education was a contemporary subject and served well the purpose of creating awareness and concern about environmental issues among the students.

On the basis of **observations of field work and photographic evidence** the researcher has a reason to opine that Environmental Education helps to impart knowledge bringing about awareness and empowerment which slowly inculcates a change in the way of thinking and eventually the social behaviour of people towards the environment. The researcher observed some exemplary work in terms of water harvesting, soil conservation and forest restoration being done by Retd. Principal Prof Y. B. Bhide, President ‘Hariyali’ (NGO) and an alumnus of the University of Mumbai. He, along with student volunteers, corporate organisations and members of the public have brought about a huge change in the Yeoor Hills of Thane.

The Yeoor hills in Thane, Maharashtra are an extension of the Sahyadri Range. Large tracts of this hilly area were heading towards an ecological disaster with rampant deforestation and soil erosion. ‘Hariyali’ the NGO headed by Prof Y. B. Bhide, (70 years of age) and well supported by a huge number of school and college students and members of the academia, continued the afforestation campaign on a war footing. It has resulted in a total transformation in this area. Seeds of fruits and vegetables donated by Corporate houses, members of the public and NGOs are scattered all over the hill sides and then transplanted. This activity is carried out during the monsoon months.
Picture 3: Students busy with plantation on Yeoor Hills, Thane

Picture 4: Afforestation to prevent soil erosion
The following was the schedule for Hariyali-Mass Plantation activities as observed by the researcher.

<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
<th>No. of Trees</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>15th June</td>
<td>Sambhaji Maidan</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>==do==</td>
<td>Part of ITI</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>18th June</td>
<td>Hari Om Nagar Maidan</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>19th June</td>
<td>Kalidas, P K Rd. M.M. Malaviya Rd</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>25th June</td>
<td>RRT Zaver Road, Ganesh Gavade Road</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>26th June</td>
<td>J N Rd, M G Rd, L B S Marg</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>2nd July</td>
<td>Baburao Kunte Marg, St. Ramdas Rd, C D</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Deshmukh Udyan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3rd July</td>
<td>I T I Part</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>9th July</td>
<td>I T I Part</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>10th July</td>
<td>Eastern Express Highway</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>16th July</td>
<td>==do==</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>17th July</td>
<td>Junction of Airoli to Toll Naka</td>
<td>50</td>
<td></td>
</tr>
</tbody>
</table>
Ever since its inception in the year 1996, Hariyali has been very active in the field of protection and up-gradation of environmental conditions, more particularly with the involvement and participation of the student community and nature-lovers. The researcher personally visited the sites where the volunteers of Hariyali had been conducting environment conservation activities such as rain-water harvesting, tree plantation and prevention of soil erosion. While the researcher visited the sites, students from the following institutions were some participants involved in these activities.

- Marathi Vidyalaya, King George High School, I.T.I., NSS Nalanda Public School
- Laxmibai English Medium School, N.G.Purandare, St. Mary’s High School
- Mhatre High School, Mulund Vidyamandir, Vidya Prabodhini
- Thakur Vidyalaya, Holy Angels, M C C College, Vaze College
- 10 Corporates, 30 Hariyali Volunteers, 50 Private Organisations

<table>
<thead>
<tr>
<th></th>
<th>Date</th>
<th>Activity</th>
<th>Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>23rd July</td>
<td>==do==</td>
<td>50</td>
</tr>
<tr>
<td>14</td>
<td>24th July</td>
<td>==do==</td>
<td>50</td>
</tr>
<tr>
<td>15</td>
<td>30 &amp; 31th July</td>
<td>Overnight trek</td>
<td>200</td>
</tr>
<tr>
<td>16</td>
<td>6th August</td>
<td>Private Societies</td>
<td>100</td>
</tr>
<tr>
<td>17</td>
<td>7th August</td>
<td>Private Societies</td>
<td>100</td>
</tr>
<tr>
<td>18</td>
<td>13th August</td>
<td>Private Societies</td>
<td>100</td>
</tr>
<tr>
<td>19</td>
<td>14th August</td>
<td>Private Societies</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 4
Objective 2: To find out whether the students and teachers feel capable and empowered to tackle the local environmental problems

Responses to the questions in the Questionnaire given to the students showed that the students who truly showed interest in Environmental Education were ready to tackle the local environmental problems. The responses showed that sometimes they were ready to do environmental conservation activities individually and sometimes in groups. They seemed to have acquired the right
attitude of concern and care for the environment. This objective was further attained through personal visits to the sites, photographic evidence and interviews by the researcher. The following responses are of the main study.

**Q.1 University of Mumbai introduced Environmental Education in 1992 as a compulsory subject in higher education. Do you think it was necessary?**

**Question No.1**

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
<td>185</td>
<td>12</td>
</tr>
</tbody>
</table>

**Table 5**

The 185 ‘Yes’ and the 12 ‘No’ responses to Question no.1 from Questionnaire no.2, given by the students and staff members of Environmental Education, indicate that the induction of the subject was necessary in the year 1992 as the respondents were slowly becoming aware of the environmental problems prevailing at the local, regional and global areas. The respondents strongly convey the fact that Environmental Education was needed to create the
awareness and knowledge requisite to tackle the increasing environmental problems. 94% of the respondents are of the opinion that the change in the syllabus with the inclusion of Environmental Education as brought about by the University of Mumbai in 1992 was fully justified.

