AN EXPLORATORY STUDY ON SUSTAINABLE LIFESTYLE PRACTICES IN UPPER PRIMARY SCHOOLS OF KERALA

Thesis submitted for the Degree of

DOCTOR OF PHILOSOPHY

IN EDUCATION

by

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Under the guidance of

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DECLARATION

I, Deepthi R., do hereby declare that the thesis **AN EXPLORATORY STUDY ON SUSTAINABLE LIFESTYLE PRACTICES IN UPPER PRIMARY SCHOOLS OF KERALA** has not been submitted by me for the award of Degree, Diploma or Recognition before.

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CERTIFICATE

This is to certify that the thesis entitled **AN EXPLORATORY STUDY ON SUSTAINABLE LIFESTYLE PRACTICES IN UPPER PRIMARY SCHOOLS OF KERALA** is an authentic record of research work carried out by Mrs. Deepthi. R., for the degree of Doctor of Philosophy in Education, University of Calicut under my guidance and supervision and no part of it has been presented before for any other University Degree, Diploma or Associate-ship in any other University.

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ABBREVIATIONS

CFC	-	Chloro Fluro Carbon
CFL	-	Compact Fluorescent Lamp
EE	-	Environmental Education
ESD	-	Education for Sustainable Development
ESL	-	Education for Sustainable Living
FAO	-	Food and Agricultural Organization
GOI	-	Government of India
GSSL	-	Global Survey for Sustainable Lifestyle
IGPN	-	International Green Purchasing Network
IUCN	-	International Union for Conservation of Nature
LCD	-	Liquid Cristal Display
LED	-	Light Emitting Diode
MANOVA	-	Multivariate Analysis of Variance
NEP	-	New Ecological Paradigm
NGO	-	Non Government Organization
PCA	-	Principal Component Analysis
PEB	-	Pro Environmental Behavior
PPEB	-	Personal Pro-Environmental Behavior
PVC	-	Poly Vinyl Chloride
RDD	-	Random Digital Dialing
RDW	-	Rural Domestic Waste
SAIC	-	Science Application International Corporation
SC	-	Sustainability Consciousness

SPSS	-	Statistical Package for Social Sciences
TPB	-	Theory of Planned Behavior
UK	-	United Kingdom
UN	-	United Nations
UNCED	-	United Nations Conference on Environment and Development
UNDESD	-	United Nations Decade of Education for Sustainable Development
UNEP	-	United Nations Environmental Programme
UNESCO	-	United Nations Educational Scientific and Cultural Organization
USA	-	United States of America
USEPA	-	United States Environmental Protection Agency
WCED	-	World Commission on Environment and Development
WSICS	-	Weather Sensitive Irrigation Controller Switches
WTP	-	Willingness To Pay
WWF	-	World Wide Fund

CHAPTER I
INTRODUCTION

- Need and significance of the study
- Statement of the problem
- Definition of key terms
- Objectives
- Hypothesis
- Methodology in brief
- Scope of the study
- Limitations of the study
- Organization of the report

Education has always been considered as an excellent vehicle which contributes the holistic development of an individual. Not only it enables humanity to achieve a quality living but also it equips them to find out effective strategies to resolve perpetuating issues of contemporary world. Education is sharing and shaping of experiences for a better life by which knowledge, values, skills and attitude are acquired and integrated. It brings about remarkable changes in human behavior and thereby enables the individuals to meet the new challenges of future.

Sustainability is increasingly important as a concept within education, particularly in the light of United Nations Decade of Education for Sustainable Development (UNDESD). Sustainability ensures a better world in which environmental, social and economic preferences are balanced while thriving for development and quality living. It is sure that Sustainable Development cannot be achieved only through technological innovations, financial aids and political regulations. It needs a strong visible change in the pattern of thinking and actions from the part of individuals. Sustainable Development is an inter-generational responsibility and emphasizes on improving the quality of human life while protecting earth's capacity for re-generation.

Rapid population explosion and the quest for economic development impart serious threats to global environment and ecosystems. Whatever nature gifted us is not sufficient to satisfy our growing needs. Man exploits mother earth till her last breath without any concern of the wellbeing of the planet and the future generations. Man is turning the earth as a garbage pile by unscientific dumping of wastes directly to the environment. He introduces hazardous chemicals to the land in the form of pesticides, insecticides and fertilizers which permanently alter the quality of soil. He discharges harmful gases to the air from automobiles and industries. Man uses the natural resources unwisely which leads to irrecoverable depletion of resources. The natural green blanket of the earth had been significantly lost in the past decades due to industrialization and urbanization. Like these, instances of man's impacts on nature are uncountable.

The consequences of massive destruction of environment is evident in the form of environmental pollution, biodiversity loss, energy crisis, scarcity of natural resources, lifestyle diseases and decline of quality living. The disrupted nature threatens man day by day in the form of earthquakes, Tsunamis, floods, droughts and other natural calamities. Climate change is one among the most threatening challenges in the present era. It is not only adverse to the nature but also to the economical, cultural and social sectors (UNESCO, 2010).

Since the complexity of ecological issues is much severe, the ecological concern of the world is at its highest peak than ever before. The concept of Sustainable Development is increasingly becoming popular across the world. The major goal of Sustainable Development is to ensure socio-economic progress and equity without interfering nature and its cycles. As sustainable development is a pressing need of today, we need to take bold steps and well defined strategies to accomplish it.

Although the organizational and political influences of environmental issues were focused more in the past, now the attention has been slowly shifted to individual roles in matters of consumption and ecological actions (Jackson, 2005). As global citizens, each individual should be highly committed to the planet in maintaining the harmony between man and nature. For this we should restructure our daily lifestyle by adopting sustainable course of actions. Our way of living can be restructured in an eco-friendly manner by the right choices and actions regarding diet, water, waste, transportation, purchase, home designs and tourism. Such a lifestyle- the so called 'Sustainable Lifestyle' not only protects the natural resources, but also preserves them for the coming generations.

Sustainable Lifestyle is a way of living that attempts to reduce an individual's or society's impact on nature and its resources to minimum. It is a lifestyle based on environmental responsibility which maintains humanity's

symbiotic relationship with nature and its cycles. It is fundamentally the application of sustainability principles into lifestyle choices and decisions. The practitioners of Sustainable Lifestyle attempt to reduce their 'Carbon foot print' by altering methods of transportation, housing, energy, consumption and diet.

Orr (1991), who is one of the pioneers of 'Sustainable Lifestyle', opined that people are becoming more ignorant to live well and sustainably on the earth. For the wellbeing of the present as well as future generations, it is necessary that an affirmative attitude towards sustainability should be an integral part of our day-to-day life. A fundamental change in lifestyle is essential to bring about a progressive change in environmental impact (Shove, 2003). The emerging trend of sustainable living helps man to assess his daily practices in terms of eco-friendliness. This enables man to opt for a number of eco-friendly alternatives in routine practices. Climate change can be brought under control if individuals make a shift to eco-friendly living (Agostino, 2010). Sustainable Lifestyle will be much beneficial in reducing the carbon emissions and thereby providing quality life to man and other living forms on the earth.

It is not an easy task to impart an eco-friendly behavior shift among the public. It may take several months or years to develop good habits in favor of environment. Moreover individuals have to sacrifice many of their life

comforts in order to live environment-friendly. For this, thorough understanding regarding the genuine need of lifestyle change is necessary. No other tool is as effective as education to bring about the requisite lifestyle change among people which will safeguard nature. Education for Sustainable Living (ESL) is an emerging area of Education which aims to incorporate the sustainability principles into lifestyles, thereby making a conscious attempt in the shift towards global sustainability. Schools as social institutions can act as the key agents in this venture.

Need and Significance of the Study

It is a promising fact that there has been a key shift in people's attitude towards environmental protection and preservation of resources in the past decades. Still studies revealed that there exists obvious attitude-behavior gap in eco- friendly consumption of majority of the consumers (Follows &Jobber 2000; Young et al, 2010). The destiny of our planet is in the arms of our youth. They can act as vibrant agents of lifestyle change and explore innovative strategies to combat with climatic change issues.

The Global Survey for Sustainable Lifestyle (GSSL) conducted by UNEP among the youth of age range 18-35, selected from twenty countries recognized the need to better understand, educate and empower young adults worldwide so that they can create their own positive visions for Sustainable Lifestyles. The major findings of the survey revealed that although the youth

are confident and ready to participate and improve the world they live in, they need guidance and opportunities to take effective actions (UNEP, 2011). Hence it is the need of the hour that young generation needs to be endowed with adequate knowledge and skills to bring about a purposeful shift towards Sustainable Lifestyle.

UN Decade of Education for Sustainable Development (UNDESD) aimed to prepare young people for sustainable living for the lifetime. But there are no sufficient evidences to confirm whether the aims of DESD have been completely achieved by our schools. Although the crucial role of Environmental Education has been imbibed much long ago by Indian schools, an evident behavioral shift among learners favoring nature has not been achieved yet.

Scott (2013) opined that school's commitment to sustainability is reflected in its ethos and practices. It is an urgent need that each school should implement programs that support reduction of greenhouse gases and encourage the wise use of resources. School's commitment to sustainability should be reflected in the overall experiences it provides to students through curricular and co-curricular activities. There should be collective effort from the part of students, teachers, school organization, curriculum framers, social activists, environmentalists and educational experts to achieve this goal.

The investigator strongly believes that Primary schools can contribute to sustainability needs of the future in the maximum level, as it is easier to bring about the required behavioral changes among the young learners. The skills for eco-friendly living inculcated among the students in younger ages will be surely retained throughout the lifecycle transforming them as ecologically responsible global citizens. Although Primary stage of education is the best platform for conveying the message of Sustainable Lifestyle Practices, researches on sustainability from this field are practically nil in India. Hence the investigator thinks that selection of Upper Primary Schools as sample is apt to serve this purpose.

Realizing the immediate need of achieving Sustainable Development in the present era, numerous attempts are being done to integrate the issues of sustainability into various subjects of school curriculum. A lot of messages are continuously imparted to schools regarding the need to empower learners to adopt Sustainable Lifestyles. But we are unsure about the success of 'Sustainable Lifestyle practices' implemented by our schools. This made the investigator choose specifically the theme for the study.

Only through collective institutional experiences the aims of 'Sustainable Lifestyle Practices' could be completely achieved. Hence the researcher thinks that it is necessary to analyze the text books of Upper Primary Schools to have a better understanding of the content incorporated in

the text books which represent 'Sustainable Lifestyle Practices'. One more intention of the researcher is to gather experts' viewpoints regarding the present trend of 'Sustainable Lifestyle Practices' of Upper Primary Schools. This will be done by conducting interviews with curriculum framers, environmental experts and Eco-club in charges of highly successful green schools. Experts' suggestions were also gathered for improving the practices of schools, through the interviews.

The researcher thinks that it is essential to explore the 'Sustainable Lifestyle Practices' of schools in order to find out the emerging trends in such practices. The investigator intends to do this by studying the 'Sustainable Lifestyle Practices' of schools in the areas of Sustainable agriculture, Water conservation, Energy conservation, Waste management and Green purchasing. The practices which are given more focus and the least followed practices could be identified by studying the status of implementation of 'Sustainable Lifestyle Practices' by the schools. This would provide a clear direction about the specific practices which should be given more focus by the schools so that the green movement of schools would be more successful and vital in the nearby future. During the review of related studies the researcher found that teachers face practical difficulties to implement Sustainable Development programs in school settings. Hence the investigator also attempted to study the constraints faced by Upper Primary School Teachers in implementing 'Sustainable Lifestyle Practices' in their own schools.

Thus the study reflects the commitment of each school towards Sustainable Development through the novel policies and programs implemented by them in the field of environmental sustainability. The researcher hopes that a detailed investigation regarding the prevailing 'Sustainable Lifestyle Practices' of schools will give a better picture of the emerging trends in the green activism undertaken by the schools. The study will be helpful to identify the innovations and discrepancies in 'Sustainable Lifestyle Practices' of schools. The researcher strongly believes that the study would be a stepping stone to frame more effective strategies and programs in order to make schools more sustainable. The suggestions the investigator intends to make would be definitely beneficial for Upper Primary schools to extend their 'Sustainable Lifestyle Practices' to the entire community. The investigator hopes that the study will remind the society regarding the necessity of adopting 'Sustainable Lifestyle' for the wellbeing of the planet and the entire living forms.