Q 1.1

a) Made you eco friendly and changed your lifestyle.

b) Made you aware of environmental problems - local and global.

c) Makes you want to do something good for the environment.

d) Makes you want to share your awareness with others.

Question No. 1.1

<table>
<thead>
<tr>
<th>Made Eco Friendly and changed life style</th>
<th>Aware of Environmental Problem</th>
<th>Makes you to do something good for Environmental issue</th>
<th>Share awareness with others</th>
</tr>
</thead>
<tbody>
<tr>
<td>28</td>
<td>97</td>
<td>51</td>
<td>27</td>
</tr>
</tbody>
</table>

*The increased number of responses is due to multiple answers.

Table 6

[Graph 5: How has the subject helped you as a student?]

Total Respondents 197

Graph 5
Students of Environmental Education responded to Question no.1.1 and while analysing their responses, the researcher noted a major positive change in the overall outlook and social behaviour of these students. These students of Environmental Education with their increased knowledge were more aware of local as well as global environmental problems, more concerned and environment friendly. 97 student respondents, that is nearly 53%, responded positively stating that Environmental Education had helped them become more sensitive and aware of the happenings in their surroundings. 30 students or 15% felt that after studying Environmental Education they had become eco-friendly and changed their lives for the better by becoming environmentally more responsible.

After analysing all the responses, it can be interpreted that 53 students or 27% of the respondents have not only developed a greater understanding of the dynamics of the environment but have also acquired the requisite skills and a strong desire to try and reduce the problems. Finally 29 students or 14% feel the desire to share their knowledge with others which the researcher feels may be a step in the right direction of spreading awareness among all sections of society. Some of the respondents gave multiple answers implying that the subject of Environmental Education had created a positive impact on them. A few refrained from giving any response at all signifying that they were confused and unable to link their daily activities to the impact created by the subject.

Q 2 Do you think Environmental Education will benefit the society in the long run?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>188</td>
<td>9</td>
</tr>
</tbody>
</table>

Table 7
Question no. 2 is a direct query to the students and staff members questioning them about the efficacy of the subject. A large number amounting to nearly 96% of the respondents strongly felt that the subject of Environmental Education was an important inclusion in the syllabus and would help in creating a link between Environmental Education and social responsibility. 188 of the respondents felt that the subject of Environmental Education would surely influence the behaviour, attitude and actions of the society and help sustain the environment.

Certain members of the alumni have taken it upon themselves to safeguard the local environs with help from some like-minded people. Mrs. Pranali Lad, 37 years, an alumnus of the University of Mumbai who is also the lady corporator of ward 46, Vashi and her husband Mr. Avinash Lad have been carrying out an environmental crusade to conserve a major section of the Vashi creek area in Navi Mumbai since 2000. This effort to conserve and maintain the creek in Navi Mumbai along with its holding pond and the 2.25 km stretch of land along the pond, popularly termed as the ‘Mini Seashore’ or the ‘Jogger’s
Track’ was wholeheartedly supported by the senior citizens, students of the neighbouring schools and colleges and the morning and evening walkers/joggers of Navi Mumbai.

As early as in the year 2000 nearly 100 truckloads of good quality red soil was brought and deposited in this area and an initial tree plantation of 1000 saplings has now steadily grown to nearly 10,000 trees planted in this area today. Small concrete water tanks built at regular intervals along the jogger’s track were initially supplied water by water tankers but have now been given water supply by the Navi Mumbai Municipal Corporation (NMMC). The provision of 150 small plastic buckets along the 2.5 kilometer track of the ‘Mini Seashore’ was a novel idea by the young lady corporator and her husband to encourage the people taking morning and evening walks, to help water the trees planted along the track while taking their walks. A person walking from one direction voluntarily fills a small bucket with water and after pouring the water on the roots of the tree leaves the bucket near the tree while another person returning from the opposite direction carries the empty bucket back to the water tank, where it is left or filled again to be poured on another tree growing further along the track. This praiseworthy voluntary exercise of ‘adopting’ trees and watering them is carried out without any break in the walking routine and without anyone issuing any instructions to the other.

The researcher has observed that during festival times, there is the production of a lot of biodegradable and non-biodegradable ‘Nirmalaya’ or prayer offerings which may prove to be toxic and thereby cause harm to the environment. As the mini sea shore is the only area accessible to the sea in Vashi, Navi Mumbai, people throng to this area especially during high tides to immerse the ‘Nirmalaya,’ collected by them. To avoid water and land pollution, huge concrete urns or ‘Kalash’ and dustbins have been set up along the sea face by Mrs Pranali Lad and her husband which are being maintained with the help of Navi Mumbai Municipal Corporation (NMMC). The people are
urged to put their offerings into these urns and not to cause water pollution by dumping them into the sea. Cleaning of the water bodies and the Mini Sea Shore is carried out by voluntary workers and students to help the township remain, ‘Green and clean.’

With the back flow of the waters at the mouth of the Mithi river caused due to the accumulation of garbage and plastic which resulted in the deluge of 26th July 2005 still fresh in the memories of the Mumbaikars, the Navi Mumbai Municipal Corporation of Navi Mumbai is extremely wary and orders the desilting of nullahs and drains before every monsoons, safeguarding the lives of people and also public property due to water-logging on the roads. Public siren systems have been put in place at various strategic places to warn people who now understand the vagaries of nature and the destructions which can be caused due to natural calamities.

The various photographs and newspaper clippings collected by the researcher reveal that the initiatives taken by the environment friendly students, staff, members of the alumni of the University of Mumbai as well as the civic authorities of Navi Mumbai are bringing about a positive change in the social behaviour of the people and resulting in a positive impact on the environment in and around the township. A noteworthy factor is that some of the senior citizens who take morning and evening walks regularly are proving to be true sentinels of the environment and a highly motivated lot ever ready to give their time for environment conservation related activities. The following photographs show the activities carried out by the people of Navi Mumbai showing a change in their social behaviour initiated by the steps taken by the conscientious and empowered members of the alumni of the University of Mumbai.
Picture 6: Entrance to the Mini Sea-Shore Jogger’s Track

Picture 7: Water Tanks along Jogger’s Track
In this study, the researcher has been a participant observer. Observation was primarily carried out to gauge the knowledge of the students, their ability to
comprehend and accept the subject and also to observe the process of implementation of the eco-friendly methods in day to day activities by the learners of the subject. The observer considers herself fortunate to have been able to take important photographic evidence of the results of some eco-friendly initiatives which were taken up in Navi Mumbai years ago, which have resulted in Navi Mumbai being designated as a ‘Planned City,’ and ‘City of the Millennium’ today.

As per provisional reports of Census India, population of Navi Mumbai in 2011 was 1,119,477. Navi Mumbai, was never listed as an important residential area till recently. This whole area beyond Greater Mumbai across the Vashi Creek was an unattractive marshy area inhabited by only the Kohlis (fisherfolk) of Maharashtra. As this township was created basically to decongest Greater Mumbai which was facing a serious situation of residential, environmental and social degeneration, Navi Mumbai was set up with the hope that the problems seen in Mumbai would not be seen here.

The researcher went to live in Vashi in 1984 and has been a part of the academia there since then. She has observed a sea of changes that have swept through the various nodes of Navi Mumbai making it a very attractive residential destination today. Tree plantation drives by students are carried out periodically to compensate for the brazen cutting down of trees by builders and people with vested interests. The much-advertised Second International Airport of Mumbai stated to come up near Panvel, Navi Mumbai ran into environmental issues with the mindless hacking of mangroves in the area. The matter was later resolved after it was proved to the Ministry of Environment and Forests (MoEF) that the mangroves of the neighbouring areas would be left untouched to compensate those that would have to be removed to make way for the International Airport.
While making field notes the researcher has observed that many positive steps have also been taken to safeguard the environment of Navi Mumbai by the governing bodies such as the Navi Mumbai Municipal Corporation (NMMC) and City and Industrial Development Corporation (CIDCO) along with NGOs and the alert citizens.

Picture 10: Digital Board Showing Levels Of Toxic Gases
A digital display board above the main entrance of the Fire Brigade Station at Sector-9, Vashi acts as an indicator, warning the public about air pollution and the levels of various toxic gases and suspended particulate matter present in that area. This constant display of the amount of poisonous gases present in the atmosphere acts as a reminder for the public to keep their vehicles emission of pollutants under control. To ensure that no time is lost in long queues, mobile vans stationed along freeways are authorised to do PUC checks and issue certificates to the passing vehicles to keep air pollution under control. Furthermore, keeping the hazards of noise pollution in mind, the Police force of Navi Mumbai ensures that loud speakers and loud music is switched off at promptly at 10 pm especially during festival times.

With the introduction of Environmental Education in colleges of Navi Mumbai in 1992, the knowledge and skills of the learners have been put to good use and
have helped to create an impact in Navi Mumbai and its environs. People have learnt to nurture nature.

**Objective 3: To verify whether Environmental Education has brought about any change in the lifestyle of the selected sample of students and made them eco-friendly**

Environmental issues such as Global Warming, Deforestation, Pollution and Depletion of important Natural Resources are global as well as local concerns and there is an urgent need to try and address the causes of these environmental concerns so that the rapid environmental degradation taking place can be arrested before it becomes too late for man’s own survival. The researcher feels there is an urgent need to empower the people especially young students with information about the deteriorating conditions of the environment and to provide the skills and technical knowhow to maintain the surroundings.