Statement of the Problem

The present study is entitled as "AN EXPLORATORY STUDY ON SUSTAINABLE LIFESTYLE PRACTICES IN UPPER PRIMARY SCHOOLS OF KERALA."

Definition of Key Terms

Exploratory research

Exploratory research refers to research whose goal is to explore- to break new research ground, to attack some little studied problem in some new and mostly non-predetermined ways (Miller, 2013).

Exploratory study

Operational definition

A mixed method of study conducted to discover new ideas, to gain new insights and to increase the knowledge regarding a problem which is little studied.

Sustainable Lifestyle

Sustainable Lifestyles are patterns of action and consumption, used by people to affiliate and differentiate themselves from others, which meet the basic needs, provide a better quality of life, minimize the use of natural resources and emissions of waste and pollutants over the lifecycles, and do not jeopardize the needs of future generations (Mont, 2007).

Sustainable Lifestyle Practices

Operational Definition

Practices that can lead to environment friendly and ecologically responsible lifestyle through the right actions and consumption which will help to protect the environment and sustain its natural resources for the current and the future generations.

Upper Primary Schools

In the present study, Upper Primary Schools are recognized schools of Kerala following state syllabus which provide Primary Education from the standards V^{th} to VII^{th}.

Variables

There is only one variable in the present study that is 'Sustainable Lifestyle Practices'.

Objectives

1. To analyze the Science text books of Upper Primary Schools following state syllabus to explore the content representing ‘Sustainable Lifestyle Practices’.
2. To derive experts’ viewpoints on the present trend and suggestions for improvement of ‘Sustainable Lifestyle Practices’ of Upper Primary Schools.

3. To study the level of students' perception on 'Sustainable Lifestyle Practices' of Upper Primary schools.
4. To find out whether there is any significant difference in students' perception on 'Sustainable Lifestyle Practices' of schools between

    a) Government and Aided school students

    b) Urban and Rural students

    c) Boys and Girls

5. To find out the status of implementation of 'Sustainable Lifestyle Practices' by Upper Primary Schools as perceived by Eco-club in charges.
6. To study the constraints faced by Eco-club in-charges in implementing 'Sustainable Lifestyle Practices' in schools.

Hypothesis

1. There exists significant difference in students' perception on 'Sustainable Lifestyle Practices' of schools between

    a) Government and Aided School students

    b) Urban and rural students

    c) Boys and Girls

Methodology in Brief

The study was conducted by using a combination of qualitative as well as quantitative methods. There are three phases involved in the study. These are content analysis, interview and survey.

- During the first phase, the researcher intended to explore the contents connected with 'Sustainable Lifestyle Practices' incorporated in the Science text books of Upper Primary Schools. For this a unit wise analysis of the content of Science text books of 5^{th}, 6^{th} and 7^{th} standards following state syllabus was carried out. The investigator also intended to identify the gaps in content associated with the area and to provide suggestions for better transaction of 'Sustainable Lifestyle Practices' through the text books.

- During the second phase, the researcher conducted interviews with curriculum framers of Upper Primary level,environmental experts and Eco-club in-charges of highly successful green schools of the state to get their viewpoints regarding the present trend of 'Sustainable Lifestyle Practices' of schools. Experts' suggestions were also gathered to improve the 'Sustainable Lifestyle Practices' of schools.

- The aim of the third phase of the study was to explore 'Sustainable Lifestyle Practices' implemented by Upper Primary Schools. For this survey was conducted among students and teachers who are active

members of school Eco-clubs. Students' perception regarding the 'Sustainable Lifestyle Practices' of schools was gathered through the survey. The status of implementation of 'Sustainable Lifestyle Practices' by the schools was elicited from the Eco-club in-charges by conducting survey. The constraints faced by Eco-club in-charges in implementing 'Sustainable Lifestyle Practices' in schools were also studied through the survey.

Sample

The study was based on a sample of 72 Upper Primary Schools selected through stratified random sampling representing six districts of Kerala. The districts selected were Malappuram, Kozhikode, Trissur, Palakkad, Alappuzha and Kottayam. The data was collected from seventh standard students who were active members of school Eco-clubs and teachers-in-charge of Eco-clubs of each school. A total of 841 students and 72 teachers were selected based on purposive sampling. The investigator also collected data from 3 curriculum framers of Upper Primary level, 3 environmental experts, and 3 Eco-club in-charges of highly successful green schools of the state.

Tools and techniques used for the study

1. Semi-structured interview schedule for curriculum framers of Upper Primary level

2. Semi-structured interview schedule for environmental experts
3. Semi-structured interview schedule for Eco-club in-charges of highly successful green schools
4. Scale of Students' Perception on Sustainable Lifestyle Practices of Schools (administered on 7th standard students who are active Eco-club members of schools) (Deepthi & Meera, 2016).
5. Scale of Status of Implementation of Sustainable Lifestyle Practices by Schools (administered on Teachers in-charge of Eco-clubs of schools) (Deepthi & Meera, 2016).
6. Questionnaire on the Constraints in Implementing Sustainable Lifestyle Practices in Schools (administered on Teachers in-charge of Eco-clubs of schools).

Statistical techniques used:

t-test and Percentage analysis.

Scope of the Study

Through the present study the investigator hopes to get a better picture of the emerging trend of 'Sustainable Lifestyle Practices' in Upper Primary Schools of Kerala. The content analysis of text books of Upper Primary level would help to identify the content areas connected with 'Sustainable Lifestyle Practices' represented by the text book. This would pave the way to identify the gaps in the content and to suggest certain relevant topics which can be

integrated into the text books to transact 'Sustainable Lifestyle Practices' in a more effective manner. One more objective of the research is to gather experts' viewpoints on the present trend of 'Sustainable Lifestyle Practices' of schools. The study also intended to derive the status of implementation of such practices in schools. This would be helpful to identify the specific practices which are popularly practiced and those which are least carried out by the schools. This would be beneficial to find out the specific areas upon which schools should give more focus in order to achieve a balance in 'Sustainable Lifestyle Practices'. The study will throw light upon certain constraints in implementing 'Sustainable Lifestyle Practices' in schools. This would definitely help to evolve certain effective strategies to overcome such barriers. The researcher hopes that indeed the outcomes of the research will provide a clear direction to schools to proceed in the green track more successfully.

Limitations of the Study

- Even though the researcher intended to explore the 'Sustainable Lifestyle Practices' in Upper Primary Schools of Kerala, the study was restricted to only six districts.
- Since 'Sustainable Lifestyle Practices' is a wide area, the investigator mainly focused on the practices of schools in the fields of Sustainable

agriculture, Water conservation, Energy conservation, Waste management and Green purchasing while conducting the survey.

- The researcher analyzed only the Science text books of Upper Primary level. The Social Science text book was not analyzed since there is no much representation of 'Sustainable Lifestyle Practices' in the text book compared to the Science text book.
- The investigator didn't conduct observation as a data collection technique since it is not practically possible in the case of some of the practices considered.

Organization of the Report

The report is organized in six chapters.

Chapter 1:The first chapter covered introduction, need and significance of the study, statement of the problem, definition of key terms, objectives, hypothesis, methodology in brief, scope and limitations of the study.

Chapter 2: Conceptual framework is presented in the second chapter.

Chapter 3: The third chapter is a reflection of the review of related literature.

Chapter 4: A detailed description of the methodology adopted for the study is provided in the fourth chapter.

Chapter 5: Analysis and interpretation of the findings is presented in the fifth chapter.

Chapter 6: The sixth chapter included summary of the findings, suggestions, educational implications and scope for further research.

CHAPTER II
CONCEPTUAL FRAMEWORK

- Sustainable Development
- Education for Sustainable Development(ESD)
- Sustainable Lifestyle
- Sustainable Lifestyle Practices
  - Sustainable Agriculture
  - Water Conservation
  - Energy Conservation
  - Waste Management
  - Green Purchasing

CONCEPTUAL FRAMEWORK

Sustainable Development

The concept of Sustainable Development received serious attention by the *Brundtland Commission report* (1987) of World Commission on Environment and Development (WCED). The *Brundtland Commission* in its report '*Our Common Future'* defined Sustainable Development as "the development that meets the needs of the present, without compromising the ability of future generations to meet their own needs." Although the concept evolved as a result of global environmental crisis, presently it interlinks ecological, economical and social spheres. Sustainable Development is considered as an effective solution for ecological degradation caused by industrialization (Duran, Gorgan & Duran, 2015). Due to the widespread awareness regarding the topic, it is evident in the programs of academic as well as public institutions. Daly and Cobb (1989) defined sustainable development as "improving the quality of human life while living within the carrying capacity of supporting ecosystems". According to the report *Caring for the Earth* of IUCN/UNEP/WWF (1991), for a society to develop sustainably it must ensure the quality of living of mankind while taking care of earth's vitality and diversity.

Dimensions of Sustainable Development

There are three major dimensions of Sustainable Development (Holmberg, 1992). These are Economic, Environmental and Social dimensions (Fig.1). The three pillars, i.e., economic progress, environmental quality and social equity form the foundation of sustainability (Liu, 2009).

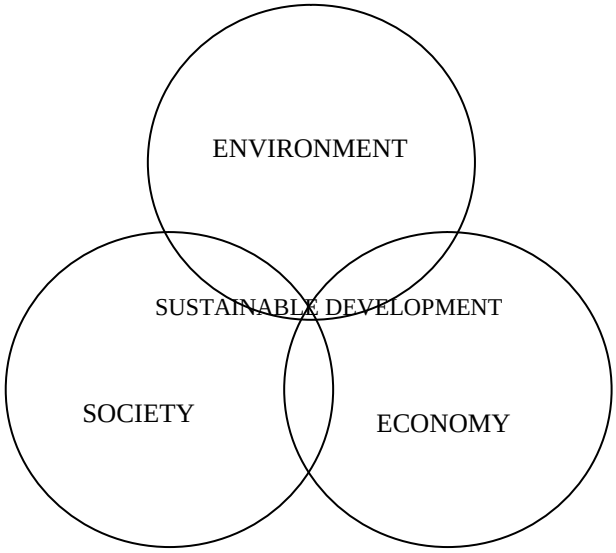

Figure 1. Dimensions of Sustainable Development

Economic dimension: An economically sustainable system will produce products and services in a continuous manner in order to reduce the imbalance that may adversely affect the industrial and agricultural production. Such a development aims at the establishment of a stable economic framework while taking care of earth's resources.

Environmental dimension: An environmentally sustainable system would be able to maintain a balanced state of natural resources and avoids over

exploitation of such resources. It includes maintenance of biological balance and stability of the environment. Such a system takes care of the carrying capacity of earth while developing natural ecosystems.

Social dimension: A socially sustainable system maintains equity in education, health, gender, social accountability and social involvement. Sustainable social development focuses on social well-being of people and ensures social association, justice and equality.

According to chapter two of *'Our common future'* (Brundtland commission, 1987), the most important objective of development is fulfillment of human requirements and aspirations. Unless social and economic equity is achieved, the ecological sustainability cannot be ensured. This shows how closely the three dimensions of sustainability are interdependent on one another. Meadows et al (1972) stressed on the following guidelines to reconstruct the society in a sustainable manner:

- To limit the consumption of non-renewable resources.
- To prevent the depletion of renewable resources.
- To control the rapid growth of population.
- To evaluate the status of natural resources periodically and
- To utilize earth's resources with greater efficiency.

Principles of Sustainable Development

Several researchers in the field of sustainability identified the major principles behind Sustainable Development (Straskraba, 1994; Gibson, 2002). The major principles that lay the foundation of Sustainable Development are ecological stability, social equity, equal access to opportunities, accountability, democracy, communication, co-operation, and integration.