To verify whether Environmental Education can bring about an increase in awareness and a change in the lifestyle of the people associated with it, the researcher started by analysing the responses to Question no. 2 from Questionnaire no.2, which was asked to gauge the general acceptability of the subject.
Q 2  Do you think Environmental Education will benefit the society in the long run?

Question No 2

The positive response given by 95% of the respondents brings forth the wide acceptance and acknowledgement of the potentiality of this contemporary subject, introduced by the University of Mumbai. The respondents feel that if the subject is taught well by qualified and sincere teachers, then Environmental Education would help to bring about a change in the social behaviour of the people benefiting society in the long run.

Total Respondents :197

Graph 7
Q2.1 Have you organised or participated in any of the following?

Question No. 2.1

<table>
<thead>
<tr>
<th>Q 2.1</th>
<th></th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td></td>
<td>152</td>
<td>36</td>
</tr>
<tr>
<td>If Yes</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 8

The responses of 188 out of a total of 197 respondents to Question no. 2.1 from Questionnaire no.2 is clearly an indication that the decision taken by the University of Mumbai to induct Environmental Education into the syllabus of higher education, to create environmental awareness, prevent environmental deterioration and to create better citizens of the world has proved to be highly rewarding. Only 9 respondents have refrained from giving any answers while many others have shown greater environmental concern by giving multiple
responses. The responses are indicative of the fact that the respondents strongly feel that Environmental Education does play a positive role in changing the mindset of the people and urge them to share their learning and knowledge with others. The respondents also seem to realise that the conservation of the surroundings is more effective with team work.

3.1 Analysis of Student Awareness

<table>
<thead>
<tr>
<th>Different Types of Activities</th>
<th>No. of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Street Plays</td>
<td>14</td>
</tr>
<tr>
<td>Workshops</td>
<td>25</td>
</tr>
<tr>
<td>Presentations/Exhibitions</td>
<td>48</td>
</tr>
<tr>
<td>Rallies/Walks</td>
<td>35</td>
</tr>
<tr>
<td>Tree Plantation drives</td>
<td>71</td>
</tr>
<tr>
<td>Any Other</td>
<td>10</td>
</tr>
</tbody>
</table>

Total Respondents : 197

Graph 9

All social activities representing a respondent’s concern for the environment has been well represented in this question with tree plantation drives receiving the maximum of 71 entries. Responses of another 48 respondents show that they have conducted exhibitions and presentations sharing their knowledge with others. 'Padyatras’ or environmental rallies seem to be another means by which 35 respondents wish to share their concern about the environment with the public. Interestingly a lesser number of 25, 14 and 10 respondents have taken part in group activities such as workshops, street plays and other activities to communicate their concern for the environment to others. The researcher finds this small number of responses of these group activities
intriguing because she analyses and feels that the more environmentally conscious and empowered an individual becomes, the more confident and action oriented his/her response becomes.

Responses to the following questions tabulated in the form of graphs act as indicators to inform the researcher about the effectiveness of Environmental Education in bringing about a change in the mind set as well as the lifestyle of the respondents. The responses show that the repercussions of recklessly using the resources have been well understood by the respondents who after having acquired knowledge through Environmental Education would now like to use the resources more rationally and conserve the same for posterity. The researcher notes the massive change in their social behaviour and feels the impact of Environmental Education is definitely a positive one.

**Q8 Do you make a conscious effort to**

a) **Switch off the lights and fans when not in use**

![Graph 10](image-url)
b) Use energy savers at home

Graph 11

<table>
<thead>
<tr>
<th>Use energy savers at home</th>
<th>Always</th>
<th>Sometimes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>38%</td>
<td>42%</td>
<td>20%</td>
</tr>
</tbody>
</table>

(c) Conserve potable water

Graph 12

<table>
<thead>
<tr>
<th>Conserve potable water</th>
<th>Always</th>
<th>Sometimes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>43%</td>
<td>37%</td>
<td>14%</td>
</tr>
</tbody>
</table>
d) Keep the surroundings clean:

![Graph 13]

Graph 13

e) Separate dry and wet garbage from your home

![Graph 14]

Graph 14
f) Conserve trees by using less paper:

![Graph 15]

**Graph 15**


g) Delete junk mails and minimise carbon footprints:

![Graph 16]

**Graph 16**

To clarify the assumption that teaching and learning of Environmental Education can bring about changes in the social behaviour of the respondents, the researcher not only analysed responses collected through questionnaires and focus group discussions but also gathered photographic evidence and
newspaper clippings of environmental conservation activities being carried out by the students, teachers and members of the alumni of the University of Mumbai. These activities focused on conserving the environment clearly signify that Environmental Education has created a clearer perspective and deeper understanding of the environmental happenings for the respondents. They now seem more aware and conscious of environmental happenings and their understanding and concern for the deteriorating conditions of the environment and its fallouts makes them come forward and take part in environment conservation activities. From these photographic evidence the researcher surmises that Environmental Education definitely imparts the much needed knowledge that helps to bring about a radical change in the thinking of the respondents, making their behaviour environment friendly.

The researcher, herself a lecturer of Environment Education at the Degree College of SIES (Nerul) College of Arts, Science and Commerce, Navi Mumbai, feels that the knowledge she has acquired in the course of teaching her students and studying Environmental Education for research paper presentations has sensitised her to the dynamics of the environment and brought about a lot of change in her way of thinking and lifestyle. Once the urgent need to protect and conserve the environment was understood by the researcher herself, she has been trying her best to make her students do the same.

To make her students understand the importance of waste management through the concept of Recycle, Reuse and Reduce, the researcher and her students collected old but useable household articles such as old clothes, shoes, 

**Picture 13 : Students of SIES (Nerul) College of Arts, Science & Commerce participate in ICICI sponsored RAINATHON 2010.**
electronic items, books, stationery, decoration items, trinkets, carry bags made from newspaper, crockery and utensils from their own and neighbouring households. After cleaning, mending and sprucing up the articles, they were put up for a two days ‘Jumble Sale’, wherein the students used their communication skills to imbibe upon the public the need to carry out proper waste management through drives to recycle, reduce and reuse old items rather than throwing them away to be piled on the dumping grounds. The money collected by selling the old reusable items was donated to the “Save the Tiger” campaign which was a step in the correct direction of trying to conserve the swiftly disappearing biodiversity of India. Both these gestures of recycling the used items and donating the money for another environmental concern are indicative of the fact that the students nowadays are becoming fully aware of the environmental problems prevailing around them and just need some guidance to feel responsible and motivated to try and contribute in trying to solve them.

![Picture 14: Newspaper clippings from DNA, Navi Mumbai edition](image)
The concept of Recycle, Reuse and Reduce with the help of the ‘Jumble Sale’ and the idea to donate the entire collection towards the conservation of Tigers in India received a fair share of local media coverage, wherein the media congratulated the students for their efforts towards waste reduction by waste management and their concern for the conservation of tigers. This idea of recycling household goods with a ‘Jumble Sale’ proves that a well planned and properly executed environmental activity can contribute largely towards mitigating two or more environmental problems at the same time.

The researcher interviewed and observed the activities of the members of the Stree Mukti Sangathana (NGO) and noted how wet waste being generated from the Food Courts of the largest Shopping Mall in Vashi was being converted...
into compost in a room barely 10 feet by 6 feet by the female members of the Sangathana. This commendable task of creating compost from food waste is now being followed by the other Malls in a bid to make the city garbage free.

Noticing the silent yet committed efforts made by teachers and students of Navi Mumbai to conserve the environment, quite a few NGOs, corporate houses and the media too have joined them with eco-friendly activities. For instance, The DNA, a daily newspaper, conducts newspaper collection drives along with school and college authorities in a bid to recycle newspaper and reduce waste paper. The DNA is also instrumental in providing bio-degradable Ganpatis made of ‘Saado’ mud to the authorities to be sold to the public at nominal costs through stalls set up at various schools and colleges. This is an effort by them to contribute along with the youth who try and educate the public about the benefits of using bio-degradable idols and reduce water pollution during festivals.

Objective no. 3 was further analysed with the help of a pre-test and post-test conducted on the First Year students of BMS (Bachelor of Management Studies). The BMS students have to study Environment Management for one semester in the first year. The pre-test was administered to the students of SIES (Nerul) College of Arts, Science and Commerce, Navi Mumbai at the beginning of the semester and thereafter the post-test was conducted at the end of the semester when teaching of the subject was complete. The objective of the test was to measure the increase in the level of environmental awareness of the students before and after studying Environmental Education and to note changes in their thinking and social behaviour vis a vis the environment.

The following graphs indicate scores of students in pre-test and post test.
Graph 17

Roll No. 1 to 10

Graph 18

Roll No. 11 to 20
Graph 19

Graph 20
The performance of the 41 students from First Year BMS who took the pre test and the post test has been graphically represented.

Each of the 5 questions in the pre-test and post-test were meant to record scores on the same parameters of the student, concerning the environment. In both the tests while Question no.1 and 1.1 recorded the awareness regarding the environment, Question no.2 and 2.1 tested the understanding of environmental concepts. Justification of cause and effect concerning environmental phenomena was graded with the help of Question no.3 and 3.1. Finally Question no. 4 and 5 helped to evaluate the theoretical/conceptual understanding of the students regarding environmental issues.

The scores of the students indicate a clear improvement in the post-test. The researcher rationalises that this was bound to happen as the subject of Environmental Education was taught for an entire semester between the pre-test and the post-test. Further, since this subject is a compulsory component of the syllabus, it is also obligatory for the students to pass the examinations. Hence there is an effort on the part of the students to perform.

The existing syllabus of Environmental Education for the First Year BMS students termed Environmental Management includes theoretical topics, projects and case studies. The students are given an in depth knowledge of the prevailing environmental problems, and the disasters caused due to ecological imbalances created by man and stress is laid on the need to conserve and preserve the environment. The outcome of the tests conducted on the first year students proved that proper knowledge of the subject does help the students develop a better understanding of the vital role of the environmental components, their usefulness and the need to conserve them.