Ecological stability:

Stability of environment is one of the vital elements that can lead to sustainability. The interactions of man with nature should be in such a way that the systems and cycles of nature are well protected and conserved for the future generations.

Social equity:

The term social equity refers to equal access to opportunities, resources and healthy environment for all of the individuals. Gibson (2002) opined that planning for sustainability need to fill the lacunae in the fields of public health, access to healthy surroundings, financial stability and social equity.

The Rio Declaration on Environment and Development of 1992 conveyed the principles of sustainability such as:

- People are entitled to a healthy and productive life in harmony with nature.

- The development of today should be fulfilled while taking care of the developmental and environmental needs of the present and future generations.
- Poverty eradication and reducing disparities in living standards are necessary to attain Sustainable Development.
- Environmental protection is an essential part of development and can't be separated from development.
- To ensure the complete participation of women is inevitable for Sustainable Development.
- Peace, development and environmental protection are interdependent and indivisible.
- Nations should reduce unsustainable production and consumption to ensure a higher quality living of citizens.
- The interests and needs of all nations should be taken care in international actions addressing environment and development (UNCED, 1992).

The fundamental principles to be followed for building a sustainable society put forwarded by IUCN/UNEP/WWF (1991) are:

- Admiring and caring for the well-being of communities.
- Improving the quality of human life.
- Conserving the planet’s diversity.

- Taking care of carrying capacity of earth.
- Developing a global alliance.
- Enabling communities to care for their own environments.
- Changing personal attitudes and practices.
- Providing a national framework for integrating development and conservation.
- Minimizing the depletion of non-renewable resources.

Admiring and caring for the well-being of communities: This principle indicates that it is the responsibility of human beings to take care of other communities and living groups. This conveys the message that development should be achieved not by destructing other living forms. Since all the living beings are part of an inter-dependent system the disturbance of one group may adversely affect the survival of many other living groups.

Improving the quality of human life: The ultimate aim of any development is to enhance the quality of life. Real development makes man to become fully aware of his actual potentials and improves his self confidence to lead a dignified life. Quality living does not merely mean the economic progress, but it also involves healthy life, better educational opportunities, equal access to resources, human rights and freedom.

Conserving the planet's diversity: Conservation indicates actions which facilitate the protection of diverse living and non-living elements of the

planet. Apart from conserving diverse species of organisms, conservation also involves attempts to make the earth suitable for healthy living. Conservation ensures the switching to renewable resources to live sustainably on the earth.

Taking care of carrying capacity of earth: Carrying capacity of the environment is defined as "its maximum persistently supportable load" (Catton, 1986).Carrying capacity means the limit to which biosphere can withstand the ecological impact without serious deterioration. As per the report, *Caring for the Earth* of IUCN/UNEP/WWF (1991) for sustainable development to be ensured adequate policies and technologies should be developed in order to balance the population size and living style with the earth's capacity.

Developing a global alliance: IUCN/UNEP/WWF (1991) reported that in order to achieve global sustainable development, there should be sound international alliances. This would enable the developing countries of the world to protect their natural resources and to develop sustainably. Global alliances also would help nations to have sustainable use of shared natural resources such as shared ecosystems and oceans.

Enabling communities to care for their own environments: Communities need to be empowered to involve in actions that would protect their local environments. Such actions involve efforts to control pollution; to manage

soil, water and biodiversity. This can be possible by providing adequate education, training and financial support to communities.

Changing personal attitudes and practices: People will follow an environment-friendly lifestyle only when they are convinced with the necessity of doing so and when they are equipped with the essential knowledge and skills. For this sustainable development should be mainstreamed in our formal education system. There should be actions from the part of government and NGOs to offer public awareness programs and campaigns to gain changed attitudes and practices among public.

Providing a national framework for integrating development and conservation: For setting up of a sustainable society it is essential to integrate development and conservation. For this establishment of a national framework is necessary incorporating financial policies, national laws and regulations. The report of IUCN/UNEP/WWF (1991) recommended that environmental auditing should be conducted at national level for the regular reporting of the environmental quality and living standards to the respective governments.

Minimizing the depletion of non-renewable resources: Attempts to reduce the depletion of non-renewable resources shall be promoted. Such actions include shifting to renewable resources, recycling and minimal use of resources while product manufacturing.

Education for Sustainable Development (ESD)

Education for Sustainable Development (ESD) is an emerging area of Education which aims at engaging public in sustainability issues and enabling them to contribute to Sustainable Development through capacity building by the processes of teaching and learning. ESD can be brought about not only in formal educational settings but also in diverse social settings (UNESCO, 2004). One of the major goals of ESD is to promote Sustainable Development by re-orienting the existing educational pattern (UNESCO, 2002).

ESD calls for a holistic approach which should be incorporated not only in curriculum and academic programs but also in educational institutions and organizations (UNESCO, 2011). "Education for Sustainable Development must explore the economic, political and social implications of sustainability by encouraging learners to reflect critically on their own areas of the world, to identify non-viable elements in their own lives and to explore the tensions among conflicting aims" (UNESCO, 2002).

The major objective of ESD is to enable learners to assess global issues of sustainability and to evolve strategies to limit those issues (Almov & Moberg, 2008). ESD mainly focuses on implementing programs which have local relevance, with due consideration of ecological, social and economic aspects of the specific locality. Hence the means and modes of practicing

ESD may vary from place to place. ESD was first mentioned in 36th chapter of Agenda 21. The four major thrusts of ESD identified by Agenda 21 were a) to improve basic education b) to re-orient prevailing education to address sustainability c) to develop public awareness and d) to provide training (UNESCO, 2006).

According to UNESCO (2006) in order to address the growing demand for sustainability, ESD should incorporate 5 major elements such as knowledge, issues, perspectives, values and skills.

- **Knowledge**: Teaching ESD should empower the learners with thorough knowledge on natural, economic and the social situations. Knowledge in traditional disciplines complements ESD.
- **Issues:** One of the major aims of ESD is to make learners aware of existing ecological, social and economic issues and to find out effective solutions.
- **Perspectives:** ESD should consider an issue from the viewpoints of different stakeholders in the society. 'Perspectives' are important in ESD since they create a co-operative atmosphere which is very much essential for a creative, sustainable society. Some of the basic perspectives involved in ESD are:

➢ Ecological and social issues are dynamic from time to time.

➢ Current ecological issues of the world are interconnected.

- It is essential to look through different perspectives before reaching in a final statement or decision.
- There are many problems in the world which Science and technology can't solve.
- Each individual should assign himself as global citizen apart from taking the role of a member of the locality.
- Individual consumer choices and actions have a long lasting impact on manufacturing and resource extraction.

Values: Identification of values and analysis of those in the curriculum is an essential part of ESD. In a democratic society it is vital that shared values should be developed in students on the aspects of social justice, decision making and social involvement. While integrating specific values with ESD, the values concerned with local community, ethnic people and different religions should be duly considered and preserved (UNESCO, 2006).

Skills: ESD also aims at developing certain basic skills among the learners such as:

- Critical thinking on social, economic and environmental issues.
- Effective communication skill to convey such issues meaningfully.
- Ability to move from knowledge or awareness level to the level of actions.
- Ability to co-operate and work with others.

- Ability for timely thinking.
- Ability to develop aesthetic sense regarding nature (McClaren, 1989).

Sustainable Lifestyle

Agenda 21 of 1992 called for new concepts of wealth and prosperity which allow higher standards of living through changed lifestyles and are less dependent on earth's finite resources (UNCED, 1992). Agenda 21 proposed that fundamental changes in production and consumption are inevitable for reaching at the goal of global sustainable development (UN, 2004). Thus Agenda 21 was a leading document claiming that sustainability issues can't be solved only by improving efficiency, but behavioral changes are essential to equip people in shaping a sustainable society. The strategies and action plans put forwarded by Agenda 21 have profound importance in equipping the world nations to bring about a lifestyle shift in favor of environment.

What is lifestyle?

Lifestyle is the mode of living adopted by an individual, group or nation. The identity of every individual is reflected in his lifestyle. It involves life practices, i.e., individual and collective habits. Lifestyle is a way we live our lives that allows us to fulfill our needs and aspirations. It serves as social conversations in which people signal their social positions and psychological aspirations to others. Lifestyle is closely related to material and resource flows in the society. Lifestyles are based on past and current consumption

and production patterns and are intrinsically, interlinked with everyday choices of people (UNEP, 2007). The identity of every individual is reflected in his lifestyle. Lifestyle is shaped by a number of factors such as social norms, political state, cultural elements and economics.

According to Seddon (2011) lifestyle is a way of living, based on individual choices, characteristics, personal preferences and circumstances. The recent notion of lifestyle is not only restricted to the way of living but also how good life is conceived in the circumstance of changing values in a particular context. Lifestyles are based on our ways of doing, having, using and displaying our behavior and all of the related products, objects and infrastructures (Ropke, 2009).

Current status of consumption and lifestyles

Lifestyles are closely linked with consumption patterns. The basic needs of people all over the world seemed to be similar although their ways to satisfy the needs are diverse across different countries (MEA, 2005). A steady increase in energy consumption was felt all around the world especially in the urban regions recently. This is evident in the form of huge rise in the number of vehicles, rise in frequency of ride outs and increase in the number of domestic equipments (WWI, 2004).There was also a tremendous increase in the quantity of electricity consumption, paper consumption and waste generation (EEA, 2005). During the period from 1960-2000 there occurred

doubling of water consumption; tripling of wood consumption and 2.5 times rise in the food consumption and production (MEA, 2005).

The things which were considered as luxury once became necessities of today. The import of goods from distant locations increased along with rise in the usage of processed food items (EEA, 2005).The prevailing consumption patterns resulted in severe destruction of ecosystems and inequalities among people. The basic needs such as access to clean water, food and health services are still puzzling issues in many countries. In the year 2002, for around 1.1 billion people, there was not even access to 20-50 liters of clean water for meeting their basic needs (UN, 2006). Around 10 million people die out of malnutrition every year and 14% of the world population is hungry every day (FAO, 2003).

Sustainable Lifestyle

The popular definition of Sustainable Lifestyle is "Sustainable Lifestyles are patterns of action and consumption, used by people to affiliate and differentiate themselves from others, which meet the basic needs, provide a better quality of life, minimize the use of natural resources and emissions of waste and pollutants over the lifecycles, and do not jeopardize the needs of future generations" (Mont, 2007). Our home and workplace choices of power, conveyance, diet, waste management and communication will contribute to create a 'Sustainable Lifestyle'.

Sustainable Lifestyle means rethinking of every one's living ways and making a change in our buying, socialization, sharing, education etc to safeguard the planet (UNEP, 1996). Sustainable Lifestyle reflects the respective cultural, natural and economic lineage of every community. It includes change in people's knowledge, attitudes and behaviors. Apart from enabling people to meet their personal needs, Sustainable Lifestyle also allows the future generations to do the same (Backhaus et al, 2011).

Sustainable Lifestyle attempts to integrate both sustainable consumption and production patterns. This means, the consumer decides to purchase a green product which had been produced in sustainable manner rather than choosing a conventional product (E.g: choice of a hybrid car or organic food items). Hertwich and Katzmayr (2003) opined that for sustainable economies to be formed, sustainable production and consumption are the two complementary strategies to be implemented.

Sustainable living is a new pattern of lifestyle which should be taken up not only individually but also in different levels like community, country and world. For achieving changed lifestyles, changed attitudes and practices need to be brought about among individuals (IUCN/UNEP/WWF, 1991).

As per United Kingdom Global Survey on Sustainable Lifestyle, (2010), Sustainable Lifestyle refers to be aware about our surroundings. It also means to select the priorities that cause the least harm. More than

safeguarding the nature it also involves considering the people and community. Rather than thinking about material benefits it addresses factors like health and educational progress (UNEP, 2010).

For a Sustainable Lifestyle to be achieved it is very much necessary to develop strong collaboration of individuals with communities. Sustainable Lifestyle ensures that every act we practice in life improves our quality of life at the same time preserves the natural resources for the coming generations. There is a huge rise in the number of people who adopted a shift in lifestyle to support sustainability in the recent years. There are various evidences for such movements from diverse parts of the world. Sustainable Lifestyle should not be considered as a choice of only developed nations. UNEP (1996) pointed out that as the general trend in developing countries is to go behind western lifestyle, there is much scope to impart sustainable solutions in such countries also.

Shift towards Sustainable Lifestyles

As per the U.K report entitled as '*I Will If you will'*, shifting towards Sustainable Lifestyle can be materialized if there is a 'triangle of change' is built by the collective effort from government, people and business. The report stressed the important role of government in enabling change towards Sustainable Lifestyles by implementing effective policies (NCC & SDC, 2006).

There is a great role of policy makers in influencing consumption and behavioral modification. Tukker et al (2008) proposed a framework for making a behavioral change favoring sustainable consumption and lifestyle. The major remarks in this framework include:

- Separate policies shall be framed suitable for under-developed, developing and developed countries rather than adopting a uniform approach.
- Stress should be given to three prime fields such as food, transport and housing/power consumption and the policies which support these fields need to be introduced.
- Collaboration of policy makers with businesses and consumers is required since all these factors are inter-linked with one another.
- Policies which are readily acceptable by people are to be given priority.
- Different policies must be implemented after detailed discussions and experimentations, and public need to be engaged and communicated regarding such policies.

Sustainable Lifestyle Practices

The promising practices that safeguard sustainability mainly fall under the following subheadings.

- Sustainable agriculture

- Water conservation
- Energy conservation
- Waste management
- Green purchasing

Sustainable Agriculture

The term ‘sustainable agriculture’ is defined as “an integrated system of plant and animal production practices having a site specific application that will over the long term: a) Satisfies human food and fiber needs, b) Enhances environmental quality c) Makes use of non renewable resources, d) Sustains the economic viability of farm operations, e) Enhances the quality of life for farmers and society as a whole” (U.S Farm Bill, 1990). Sustainable agricultural practices are drawing the attention of contemporary farmers due to many of its merits over the conventional practices. The major benefits include enrichment of soil fertility, improvement of water retention by soil and production of toxic free food crops. Some of the sustainable agricultural techniques are

- Organic farming
- Urban gardening
- Crop rotation
- Natural pest management
- Permaculture

- Local and seasonal foods
- Cover crops to prevent soil erosion

Organic farming:

Organic agriculture is a holistic production management system promoting agro-ecosystem health together with biodiversity, biological cycles and soil biological activity (FAO, 1999). Compared to conventional farming practices which are more dependent on synthetic fertilizers and pesticides, organic farming stresses upon biological and mechanical methods and crop diversity. After realizing the adverse ecological impacts of conventional farming practices, there had been a huge shift to organic farming practices in India. The 10^{th} five year plan has given due recognition for organic farming techniques like integrated pest management, integrated nutrient management and use of organic wastes in farming (GOI, 2001).

Organic Farming Practices

Some of the widely used organic farming practices are given below:

1. Mulching: This is controlling the growth of weeds by covering soil with dead blunts of plant parts in order to protect annual crops (FAO, 2015).

2. Green manuring: This can be done by planting some leguminous plant species in the farm and applying the plant parts into farm after attaining the required growth. This will greatly contribute in improving the soil fertility. It

would be beneficial if such leguminous plant species are planted as alternate with different crops (FAO, 2015).

3. Construction of terraces and soil bunds: Conservation of soil in farmlands in sloppy areas can be done by construction of terraces and soil bunds.

4. Planting leguminous trees: Leguminous trees like *Calliandra, Gliricida* and *Sesbania* can be grown along with perennial crops like Banana, Cocoa and Coffee. This will help to improve the shade, soil cover and fixed nitrogen in soil (FAO, 2015).

5. Bio-composting: Bio-compost is a cheap and nutritive fertilizer which can be made from decayed organic matters. For this, the plant residues and manure is collected and stacked in a pit dug of convenient size. The decomposition process will be more severe since the pit is made completely of organic matter. After few months period the bio-compost will be ready for use in farms.

Urban gardening

Urban gardening refers to grow, process and distribute food products through plant cultivation and seldom raising livestock, based on cities in order to feed local populations (Kulak, Graves & Chatterton, 2013). It includes farming practices in vacant spaces, terraces, balconies and inner spaces of

houses. Urban gardens provide excellent opportunity for gathering knowledge in ecological ethics, food safety and sustainability issues (Travaline & Hunold, 2010).

Crop rotation

Crop rotation indicates alternating the type of crops cultivated in a field year after year. It is beneficial in controlling the insects there by protecting the plants from diseases (Mohler & Johnson, 2009). The rotation of crops also will help to control the weeds in the fields. Thus crop rotation serves as a natural method for pest and weed management. It also helps in improving the structure of soil.

Natural pest management

Outbreaks of plant diseases can be greatly controlled by applying organic techniques like crop rotation, selecting sowing period with limited pest outbreaks, usage of physical barriers to avoid pests, usage of pheromone attractors to trap pests and applying biological agents to control pest diseases.

Permaculture

Permaculture, otherwise known as permanent agriculture is a unique method of organic agriculture. It incorporates plants, animals and landscapes into symbiotic system in which the products of one serves as beneficial for the other. It integrates variety of sustainable practices like organic farming, waste

recycling, energy efficient designing and facilitates development of the community.

Water Conservation

Water is an essential commodity without which the existence of the entire living world will not be possible. The quantity of pure water available on the earth is so limited. Because of a number of reasons such as urbanization and industrialization majority of our fresh water resources are contaminated more and more day by day. It is critical that pollution of water resources should be prevented and necessary steps should be taken to conserve water in our daily life actions.

Techniques of water harvesting

Rain water Harvesting: This is the technique of collecting and storing rain water before it is lost through surface runoff. Rain water can be harvested from roof tops of buildings, open areas and landscapes. Water harvested from flat or slopped surfaces can be filtered and carried through PVC pipes to water storage systems like cement tanks, Poly propylene tanks, pits or ponds. This can be used for daily water use purposes. The harvested rain water can also be used for recharging ground water by means of rain water pits, trenches and recharge wells. This is helpful to improve the ground water level considerably and to overcome the rapid water depletion issues (Kunke et al, 2008).

Roof top harvesting: Rain water harvesting can be done from roof tops to storage systems through down pipes. The roof tops can be covered by iron sheets, tiles or fiber glass sheet. The quantity of rain water collected depends upon the availability of rainfall, features of catchment and extent of runoff.

Water reuse and recycling: This is an effective alternative that can be applied for systems which do not need high water quality. Waste water is treated to a prefixed water quality that permits the reuse of treated water. Waste water includes municipal waste water from households, industries as well as rain or storm water (Exall, Marsalek & Schaefer, 2004). The treated water can be directly or indirectly used for beneficial purposes. The popular application of water reuse is in the field of agricultural and landscape irrigation.

Water saving techniques in agriculture

Drip irrigation: This is the technique of watering plants through perforated pipes which can be laid along the bottom of planted crops. Drip irrigation system can minimize water consumption considerably since here only the soil which contains the roots of plants is watered. It is an efficient water conservation method which is desirable for small scale farmers. The major advantages of drip irrigation method are higher water use efficiency, higher fertilize use efficiency, and improved crop yield (Qureshi et al, 2001).

Strip cropping: This is the type of farming in which crops are arranged in alternate rows of strips in a sloped land. Since the crops are arranged at right angles to the surface runoff water, it will reduce the normal speed of runoff. Hence more water will be infiltrated into soil and moisture will be retained in the soil.

Mulch tillage: This is the practice of covering bare earth with residues from plants and plant parts. Since the earth surface is not exposed directly more moisture will be retained in soil preventing excessive evaporation from soil surface (Patil, Kelkar &Bhalerao, 2013).

Ploughing: Ploughing is a conventional technique used to loosen the surface soil and to improve the aeration and water retention by soil. This includes a number of techniques such as sub-soiling, soil inversion and deep tillage which facilitate surface detention, storage and infiltration (Ogunremi, Lal & Babalola, 1986).

Measures for water conservation

The following are some of the preferable water conservation measures as recommended by USEPA (1998):

- In time repairing of water leakages in water supply and storage systems can yield potential water savings.

- Landscapes and gardens can be renovated to avoid excessive watering demands. This can be done by soil improvement to retain more water, choosing native plants with reduced water requirement and use of water efficient irrigation systems.
- Water metering can be introduced to inform users about the quantity of water they use for a fixed period.
- Water accounting is an effective strategy to track water loss. Hence this can be applied as necessary initial step to prevent water loss in supply systems.
- Water pricing is a popular strategy which is in use by developed countries. This will make consumers understand the true value of water and will help to improve water conservation practices.
- Water auditing can be implemented by houses and public institutions to track indoor and outdoor water consumption over a period.

Energy Conservation

Energy is an important natural resource, which is very much essential for any development. Living pattern of people in recent decades is closely associated with energy systems. It is a common saying that 'Energy saved is the energy produced'. Unnecessary wastage of energy should be prevented since 21st century world experiences chronic energy shortage (Sharma, 1995). One of the desirable practices to ensure sustainable energy management is to

restrict the consumption of fossil fuels and to depend upon renewable energy resources as far as possible.

Renewable energy resources

Renewable energy resources are pollution free, non-exhaustible energy sources which have reduced costs. Such energy systems are well appropriate for medium level energy supply systems and rural agricultural systems in India (Sharma, 1995). Solar energy, biogas, wind energy, tidal energy and geo-thermal energy come under the category of renewable energy resources.

Solar energy

The ultimate energy source available to all living forms on the earth is solar energy. Solar energy can be utilized in a variety of devices such as solar cookers, solar water heaters, solar air conditioners and solar chargers. Solar energy is advantageous in the sense that it does not bring about any kind of pollution issues (Sharma, 1995). Solar drying is one among the oldest applications of solar energy. Photovoltaic cells can be developed by trapping solar energy and these can be applied in solar calculators, street lamps and for working refrigerators. Telephones working by solar power are widely popular among farmers to collect information regarding market rates and arranging conveyance facilities. High cost and the careful handling required are the major limitations of photo voltaic systems (Vanderhulst et al, 1990).

Biogas

Biogas is the non-conventional energy produced from degrading biomass by the process of fermentation (Sharma, 1995). It has many advantages like reduced demand for fuel wood, improved sanitation, reduced costs and high versatility. It is a potential fuel in the age of climate change since its burning emits only reduced quantity of carbon dioxide compared to combustion of fossil fuels. The by-product obtained during biogas production is an enriched fertilizer for agricultural purposes (Kumar, 2000). The additional benefits of biogas such as convenience in usage and high colorific value make it a better energy alternative for domestic purposes (Sharma, 1995).

Wind energy

Power needs of many places of world have been addressed by wind energy projects (Rangi et al, 1992). The energy from wind is captured by turbines. The local average wind speed is the major factor determining the wind energy captured. Areas like mountain regions, coastal lands and inlands which are more susceptible to winds have more attractive potential of usage of wind energy. Wind driven power stations are beneficial for developing countries as an economic energy source. Wind energy can be used for running sail boats, water pumps and flour mills (Sharma, 1995).

Tidal energy

Tidal energy is created by the gravitational pull exerted on ocean waters by sun and moon. Tidal energy installations are successful in high tide regions like Bay of Fundy (Canada), Seven Estuary (UK) and Western Australian Coast. Tidal barrages are used commonly to tap tidal energy (Sharma, 1995).

Geo-thermal Energy

Geo-thermal energy is the energy produced from the heat of earth core. This can be utilized for production of electric current in power stations. It can be directly used for heating buildings and green houses. The scope of geo-thermal energy has been exploited too little and the techniques for geo-thermal energy production are still at the beginning stage (Sharma, 1995).