The real understanding of the performance of the students, however, is seen through the other indicators with the help of a rubric prepared by the researcher. Going beyond the theoretical framework, the researcher had kept in
view the UNESCO objectives as the criteria for assessment of the students’ learning at the end of the course.

**Performance Evaluation Rubric**

*The rubric was prepared by the researcher keeping in view the UNESCO Objectives for Environmental Education.*

<table>
<thead>
<tr>
<th></th>
<th>Poor 0-2</th>
<th>Satisfactory 3-4</th>
<th>Commendable 5-7</th>
<th>Excellent 8-10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awareness</td>
<td>Cannot understand the basic concepts.</td>
<td>Understands the concept but cannot explain/justify to others.</td>
<td>Is able to comprehend and convince others.</td>
<td>Is able to understand the concepts and feels a great sense of commitment.</td>
</tr>
<tr>
<td>Knowledge</td>
<td>Studies by rote and only for the examinations.</td>
<td>Has a positive attitude; knowledge is limited due to linguistic barriers.</td>
<td>Is interactive in the classroom and desires to know more from the teacher.</td>
<td>Is interactive and takes initiative to gather more knowledge from different sources.</td>
</tr>
<tr>
<td>Attitudes</td>
<td>Thinks that nature must be used and exploited.</td>
<td>Accepts that there is much harm being done to the environment.</td>
<td>Is ready to undertake tasks to conserve environment.</td>
<td>Takes initiative and acts as a team leader.</td>
</tr>
<tr>
<td>----------------------</td>
<td>--------------------------------------</td>
<td>-----------------------------------</td>
<td>--------------------------------</td>
<td>------------------------------------------</td>
</tr>
<tr>
<td>Participation</td>
<td>Takes part as a ritual.</td>
<td>Just completes the task assigned.</td>
<td>Takes part regularly in college activities.</td>
<td>Takes part in a responsible manner, involves and encourages others to do so.</td>
</tr>
</tbody>
</table>

**Table 9**

The rubric proves to be an important tool to assess the performance of the students vis-a-vis the objectives of Awareness, Knowledge, Attitude, Skills and Participation after undergoing a course in Environmental Education. The scores obtained by the student between 0-2 till 8-10 reveal the increase in potentiality of the student with regard to the above mentioned parameters.

**Awareness** - During the course of transacting the course on Environmental Education, the researcher realised that a large number of students have touched the Excellent (8-10) scale and have shown an increase in awareness, understanding and commitment towards the environment. The primary reason for this is the vast amount of information acquired during the course through classroom interactions, case studies, group discussions and also by observing the eco friendly activities being carried out by their seniors. The other reason for this change could be due to the other sources of information such as the television and internet which are available to the students nowadays in general
and the media in Navi Mumbai, in particular.

**Knowledge-** A major section of the students show Commendable (5-7) growth in their knowledge as the syllabus is quite vast and extensive. These students have shown a desire to acquire more knowledge from the teacher but left on their own they lack the initiative to gather more information and increase their knowledge. There is a tendency to be “spoon fed” by the students which the researcher feels must be avoided.

**Attitudes-** The researcher is of a strong opinion that Environmental Education has definitely brought about an attitudinal change in all the students. Though most of the students have come in the range of Commendable (5-7) a selected few have shown Excellent (8-10) change and have become team leaders ready to take initiatives and guide others.

**Skills-** On the completion of their course in Environmental Education the researcher finds that most of the students have managed to acquire certain skills which are Commendable (5-7). They are able to perform tasks quite dexterously after having observed their peers, teachers and elders.

**Participation-** Finally the participation level of the students is seen to be Excellent (8-10) wherein practically the whole class takes part in some activity or the other and learns to do team work. Some students are even seen to become leaders and to try and involve those who may shy away from participation in various activities.

The rubric created by the researcher to understand the effects of Environmental Education on her students has served its purpose by revealing the increase in the levels of achievements of the students vis-a-vis the objectives set by UNESCO.
Objective 4: To understand and enumerate the challenges and hardships faced by students and teachers in putting their ideas and plans of conservation and sustainable development into action

The investigator had interviewed senior members of the Commerce and Geography Department of the University of Mumbai and had also held focus group discussions with teachers of Environmental Education in order to ascertain their difficulties and to find ways and means to overcome them. Responses of the students had been recorded with the help of Questionnaires and informal questions. These problems and their probable solutions are given in the following sub-sections.

1. Due to the large number of students enrolled in some of the courses of higher education of the University of Mumbai, most of the teachers found it difficult to communicate effectively with the students. The minimum number of students permitted in some courses is 60 per class and the maximum can go up to 140 students in the other courses. The teachers sometimes find it extremely intimidating and dissatisfying to teach in a huge classroom packed with large number of students where they may not be heard or seen by the back benchers. Teachers feel collar mikes, a raised platform to stand upon and audio visual aids would go a long way in resolving the problems of audibility and visibility in the classrooms.
2. The teachers admitted that it was a chaotic experience to conduct classroom activities as suggested in the textbooks, again due to the large number of students in the classes. They also felt that all tasks and activities considered unimportant from the examination point of view were ignored by the examination oriented learners.