Measures for energy conservation

Oyedepo (2012) suggested some of the useful energy conservation measures for households. These are:

- Ensure maximum opportunity to make use of day light in various areas of the building while planning building design. This will help to reduce the usage of lights in day time considerably.
- Provide enough ventilation facility in buildings and homes to avoid the usage of fans and air conditioners as far as possible.

- Replace the incandescent lamps with CFL and LED lamps. This is one among the best measures for energy conservation since CFL and LED lamps have higher energy efficiency.
- Install systems for lighting control in different parts of the buildings to avoid unnecessary power loss.
- Turn off computers when not in use or to setup in sleeping mode.
- Make sure that there is no air leakage through the refrigerator doors.
- Choose air conditioner which is suitable to the size of the room in order to prevent excessive power loss.
- Use washing machines in full loads only.
- Avoid pre-heating of microwave oven unless it is necessary.
- Make use of solar energy for lighting, drying and heating purposes in households.

Waste Management

The things which are useless are called as waste. Solid waste include organic or inorganic wastes produced by households or commercial activities, which do not have value according to the first owner, but which may be of great value of somebody else (Robinson, 1986). Wastes are of different types like domestic waste, industrial waste, plastic waste, nuclear waste, bio-medical waste, electronic waste and so on.

Wastes can be classified as biodegradable and non-biodegradable. Biodegradable waste is the organic waste which can be degraded by microbial activity. These include food waste, agricultural waste and kitchen waste. Non-biodegradable wastes do not readily degrade biologically. These include wastes from plastic, metal, glass, rubber and E-waste. Apart from these categories there is hazardous and non-hazardous waste. Hazardous wastes consist of toxic chemicals which are harmful to health. i.e., waste batteries, aerosols, paints, chemical-based pesticides and containers of them (Agarwal et al., 2015). Non- hazardous waste can be kitchen waste, food waste or agricultural waste.

Population explosion and affinity towards modern lifestyle resulted in multiplication of waste. Solid waste management is a major challenge both in rural and urban areas. Due to poor awareness and lack of facilities for proper waste management, people follow unscientific waste management methods like land filling or burning. Unlike conventional waste management strategies, sustainable waste management provides opportunity to manage waste without affecting the natural systems (Chirico, 2009). Sustainable waste management is mainly based on the principles of 3Rs i.e. Reduce, Reuse and Recycle (Moore, 2012).

Reduce

'Reduce' indicates minimization of the waste generated. The principle of 'reduce' is based on the limited use of resources while manufacturing each product. Minimization of waste can be attained by legislative measures, waste recycling and composting programs (Crown, 2012). Waste segregation at the source is as important as waste reduction. In India public is getting more awareness regarding waste reduction through student centered processions, public campaigns and awareness programs (Zhu et al, 2008). Waste eduction can be brought into practice following certain important steps such as:

- Reduce paper usage by printing on both the sides of paper.
- Take print outs only in unavoidable situations.
- Promote the usage of reusable plates and cups in canteens and cafeteria.
- Purchase only for the need and not in excess.
- Insist on minimal packaging while purchase products from suppliers.
- Avoid the usage of polystyrene packaging and filling materials, during purchases (Zero waste SA, 2007).

Composting

Composting is an eco-friendly waste reduction technique in which organic waste is undergone controlled biological decomposition. Bio-

degradable waste items can be used for composting. The organic wastes pass through various steps of decomposition carried out by diverse microbial groups (Bertoldi & Zucconi, 1980). Composting if properly carried out can result in the production of enriched, agricultural fertilizer that can be used for improved crop yield.

Reuse

'Reuse' involves the usage of waste materials once again either completely or partially. Usage of second hand materials of electronic items, furniture, apparels and automobiles are examples for reuse (Goldman & Ogishi, 2001). Reuse also can be possible by sorting, cleaning, repairing and refurbishing the waste materials in part or whole (Fewtrell, 2012).

Abdul-Rahman (2014) suggested few instances for 'reuse' such as:

- Waste bottles and containers can be reused for academic project works.
- Unfit dress items can be distributed among friends or can be donated to orphanages and charitable services.
- Beverages can be purchased in returnable bottles.
- Old furniture items can be donated to needy people or institutions.
- Papers used at single side can be reused for draft making or rough written works.
- Used books can be donated to needy students, libraries, or nearby schools.

- Packaging materials such as plastic covers and boxes can be stored and reused for similar purposes.
- Automobile tyres can be reused in garden for planting purposes or can be used in play areas.

Recycle

Recycling is the conversion of waste matter from one form to another since it can't be reused as such (Crown, 2012). For example paper bags, files and cards can be produced from waste paper. Recycling is a cost-effective waste management strategy and helps to save natural resources. The recyclable waste materials include paper, glass, metal, plastic and newspaper. Some of the recycling methods that are popular in developed countries are:

Curbside collection: The wastes from households are screened and recyclables are separated by the house owners. These are kept in separate bins while the garbage is kept in standard bins. Both the bins are kept at the curb to be collected by waste collecting vehicles.

Drop-off centers: In this system people can keep their recyclable waste items such as electronic items, furniture, and household articles at drop-off centers which are easily accessible to public like nearby market places or parking spots.

Buy back centers: Such centers provide opportunity to buy back used batteries, glass, plastic and metals (Abdul-Rahman, 2014).

Advantages sustainable waste management

Chowdhury et al (2014) identified the following benefits of sustainable waste management:

- Helpful in reducing Green House Gas emissions and Carbon dioxide emissions to atmosphere.
- Biodegradable wastes can be used to produce organic gas, which is a cost-effective option for energy crisis.
- Reduces pollution problems to a great extent and helps to keep the surroundings clean and hygienic.
- Improves the soil quality by generating enriched soil additive by recycling biodegradable waste.

Green Purchasing

Green purchasing otherwise known as 'environmentally preferable purchasing' or 'green procurement' is the purchasing of any product or service which result in minimal ecological impact while carrying out a similar function or a social responsibility (IGPN, 2010). Purchasing of green products is regarded as an ecologically responsible behavior. In the recent years there is a huge rise in the number of consumers who prefer eco- friendly products. There are a lot of choices of green products available in today's market including recycled paper, furniture, apparels, electronic devices and

motor vehicles. The customers can also avail green services in tourism, banking, transportation, power supply and home designs (IGPN, 2010). Green purchasing takes into account the economic, social and ecological consequences of the products upon individuals and societies. It also considers the sources, mode of manufacturing, transportation, storage and disposal of the products.

Kennard (2006) pointed out some of the potential benefits for an organization implementing green procurement. These are:

- It reduces the costs significantly.
- Helps to maintain a green supply chain.
- Ensures both internal and external standards of the organization.
- Maintains the performance level of organization in accordance with ecological and social legislation.

Benefits of green purchasing

Green Purchasing is having a number of advantages over the conventional purchasing practices. Some of them are waste reduction, energy efficiency, reduction of toxicity and cost reduction.

Waste reduction:

Green purchasing aims to reduce the accumulation of wastes by choosing products which are repairable, more durable and recyclable. Turner and

Houston (2010) opined that the major goal of green purchasing is to reduce wastes and to lessen the total cost meant for waste disposal programs. 'Reuse' is another waste reduction strategy used in green buying. The practice of purchasing reusable products (e.g.:-cups, dishes) and rechargeable items (batteries, cartridges) will help to minimize waste to a great extent. Packaging of products in refillable containers is a useful strategy to reduce packaging wastes (SAIC, 2001).

Energy efficiency:

Buying energy efficient products will help to minimize the power consumption and thereby facilitate conservation of natural resources. Energy efficient items include star labeled electronic equipments, motors, energy efficient insulators, windows and roofing items (SAIC, 2001).

Reduction of toxicity:

Green purchasing restricts hazardous chemicals in households and workplace and thereby provides a healthy environment (SAIC, 2001).

Cost reduction:

Purchasing eco-friendly products is cost-effective as well as economic although the initial expenditure is more in some cases (Laddha & Malviya, 2015). The cost can be considerably reduced by properly choosing devices which reduce water, energy and fuel consumption (IGPN, 2010). Green

purchasing can improve an organization's financial position by limiting the disposal costs and improved conservation practices (Stock, 1992).

Green purchasing strategies

There are a number of strategies implemented by consumers in their efforts to prioritize green products in each purchase. The strategies in green purchasing as identified by Hamner (2006) are:

Requirement of product contents: This is the widely followed green purchasing strategy in which consumers insist upon certain eco-friendly features of products. For example, many institutions prefer purchasing paper that has recyclable content. Here the purchasing cost of consumer will not be much higher than that of conventional purchasing.

Restricting product contents: Here the consumers restrict harmful contents of products and avoid buying of such products. Avoiding CFC or other toxic contents on packaging and solvent based coatings are best examples. The advantage of this strategy is that consumer can avoid the consequences that result from hazardous contents of products. The issue of disposal of excessive solid wastes can also be avoided by this strategy.

Green labeling: The consumers who opt for green labeling or eco-labeling would prefer disclosure of different contents of products. Eco-label is a type of legally protected label which is applicable to a product or service, claiming

that it complies with certain pre-determined environmental and social criteria Naumann (2001). These are useful instruments which inform the consumers regarding the ecological impacts their product choices. There are a number of green labels such as green seal, green certification and reports of ecological impact assessment.

Supplier surveys: Here the consumers demand the suppliers to provide environmental features of the products they market. The effort taken by consumers for executing the strategy is comparatively higher than that of traditional purchasing.

Supplier auditing: This requires a higher effort from consumers since they audit suppliers to assess their compliance with ecological management. This will be successful in bigger organizations that are already implementing self auditing for ecological practices.

Challenges of green purchasing

Poor knowledge regarding green purchasing is one among the major challenges in popularizing it among a wide range of consumers. This will lead to considerable negligence of green labels by such consumers (Cherian & Jacob, 2012). Other obstacles in executing green purchasing include poor access to eco-friendly products, poor support from authorities and organizations (Gatari & Were, 2014) and high cost (Michaud & Llerena,

2011). Chan (2004) pointed out that the vague nature of green advertisement often fails to draw sufficient attention from consumers.

Lack of reliable information regarding eco-friendly products also serve as a barrier in green purchasing (Liddell, 2003). Insufficient supply of green products was highlighted as one of the major barriers in eco-friendly purchasing as mentioned by Barbarossa and Pastore (2015).

Green protocol in schools of Kerala

As a part of General Education Protection Mission, green protocol was implemented in schools of Kerala from June 2017 (Government of Kerala, Department of General Education, 2017). As per this a set of guidelines are issued to headmasters of schools by the Director of Public Instruction. The guidelines are:

- Schools should be environment-friendly.
- Biodiversity parks should be set up in every school.
- Plantation of trees should be done.
- There should be rain pits in every school.
- Biodegradable and non-biodegradable wastes should be segregated and compost pits should be set up.
- Schools should attempt to make plastic-free and garbage-free surroundings.

- Plastic and paper wastes should be cleaned, stacked and properly disposed.
- Food should be brought to schools in stainless steel containers instead of plastic containers.
- Ink pens and ball-point pens which could be used for longer periods should be used in schools rather than disposable plastic pens.
- Reuse of cups and containers should be practiced in schools.
- Paper or cloth banners should be used in schools instead of flex boards.

CHAPTER III

REVIEW OF RELATED LITERATURE

Studies on

- Education for Sustainable Development (ESD)
- Environmental Education practices
- Pro-environmental Behavior
- Sustainable Agriculture
- Water Conservation
- Energy Conservation
- Waste Management
- Green Purchasing
- Green Transport

REVIEW OF RELATED LITERATURE

Studies on Education for Sustainable Development (ESD)

Nixon, Sankey, Furay and Simmons (1999) studied the practice of Education for Sustainability in Secondary schools of Scotland. The required data was collected through document analysis of conference papers, discussion reports and policy statements. The profiles of fifteen schools those performed remarkably in the field of sustainability were analyzed. Interviews and discussions were conducted with key personnel and professionals of schools for getting in depth information regarding sustainability initiatives of schools. The findings revealed that sustainability practices in schools were mainly dependent on the efforts and interests of a minor group of teachers. The school curriculum represented sustainability themes only in peripheral manner. The green initiatives of schools didn't cater the holistic nature of Education for Sustainability. The researchers recommended a whole school change and professional reorientation of teachers to proceed towards sustainability in a better way.