3. Outdoor activities need meticulous planning and management of time, money and human resource to make the task fruitful and satisfying for all. Due to lack of proper support from the Government or the Institutional Management, outdoor activities such as Nature Tours, Field Trips and Research Projects are totally ignored by the teachers.

4. The students who study Environmental Education in the various courses of the University of Mumbai, come from diverse backgrounds of Arts, Science, Commerce and even Vocational courses. Sometimes, the lack of ability to understand the scientific concepts of Environmental Education, as seen in students from non-scientific backgrounds, slows down the teaching learning process.

5. Teachers felt that sufficient sessions were not available in order to do full justice to the vast syllabus given in the textbooks. All of them felt that the lecture days were grossly insufficient especially for all the First Year classes which commence late due to the different dates of the Higher Secondary Standard Twelve results and First Year admission process.

6. With the introduction of the Credit Based Examination System from the academic year 2011-2012, teachers teaching in colleges affiliated to the University of Mumbai felt that more time was being spent on
conducting internal tests and maintaining records rather than on outdoor activities and research projects which are an integral part of Environmental Education.

7. Teachers felt that the exercises on map work in the question paper namely Map Reading and marking places on the map did not do anything to tax the students’ knowledge or understanding caliber and sometimes encouraged them to copy from each other. They felt changes should be incorporated in this section of the question paper and should include topics such as Remote Sensing and the study of Satellite Imageries which would help the students gain useful knowledge about studying Satellite Imageries to be able to predict impending fallouts of climatic changes and ways to prevent them.

**Objective 5: To review the Environmental Education syllabus of the University of Mumbai and to give suggestions to make it more functional and activity oriented**

The researcher asked the teachers and students whether they were satisfied with the syllabus framed for Environmental Education by the University of Mumbai and whether they faced any teaching learning barriers in the classrooms. Questionnaires were used to gather information and some of the respondents were asked for their opinions during the focus group discussions. The following questions were asked to both the students and the teachers to get their opinion about the relevance of the syllabus and the effectiveness of the subject in today’s world.
Q3. Are you satisfied with the curriculum of Environmental Studies as framed by the University of Mumbai?

Table 10

<table>
<thead>
<tr>
<th>Y</th>
<th>N</th>
<th>Undecided</th>
</tr>
</thead>
<tbody>
<tr>
<td>95</td>
<td>37</td>
<td>65</td>
</tr>
</tbody>
</table>

Total Respondents : 197

Graph 21
Out of the 197 respondents consisting of students and teachers of Environmental Education 95 respondents or 48% of the population sample who answered Question no.3 of Questionnaire 2, said ‘Yes’ and seemed to be satisfied with the topics which were being taught and seemed contented with the knowledge which was being imparted to the students. Another 37 respondents comprising of 19% of the population felt there were certain drawbacks in the syllabus framed by the University of Mumbai such as irrelevant topics and unsatisfactory methods of teaching. They felt that a change in the syllabus with the addition of topics related to contemporary times and more outdoor activities may auger well for the students. Finally 65 respondents or 33% of the students and staff seemed undecided whether the syllabus needed a change or not.

The researcher analyses these responses and draws the conclusion that the initial topics which had been included in the syllabus in 1992 had been selected to suit the need of the hour and that environmental topics such as Natural Resource Depletion, Land, Water and Air Pollution, Population Growth and Food Scarcity had been correctly chosen for the syllabus. But the changing lifestyle of man has led to complex environmental issues and the researcher feels a few contemporary topics such as Climate Change, Disaster Management, Population Distribution Trends and Sex Education incorporated into the syllabus and taught with the help of modern technology would mean more awareness and preparedness for the students in handling environmental setbacks.
Q5 How can teachers make Environmental Education more effective and interesting for the students?

Question No.5

<table>
<thead>
<tr>
<th>Q 5</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>90</td>
<td>103</td>
<td>53</td>
<td>27</td>
<td>13</td>
<td>4</td>
</tr>
</tbody>
</table>

Note: Multiple answers in question 5.

Table 11

Question No. 5

![Bar chart showing the results of question 5]

Total Respondents 197

Graph 22

The researcher noted that though the student respondents had expressed their satisfaction with the syllabus formulated and taught by the University of Mumbai, they also felt that the topics could be made more interesting and effective with the help of innovative and practical methods of teaching.
Analysis of responses to Question no.5 from Questionnaire no.2 reveals the following details.

103 respondents or 52% of the population sample showed an arousal of interest in the subject and wanted to cultivate a better understanding of environment and its problems. They opted to be taken on nature tours so that they could substantiate whatever they had studied in the classrooms with real on site examples. By going outdoors they would be able to understand and observe nature at its pristine best and also note the ill effects of man’s activities on nature and the environment.