Wooltorton (2004) performed a case study on the practice of Education for Sustainability in the schools of Australia. Three schools selected for the study were Forest school, Riverdale School and Oak filed School. In-depth interviews were conducted with school community members following

ethnographic research method. The research with Forest school revealed that the school was successful in effective implementation of sustainability practices by implementing organizing principle. In order to achieve effective learning for sustainability, the Riverdale School followed co-operative inquiry approach. The Oak filed school already implemented collaborative ownership innovations. The researcher recommended that the dialogical political design may help the school to enrich its learning culture for sustainability.

Liu (2009) case studied the practice of Education for Sustainable Development (ESD) in Teacher Education sector in York University of Canada. The study methodology included analysis of written texts, documents and oral testimonies that were drawn from teaching faculties of the university. The researcher also conducted surveys among university members having good work experience. The study findings indicated that the national and provincial curriculum had been giving less priority to sustainability. The guidelines for Teacher certification didn't mention sustainability. The major factors identified which challenge the successful implementation of ESD were inadequate funding, lack of trained personals, inadequate national policies, poor organizational setup, poor community collaboration, lack of recognition of ESD initiatives and conventional disciplinary curriculum. The findings also confirmed that poor awareness among teaching faculties regarding ESD acted as a major hindrance in ESD practices.

Kemmis and Mutton (2012) case studied the Education for Sustainability practices in schools, tertiary educational sites and community settings. The study adopted methods such as observation, interviews and document analysis. Out of the four schools studied, two carried out green initiatives supported by local council support committee. The greening activities of these schools included seed collection, seed germination and planting seedlings in the vacant public lands. Activities of the third school concentrated on greening the spaces within school compound. The fourth school focused on weed removal from school garden and provision of opportunities for primary students to maintain vegetable and floral garden. The two tertiary educational sites conducted formal programs of agriculture, waste management and environmental management. The cases studied varied in terms of educational level and educational settings.

Berglund, Gericke and Rundgren (2014) studied the influence of ESD in schools of Sweden in improving the Sustainability Consciousness (SC) among students. The sample of the study was 638 Upper Secondary students of Science and Social Science streams. Two groups of students chosen for the study were those with and without ESD background. Survey method was followed using questionnaire assessing sustainability knowledge, attitude and behavior of students. For analyzing the data SPSS software was used. The findings revealed that there was significant difference in SC of students between two groups. According to the findings the students from ESD

profiled school were superior in SC, but the difference was relatively less. Students from both the groups differed significantly in economic dimension of SC than environmental and social dimensions.

Green and Somerville (2014) inquired the practice of Education for Sustainability in schools at Primary level. The study concentrated on eight Primary schools at Victoria in Australia. The photographs of various sustainability programs of schools were collected. Focus group discussions and field notes were also used for collecting data. Data were also gathered from teachers, principals and other school employees. The photographs were analyzed based on the significance and frequency of visual factors expressing sustainability. Problem solving learning and inquiry learning were found to be the best pedagogical approaches for Education for Sustainability as revealed by focus groups. The study also revealed that networking was most effective in extending the sustainability programs of schools to community level.

Olsson, Gericke and Rundgren (2015) investigated the impact of implementing Education for Sustainability in schools of Sweden. In the study the Sustainability Consciousness (SC) of students who were taught by ESD approach was compared with that of another group taught by normal approach. The ecological, economical and social sectors of sustainability were assessed giving preference to knowledge, attitude and behavior. The tool used was a questionnaire in the form of Likert scale comprising of fifty

items. The sample size was 1773 students belonging to 6th and 9th standards. One dimensional univariate ANOVA was used to analyze data. The findings revealed that there was minor but significant difference in SC between two groups. The study has drawn an overall finding that ESD implemented by Swedish schools didn't contribute much in developing pupil's sustainability knowledge, attitudes and behaviors. The researchers recommended the need to explore new approaches for implementing ESD.

Lee, Ma and Lee (2016) studied the success of integration of ESD in school curriculum of Hong Kong during the period from 2009 to 2016. The study followed grounded theory approach to find out representation of ESD by different school subjects and students' understanding on ESD. The provision for practicing ESD by school subjects was also studied. The study identified the precise representation of environmental, social and economic dimensions of ESD provided in school curriculum. It was also established that ESD distributed in school curriculum was highly relevant. The study confirmed that the effort of UNESCO Hong Kong Association was in accordance with the general trend of other nations in incorporating ESD in to school curriculum.

Studies on Environmental Education (EE) Practices

Lee, Wong and Luo (2000) investigated the practice of Environmental Education by schools of Primary level in Hong Kong. The study was

performed following methods of survey and case studies among a sample of 86 Primary schools. The survey results confirmed that 31 out of 86 schools even failed to provide the official guidelines regarding Environmental Education. There was no co-ordination of efforts for practicing Environmental Education in more than half of the schools. Environmental Education was not at all taught by 18 percentages of the surveyed schools. The schools which excelled in Environmental Education practices offered specially designed short term Environmental Education programs which provided unique opportunities for students in natural observation, natural protection, specimen collection and waste recycling. The conclusion of the study was implementing Education for Sustainability in school is a tough task which needs designing of an additional curriculum and special programs.

Eames, Cowie and Bolstad (2008) evaluated the features of Environmental Education practices in schools of New Zealand. The study adopted mixed methods of survey of around 200 schools and case studies focusing on eight schools. The results revealed that the prevailing Environmental Education practices were successful in developing knowledge, awareness and attitude regarding environment among the learners. Eco-friendly activities were the key factors which brought majority of the respondents close to nature. The schools selected for case study varied in the success of implementing Environmental Education practices. The scarcity of

resources and lack of time were found to be the major barriers in Environmental Education practices.

Kennelly, Taylor and Jenkins (2008) reported the findings elicited from the interviews with eight teachers representing the sustainable school programs of schools in New South Wales, Australia. The relevant portions of interviews were audio recorded. The informal talks with concerned teachers were recorded in the research diary. Coding was used to analyze the interview transcripts. The interpretation of the data from respondents was done with the help of the research diary already maintained. The study revealed that majority of the respondents showed willingness to participate in school sustainability programs and the programs undertaken were consistent with the social demands. The study recommended that adequate teacher training should be provided for successful execution of sustainable school programs.

Wang (2009) developed an instrument for performance assessment of sustainable schools in Taiwan. There were 28 items in the research instrument. Each item constituted the Environmental Education execution in the qualitative dimension. Based on the three Environmental Education Criteria, four levels of description for each situation were developed. The instrument was meant for self evaluation by any member of the institution like administrators, students or teachers. Each item was scored from one to four

points. The higher the score, the greater ecological efficiency of the institution was indicated. The total score ranged from 28 to 112 points. The instrument's validity was confirmed by a group of 21 ecological experts. The Cronbach's alpha value obtained was between 0.898 – 0.942 which indicated a high reliability for the instrument.

Stafford (2010) investigated the elements contributing to the embracement of green practices by Higher Education Institutions. The study made use of data from mass media, institutional websites and campus surveys. Data was collected from 180 Higher Education Institutions. According to the study, institutional size and financial factor were playing a major role in adoption of green practices by Higher Education Institutions. The results also revealed that Higher Education Institutes were not taking campus sustainability as a tool to catch the attraction of the newly enrolling students. According to the researcher, the regulatory pressures had little role in encouraging the green practices of campuses.

Fazio and Karrow (2013) studied about the practices of Environmental Education (EE) prevailing in one of the school districts of south central Canada. The study focused on the practices of 58 schools through survey and focus group techniques. As per the findings of the study, the administrators were able to withstand the constraints of cultural and academic backgrounds in their attempts to show commitment to EE in respective institutions. An

Environmental Education certification program named Eco-school supported the efforts of EE educators in every school.

Tonuk and Kayihan (2013) conducted a study on the sustainable usage of school sites by Primary schools in Istanbul. The sample comprised of 55 Eco schools. The researchers adopted survey method using questionnaire. The survey instrument was prepared using the formal Environmental Review, 2010 as the standard. The questionnaire addressed items from the areas of energy, waste, water, biodiversity, travel and school sites. The findings indicated that the participant schools didn't achieve a consistent success in sustainable usage of school sites. The investigators suggested the need to pay more attention to improve the facilities in parking areas, ecological play grounds and composting sites. They also recommended that the provision of agricultural sites, solar outdoor lighting elements and sustainable flooring systems would enhance the sustainable use of school sites.

Satchwell (2013) conducted a study to explore the 'Carbon literacy practices' of children at school, home and society. The study focused on students and parents representing three Primary schools, i.e. those with and without green school status. Group activities were conducted to elicit the student's knowledge on climate change. Observations of classes themed on climate change were done by the investigator. Discussions were conducted with both eco school students and non - eco school students to elicit their

understanding of climate change. The findings revealed that there was less scope for knowing more about climate change since the topics were not uniformly covered in the curriculum of Primary schools. The students of eco schools possessed higher level of 'Carbon literacy' than the students of non - eco school.

Veronese and Kensler (2013) conducted a study on school leaders, sustainability and green school practices. This was an elicitation study following the Theory of Planned behavior. The behavioral intentions of school leaders to lead green practices were explored. The study used open ended survey following Ajzen's Theory of Planned behavior. As per the findings, in participating school leaders' view there were benefits for green movement. One of major hindrances experienced by the green schools was limited resources. More than one resource conservation efforts were practiced by 55% of the respondents.

Pauw and Petegem (2013) studied the effect of green schools on student's environment related values and behavior. The sample consisted of 1287 students chosen from 45 eco schools and 45 non-eco schools. A preliminary study was conducted before executing the questionnaire. The dependent variables were preservation values, utilization values and environmental behavior. Bongner and Wiseman's (2008) two - dimensional model of environmental values was used to assess the ecological values

possessed by students. The environmental behavior of learners were assessed using a subscale CHEAKS (Children's Environmental Attitude and knowledge Scale, Leeming et al, 1995). Multi-level linear regression model was applied for all the 3 dependent variables. The results showed that utilization values more influenced the environmental behavior of students than the preservation values. The findings also indicated that in spite of implementing pedagogical approach, the green schools achieved little success in contributing children's environmental behavior.

Butt, More and Avery (2014) studied about the student involvement in sustainability activities in the universities of Australia. Longitudinal approach was adopted by collecting data from the university websites during a period from September 2008 to June 2009. Semi-structured interviews were conducted with 34 respondents closely related with the universities. The sampling technique used was purposive sampling and stratified random sampling. The Desktop research revealed that all the institutions that studied offered excellent opportunities for students to involve in sustainability programs. But the interview data revealed a contradictory fact that studies related to pupils' behavior and attitude were not influencing the implementation of sustainability programs. One more finding was that the committed staff and senior executives of universities were doing a major role in working out of sustainability programs.

Unnikrishnan, Singh, Sawant and Naik (2014) studied the Environmental Education and Practices in schools. Eco-friendly initiatives of Kendriya Vidyalayas were investigated by conducting a survey among 28 Post Graduate teachers of 28 selected schools. Prevailing eco-friendly practices and proposed environmental practices were derived through the survey. According to the respondents major benefits of eco-friendly initiatives of the schools were energy conservation and cost reduction. The participants also identified the benefits such as water recycling, waste recycling and pollution control. The study put forwarded suggestions to improve the environmental practices of schools.

Studies on Pro-Environmental Behavior

Iversen and Rundmo (2002) studied about the ecological concern and behavior among the public of Norway. The study was conducted using self-completion survey questionnaire administered among 1450 individuals. Ecological behavior was measured using 11 items and ecological concern was assessed using 15 items. The items were rated using 5-point scale. The statistical techniques used were Regression analysis and correlation. The results indicated that women and educated persons were showing a more favorable attitude towards ecological concern. Males and the persons without university degree showed less concern towards issues of environment. The study also confirmed a positive correlation between ecological concern and

ecological behavior. The researchers opined that there should be basic understanding regarding the influence of attitude on behavior in order to impart the required behavioral change among individuals.

Alp, Ertepinar, Tekkaya and Yilmaz (2008) conducted an investigation upon eco-friendly behavior of elementary school students in Turkey. The study attempted to find out the relationship of individual eco-friendly behavior with ecological knowledge, behavioral intentions, environmental affects and locus of control among students. The required data was collected from 1140 students representing 18 schools by administering scales of ecological knowledge, attitude and locus of control. The selection of schools was done on random basis. The analysis of data indicated a low level of ecological knowledge but favorable ecological attitudes. Multiple Regression Analysis indicated that environmental affects, locus of control and behavioral intentions could be significant predictors of self reported eco-friendly behavior. The study inferred that eco-friendly behavior of students was not influenced by their knowledge on ecological issues.

Walton and Austin (2011) studied the pro-environmental behavior of people settled in urban areas. The study followed telephonic survey by random digital dialing among 429 respondents. Six items from the New Ecological Paradigm (NEP) scale were used to represent the variable 'environmental concern'. The Variable 'Personal Pro-Environmental

Behavior' (PPEB) was assessed by deriving the items from Principal Component Analysis (PCA). Self efficacy towards environment was assessed by using a single item of five-point Likert Design. Age, gender, educational level and income were the socio-demographic variables chosen for the study. Among the various Personal Pro-Environmental Behaviors (PPEB), domestic energy conservation was the most frequently occurred behavior which was followed by recycling, reduced driving, avoiding non-biodegradable goods, buying eco-friendly products, and minimal packaging. According to the findings the most influential predictor of recycling behavior was availing curbside recycling service. The study also elicited the finding that the social structural variable, curbside recycling had significant relationship with Personal Pro-Environmental Behavior.

Kasim and Ismail (2012) studied the drivers and barriers in eco-friendly practices among the restaurants of Penang in Malaysia. The method adopted for the study was a survey among 26 restaurant managers running casual upscale businesses. The study proved weak performance of restaurants in practicing eco-friendly initiatives. Although top managers were concerned with ecological issues, they were unwilling to invest more amounts in eco-friendly products, initiatives and publicity. Through the study it was also revealed that weak environmental laws, scarcity in eco-friendly supply chain, and poor client demands were the major barriers in executing the eco-friendly practices of restaurants.

Mungai and Irungu (2013) assessed the management commitment to application of green practices in star hotels in Mombusa, Kenya. The study inquired the existing green practices. The relationship between management environmental commitment and organizational involvement in green practices were studied. Questionnaire, interview schedule and observational checklist were used to collect data. The study proved that 88.9% of the managers were not satisfied in their current green practices. 81.5 percentages were thinking about improved green practices. The suggestion aroused out from the study was that green performance of hotels should be monitored regularly by environmental audits. In order to develop knowledge, awareness, positive attitude, and skills in eco-friendly practices, training programs should be conducted in hotels regularly.

Conard, Kuuder, Bagson, Prempeh, Muni, Adongo and Amoako (2013) studied energy, water and waste management practices in the accommodation sector of Tamale Metropolis in Ghana. Among the 68 registered hotels, 42 facilities were considered as sample. Factors like water conservation, energy conservation, waste management and corporate social responsibility were measured using a questionnaire. According to the study, the fact revealed was that only 8% of hotels selected had environmental policies in practice. 97% of the sample utilized treated water for watering lawns and plants. The popular green practices observed were the usage of

low power bulbs and towel reuse. It was also observed that 60% of the sample implemented low flow shower heads.

Riper, Kyle, Sutton, Yoon and Tobin (2013) explored the attitudes of Australian residents towards pro-environmental behavior and climate change impacts on Great Barrier Reef. Survey was conducted among 200 individuals, completed 18 years and staying 50 km around the Great Barrier Reef. The tool comprised of statements dealing with individual's obligations to preserve Great Barrier Reef from harmful effects of climate change. A five-point scale was used to assess people's attitudes regarding climate change. Theory of Planned Behavior (TPB) was used as a guiding framework for assessment. The Chi-square value was significant owing to the sample size. According to the results the respondents were of the opinion that climate change was not favorable to the ecosystem of Great Barrier Reef. Respondents showed a positive attitude in taking personal actions to nullify the ill effects of climate change.

Gatersleben, Murragh and Abrahamese (2014) examined the influence of values and identities in explaining pro-environmental behavior of UK citizens by 3 separate studies. In the first study, survey method was adopted to find out attitude and perception of communities regarding sustainable lifestyles. Specific items belonging the components materialism, ecological values and pro-environmental behavior were administered. According to

simple correlation technique, the ecological consciousness of respondents was positively correlated with New Ecological Paradigm (NEP). The second study was conducted in 2009 among 100 households of 2 UK cities by survey method. The study used simple correlation technique and Regression analysis which proved that there was significant relationship between NEP and pro-environmental behavior. The third study adopted on-lone survey among 2293 respondents to assess usage of mass media, pro-environmental behavior and identity. Correlation analysis proved that strongest relationship was found between identities and personal norms in particular for an environmental identity.

Dresner, Handelman, Braun and Bollens (2015) studied about the pro-environmental behavior and civic engagement in parks of Portland. The study followed survey method among 172 volunteers engaged in activities of stewardship in public areas. The questionnaire comprised of 48 items assessing ecological behaviors and attitudes which were ranked in 5 point Likert scale. The survey identified 3 categories of voluntary participation in public areas; they were frequent volunteers, mid-level volunteers and first time volunteers. SPSS software was used for analyzing the data. The findings revealed a positive correlation between frequency of participation in stewardship and degree of ecological identity. It was also confirmed a positive correlation between frequency of participation and individual pro-environmental behaviors.

Sanchez, Lopex-Mosquesa and Lera-Lopez (2015) studied the influence of attitude, socio-demographic and political factors in developing two pro-environmental behaviors (i.e. purchasing and consumption) in citizens of Spain. The study was performed using survey method. 2500 individuals above the age 18 were selected as sample. Face-to-face interviews were done by house contact. Random sampling of houses was followed within municipalities. Regarding the items of ecological conservation, four options were provided. For the items standing for pro-environmental purchase behavior 1-3 Likert type scale was provided and for items measuring pro-environmental consumption behavior 1-5 Likert type scale was given. The data analysis was carried out using SPSS 20.0 and AM OS 20.0. The results indicated that pro-environmental purchase behavior was positively influenced by personal attitudes, situations of workplace, female gender and ecological knowledge. The findings also revealed that personal attitude was more influencing pro-environmental purchasing behavior.

Ambrosius and Gilderbloom (2015) studied and compared the ecological behavior among people in urban areas. The data for the study was collected by biennial LMS in the spring of 2006. The questionnaire designed by Sociology Department of Louisville Urban studies Institute was used for data collection, which comprised of items belonging to 13 ecological and 9 socio-demographic variables. Telephonic interviews using Random Digital Dialing was used to collect data from 807 respondents. Principal Component

Analysis (PCA) was performed. The study revealed the finding that there was a positive influence on urban residence on people's ecological behavior. The study has drawn one more finding that the people who recently shifted from sub-urban to urban didn't show any difference in their ecological behavior and they were significantly less concerned with ecological matters compared to urbanites, sub-urbanites and city residents.

Kennedy, Krahn and Krogman (2015) explored the ecological concern, pro-environmental behavior and Carbon footprint of individuals and households. The study was conducted by an annual survey among Albertan households, covering 400 respondents each in two cities. Random Digital Dialing (RDD) was employed. The survey questions to measure ecological concern represented the areas: forest depletion, wetland depletion, climate change, water pollution, air pollution and depletion of agricultural plots. For this, ten item cumulative scale was used. Nine items were employed in the survey to identify the frequency of pro-environmental behavior. Carbon footprint was estimated using the items belonging to the areas energy consumption, domestic waste, and emissions from personal vehicles and air transport. Preliminary Bivariate Analysis revealed that there was significant positive correlation between ecological concern and pro-environmental behavior and significant negative correlation between biological concept and Carbon footprint.

Roy, Verplanken and Griffin (2015) inquired the conception of 'sustainability' by an eco-friendly community settled at Peterborough in England. Data collection was based on eight semi-structured interviews and data analysis was conducted by following interpretative phenomenological analysis. The findings revealed that according to the respondents unsustainable behavior was interpreted as 'lack of thought'. The study also showed that even though the respondents were aware of global warming, they still followed thoughtless consumption in their daily lives. The investigators suggested to impart more effective educational programs in order to limit the over consumption practices of public.

DeKoning, Curl, Wever and Brezet (2015) investigated the sustainable consumption among public in Vietnam. The study was focused on urban middle class people at Hanoi of Vietnam and the data collection was done through survey among 176 respondents, 5 focus group discussions and 5 interviews. The survey focused on pro-environmental consumption practices of energy, food, waste, water and transport. In the survey results, 80% of the respondents preferred eco sustainable lifestyle for the wellbeing of the coming generations. The interviews revealed peoples' willingness to consume less in order to make a better future. Poor opportunities and capacities were mentioned by the respondents as the reasons for not adopting a sustainable lifestyle. 'Food' was found to be the most promising category to promote people to sustainable lifestyles. The respondents also claimed that there

would be much scope in sustainability practices of 'waste'. The overall opinion from the respondents was that they required more orientations to be the right decision makers in consumption practices.

Hidayah and Agustin (2017) studied the Pro-Environmental Behavior (PEB) of High School students. The sample selected for the study was 231 students randomly selected from a High school in West Bandung of Indonesia. A questionnaire was used to assess pro-environmental behavior which comprised of dimensions such as recycling, waste avoidance, consumerism, energy conservation, transportation and conservation behavior. The responses were rated in 5-point Likert type scale. The PEB of Science and Non-Science students were assessed and compared. The effect of grade level and co-curricular activities on PEB was also assessed. The statistical techniques used were descriptive statistical techniques and Multivariate Analysis of Variance (MANOVA). The findings revealed that the PEB of students was influenced by participation in class programs and co-curricular activities. It was also found that grade and duration of Science learning did not influence the PEB of the students.

Studies on Sustainable Agriculture

Williams (2000) investigated student's knowledge and expected impact of sustainable agriculture. Data was gathered from 386 Agricultural Education students from 31 High schools of Ionas of US selected through

stratified random sampling. The tool used was Likert type scale covering items of students' knowledge and expected impact of sustainable agriculture. Student's self assessment revealed that their knowledge in sustainable agriculture was limited. The findings also indicated that the impacts expected from sustainable agriculture were highly rated particularly in environmental and social dimensions of agriculture. The researcher concluded that there is more scope to integrate adequate technologies to school curriculum to improve students' knowledge on sustainable agriculture.

Golzardi, Sarraramini, Asadi, Kalantari and Ardakani (2012) assessed the attitude of Agricultural degree students towards organic farming. A survey was conducted among 100 students from three selected universities of Iran. The tool used was a questionnaire. The Cronbach's alpha co-efficient indicated that the tool was reliable. The tool consisted of 32 items to measure students' perception towards organic farming, which were rated from values one to six. It was revealed that students' awareness about organic farming was poor particularly in areas of 'pest management' and 'organic product standard'. Factor analysis indicated that nine factors contributed to major part (i.e., 73.71%) of the total variance out of which 'concepts' was identified as the major contributory factor (11.98%) and 'organic product standard' was the least contributory factor(4.36%). The researchers recommended that curriculum should include areas like ecological equilibrium, novel

technologies, indigenous knowledge, human safety and improvement of soil to enhance students' knowledge in organic farming.

Agahi, Moradi and Afsharzade (2012) studied the knowledge and attitude of Agricultural graduate students towards sustainable agriculture. The required data was collected from 165 Agricultural graduate students of Razi University in Iran selected through stratified random sampling. Survey was conducted using a tool consisting of items representing students' knowledge and attitude to sustainable agriculture. Responses were measured in 5-point Likert type scale. SPSS 16 was used to analyze the data. The study revealed that the knowledge and attitudes of students regarding sustainable agriculture was highly correlated and hence the students possessed knowledge based attitudes.