90 students or 46% of the population sample expressed a quest for more knowledge by wanting to view environment related documentaries and hold discussions among themselves to share information and ideas. The researcher feels this response is an outcome of the tremendous impact the subject has managed to create on the young minds of the students who now are able to reason and delve deeper into the cause and effect of the mindless activities of man leading to rampant environmental degradation visible everywhere.

53 (27%) students responded to option (c) and suggested that doing project work in a group would help them know more about the environment by discussions on different viewpoints and by sharing information with each other. This group activity would give rise to team work and well planned team work would mean co-ordination and co-operation among the members. The researcher feels that learning to do team work will help to solve the regional as well as the global problems of the world in a more civilized and cordial manner.

27 (14%) respondents wanted Case Studies to be an integral part of the syllabus so that teaching and learning can be made more interesting, effective and thought provoking with the help of real life examples. The important case
studies discussed in the textbooks will pre warn and prepare the students to tackle micro as well as macro environmental problems.

A response of 14% of the respondents to option (e) makes the researcher feel that teachers should guide and encourage students to read newspapers, books, journals and gather information from the internet in order to do write ups on various environmental issues. This method of teaching would help the students gather and share information with each other.

Q.6. Do you think teachers need to acquire any special training to teach the subject?

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>155</td>
<td>42</td>
</tr>
</tbody>
</table>

Table 12

Total Respondents 197

Graph 23
The investigator herself concedes to having encountered difficulties while teaching certain topics and interacting effectively in the class. She agrees with 79% (155) of the respondents who feel that the teachers should constantly update themselves and undergo periodic training to be able to share information and impart knowledge to the learners in a convincing manner. The response to Question no 6 from Questionnaire no 2, signifies that if a teacher is herself / himself unsure of the scientific facts and not convinced about the cause and effects of environmental issues, then the very purpose of Environmental Education would be lost of its impact on the students. A bare 21% of the students felt that there was no need for any training for the teachers.

Q6.1 Which of the following would you suggest to help an Environmental Education teacher in the class?

a) Be well read and informed and give examples in the class.

b) Should attend workshops and conferences every year.

c) Should be part of an ongoing environmental project.

d) Should write on environmental issues and encourage students to publish papers

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>81</td>
<td>50</td>
<td>52</td>
<td>35</td>
</tr>
</tbody>
</table>

Total Respondents 197

Table 13
Responses to Question no. 6.1 emphasises the fact that the learners are not totally satisfied with the teaching standards of the teachers and have given suggestions to improve the quality of teaching by the faculty members. 81 respondents want their teachers to be well read in order to make the lectures more informative, interesting and interactive by citing real life examples in the class. This graphic method of teaching would create an impact on the students who would then find it easier to correlate the matter taught in the classrooms with real life environmental incidents happening around them.

52 of the respondents suggested that the teachers should take part in environmental projects which would help them keep abreast with the times. As project work helps to innovate, experiment and discover new dimensions to share with the world, a teacher doing project work would constantly be doing research which would add to the knowledge bank of the teacher and simultaneously of the students.

Attending workshops and conferences was suggested by 50 respondents who seem to realise that such events act as a platform where ideas are shared and information gathered to be used later. The respondents feel that attending workshops and conferences will help people associated with Environmental Education be better informed and be more effective in classroom teaching.
Teachers should not only express their thoughts and write on environmental issues but also encourage their students to do. This was the response expressed by 35 respondents, who felt that to write some article would necessitate reference work and reading which needs to be inculcated in the students. A teacher with good communication skills would create a greater impact on the students and be able to spread the word of environmental conservation better than the others.

4.3 Conclusion

This fourth chapter has dealt with the analysis and interpretation of the data. The investigator has analysed and interpreted the responses of 200 students, 60 teachers of Environmental Education along with volunteers and some alumni members of the University of Mumbai, whose responses were collected with the help of Questionnaires and Interviews. Being a participant observer of the study the researcher is impressed by the salient changes brought about in Navi Mumbai by a genre of young people well supported by the seniors who have imbibed good things from Environmental Education and now want to share it with the others. They seem to have realised the worth of the environment and what it can do for them and are determined to save mother earth for posterity. The researcher also notes the undeletable impact of Environmental Education on the psyche of the alumni members whom she interviewed and observed at their activities and finds that they have turned into crusaders and have changed the very landscape of the area to which they belong. Photographic evidences have been gathered of the conservational activities being carried out by the teachers and alumni members in their bid to try and alleviate environmental problems in their respective areas and also to set examples for others to follow.
Finally in the light of the good impact Environmental Education is creating, the researcher has analysed the usefulness of the current syllabus being taught in the various courses of higher education of the University of Mumbai and has suggested probable solutions to the difficulties faced by teachers while teaching Environmental Education.

Having enjoyed (your) sweet fruits; having enjoyed sleep under shade (of your) branches, O trees! we, the travellers would like to tread on your noble path again and enjoy.