Iyagba and Amesi (2016) studied the awareness and practice of organic farming by Under Graduate students of Nigeria. The study was focused on 150 Agricultural degree students chosen by multi-stage sampling. The tool used for collecting data was a structured questionnaire. The items in the tool covered areas like students' awareness on organic farming, organic farming practices, benefits and barriers of organic farming. The study findings revealed that 31.3% of the respondents were aware of the organized organic farming. The major source of information about organic farming was internet and the most adopted organic farming practice was crop rotation. The major

barriers identified were the more labor needed and inadequate knowledge regarding organic farming practices.

Iyagba and Ekpete (2017) studied the perception and practice of organic farming by Secondary school teachers in River state of Nigeria. The study used descriptive method and data was collected from a total of 80 Agricultural Science teachers of 10 schools which were chosen randomly. The sampling technique adopted was multistage sampling. Tool used for data collection was structured questionnaire. Frequency counts and percentages were used for analyzing data. The finding was that 40% of respondents were aware of organic farming and 85.9% agreed to practice organic farming. Inter cropping was practiced by 31.2% of the sample and the crop Cassava was found to be the most cultivated crop by the respondents (38.8%)

Studies on Water Conservation

Randolph and Troy (2008) studied the attitudes of households in Sydney towards water conservation and consumption practices. Data was collected through telephonic survey among 2179 households and focus groups selected from the same area. Data collection was conducted during a period of huge water use restriction. Information about policies, programs, awareness and attitude regarding sustainable water consumption were derived. The findings revealed that only 19% of the respondents were aware of their actual water consumption and only 7% considered themselves as

above average water users. Majority of the respondents believed that charging for water use didn't make any positive influence on water conservation. The study concluded with the recommendation that there should be development of sound policies to promote minimization of household water consumption.

Willis, Stewart, Panuwatwanich, Williams and Hollingsworth (2011) assessed how the domestic water consumption was affected by environmental and water conservation attitudes. The study adopted mixed research approach involving survey and field based smart metering technology, focusing on 132 households of God Coast, Australia. The questionnaire used for the survey consisted of items measuring 'concern for environment' as well as 'water conservation awareness and practice'. The response of the sample was rated in five-point Likert type scale. Confirmatory factor analysis was followed to develop attitudinal factors and cluster analysis was done to group the houses based on the developed factors. The study revealed that the respondents with high positive environmental and water conservation attitude showed significantly reduced domestic water consumption than those with moderate positive attitudes.

Tsai, Cohen and Vogel (2011) case studied the impacts of water conservation strategies administered in four selected towns of Massachusetts. The strategies were (a) introducing Weather-Sensitive Irrigation Controller

Switches (WSICS) in homes and municipal athletic field; (b) setting up of rain water harvesting facilities in households; (c) auditing indoor water consumption and offering rebates for water efficient toilets; (d) implementing amendment to improve soil water retention of athletic field. Non-parametric statistical techniques were used for data analysis. The finding was that municipal WSICS was highly successful in reducing water consumption. Rain water harvesting facilities were effective but the quantity of water conserved through that was low compared to the total household water consumption. Water auditing, rebates and amendments implemented were effective in reducing water consumption significantly.

Samaltani and Christidow (2013) investigated the effectiveness of a water conservation program designed to improve children's' awareness on water conservation. Experimental design was adopted for the study. A group of seventeen nursery students between the age group of 5-6 years were selected. The perceptions of the group on water scarcity and conservation were recorded as pre-test. The intervention was implemented involving 12 inter-disciplinary activities of water conservation. After this children's awareness regarding the same was assessed. It was found that children's awareness on the subject significantly improved after the participation in the program. The findings confirmed that nursery school students were capable of talking about the importance of water scarcity and conservation needs. The

investigators recommended integrating topics on water conservation in Pre-school curriculum to expand student's knowledge and skills in the field.

Wang, Liu, Fa, Yang and Qin (2014) studied the perception of public regarding water consumption and its effects on water conservation behavior. Survey was conducted among 776 houses of 16 villages located in the Wei River Basin to identify the gaps between perceived water consumption and actual water consumption. The respondents were asked to maintain three day water diaries for recording their daily water use for each purpose. Survey instrument addressed the areas such as socio-economic profiles, awareness regarding conservation, individual water use patterns and practices of water conservation. The diary analysis and survey revealed that the perceived water consumption and the actual water consumption were significantly associated. It was also revealed that respondents overestimated their indoor water consumption and underestimated their outdoor and kitchen water consumption. The groups such as women and elders who correctly estimated their water consumption showed improved water conservation practices.

Studies on Energy Conservation

Aktamis (2011) investigated the behavior and awareness among school students regarding energy conservation. Survey was conducted on a sample of four hundred students using a five point scale of energy behavior and awareness. The tool consisted of fifty four items. Factor analysis was

conducted. Only the items that had the load value ranging from 0.30 to 1.00 were selected. The final selected items were 21. The tool comprised of dimensions such as renewable energy resources, energy saving, interest in energy and energy awareness. The results revealed a high level of energy awareness, renewable energy resources and energy saving, whereas a moderate level of interest in energy. It was found that girls possessed a higher level of energy saving awareness average compared to boys.

Gram-Hanssen (2014) studied the energy consumption practices and life style of families in Aarhus city of Denmark. The study involved surveys, energy consumption studies and interviews. Energy usage in each household was combined with the data regarding occupants such as age, gender, qualification and nationality. Regression analysis was performed for different building types using SPSS package. A number of variables including the 'building size' were correlated with the quantity of heat consumed. The findings revealed that the 'building size' was a major variable contributing to heat consumption followed by the 'period of manufacturing'. The 'number of individuals in a house' was more explaining the electricity consumption than the other variables. The electricity consumption of houses varied depending upon the routine practices of households.

Seniwoliba and Yakubu (2015) investigated the awareness, attitude and conservation practices of energy among university employees in Ghana. The

study followed mixed method making use of primary and secondary data. The primary data collection was done through questionnaires and interviews. The secondary data collection involved document analysis of books, newspapers and reports. The quantitative data analysis followed partial correlation for studying the relationship between gender, service and cadre of work. The results revealed that gender, service, cadre of work and time spent in the workplace were significantly correlated with energy conservation efforts of the university staff. Qualitative data analysis was performed by identifying codes and themes in response patterns. Although 80% of the respondents were aware about energy conservation techniques, their practices for the same were found to be rare in daily life. The researchers recommended energy auditing and participatory management strategies to enhance the energy conservation practices in the campus.

Khan and Halder (2016) case studied the individual behavior change in electrical energy conservation in a family as well as student's hostel in Bangladesh. It was found that electricity consumption was more contributed in the hostel by lights, fans, electric kettle and heaters. Major part of power consumption in the family came from lights, fans, refrigerator, oven and electric pump. The occupants in both the places were motivated to avoid electricity misuse by bringing about a behavioral change in them through awareness campaigns. The electricity consumption of the same months of 2014 and 2013, i.e. before the awareness campaign and after that were

compared by analyzing the meter readings. It was confirmed that around 30 kWh and 23 kWh energy was saved in the family during the periods of July-August and November-December respectively. The power savings in the student's hostel for the respective durations were 49 kWh and 80 kWh.

Lee and Tanusia (2016) studied the behavioral intention and attitude of university students towards energy conservation. The data was collected from 194 students by employing survey method. The tool used was a questionnaire comprising of sections such as personal profile of respondents, student attitude in home, student attitude in university, subjective norms, self efficacy and energy conservation intention. Majority of the respondents were in the age range from 18 to 23. The evaluation procedure of the structural model was done by examining R^2. In order to get T value, bootstrapping method was used. The analysis revealed that student attitude at home, subjective norms, and self efficacy were positively correlated with intention for energy conservation. The study also confirmed the students' belief that their own decision, along with family and peers influence is contributing intention for energy conservation.

Studies on Waste Management

Achankeng (2004) investigated and compared the solid waste management in two cities of Cameroon. The study followed a combination of methods such as survey using questionnaires, interviews, observatory

schedules and secondary data analysis. The major aspects of waste management issues and indicators of sustainability were highlighted in the questionnaire. The study findings revealed that households were the sources of the major part of solid waste which was dumped on the planes in Bamenda city. The overall generation of waste by the city was 120-160 tonnes per day. Yaoundé city generated 1200 tonnes of waste per day out of which 75% was biodegradable. Despite having the sound physical facilities, both the cities were unable to deal with drastic waste generation issue. The negligence of the cities in waste recycling, waste reduction and safe disposal generated health related problems. The waste policies of the cities were not clear and neither of the cities followed sustainable practices of waste management. The researcher proposed a good model for urban waste management.

Radwan, Jones and Minoli (2010) studied about solid waste management in hotels of United Kingdom. The effort of public sector in facilitating the solid waste management of hotels was also explored in the study. Data was collected using semi-structured interviews with open ended questions. Target hotels were chosen which had rooms less than 30. Interviews were conducted with hotel managers and waste management professionals following snowball sampling. The interview questions addressed the areas like modes of waste disposal, waste recycling practices and the challenges faced by hotels in managing solid waste. The interview data was analyzed by constant comparison based on grounded theory

approach. The results revealed that the hotel staff followed waste management practices such as land filling, recycling and donation of electronic items. Majority of respondents opined that waste reduction was not an accessible choice in small hotels because most of the hotel staffs were unaware of waste minimization methods. The investigators recommended the need to provide more incentives and support from local bodies for better waste management practices of hotels.

Rioux (2011) studied the pro-environmental behavior regarding the management of waste batteries by secondary school students. Survey method was adopted using questionnaire. The questionnaire addressed the areas such as the existing habits of recycling, ecological values, and awareness regarding adverse effects of useless batteries, behavioral control and readiness for ecological actions. The sample comprised of 102 Secondary school students. The results showed that 73% of pupils used the collection system set up by the schools in order to recycle batteries. According to the findings 55% of pupils didn't show any change in their ecological behavior and one out of four pupils still used to throw the useless batteries to surroundings. The researchers opined that adolescent people's behavior regarding used batteries could be predicted by social, affective and cognitive variables.

Edumadze, Tenkorang, Armah, Luginaah and Edumaze (2013) studied the awareness level of E-waste management among the university students in

Ghana. The study used survey method. The survey instrument comprised of the areas like environmental attitude, environmental behavior, E-waste awareness and recycling options. A set of items in 3- point scale form were framed along with open-ended questions. A total of 1200 questionnaires were distributed among the sample, out of which 1154 were returned. The findings revealed low E-waste awareness among the students even though their courses of study were related to environment. Students possessed higher level awareness of E-waste impacts on air and soil compared to their awareness in most favorable E-waste management practices.

Guan, Zhang, Zhao, Huang and Li (2015) investigated the features and existing practices of household waste management in China. The researchers derived Rural Domestic Waste (RDW) data of Zhejiang province from published Government documents, journals and books. The data analysis was carried out using Micro-soft Excel 2003. For predicting the population growth in rural sector of Zhejiang province, Non-linear Regression was carried out. The data analysis showed that the major part of Rural Domestic Waste (RDW) was contributed by organic waste (70%). There was 75.5% of combustible waste, 24.8% of recyclable waste and 54.1% of compostable waste. The study reported that the current RDW was not at all an agricultural fertilizer. The unscientific disposal practices followed such as burning and land filling had lead to pollution of water bodies and agricultural fields. Rural domestic waste disposals were not getting enough monitoring or sufficient

financing from the part of government. The researchers recommended the need to improve the rural domestic waste management practices to minimize the environmental impacts.

Studies on Green Purchasing

Ishaswini and Datta (2011) studied whether the pro-environmental concerns of Indian consumers would affect their green purchasing. The researchers adopted survey method using structured questionnaire among twenty well qualified consumers. The tool comprised of items to assess ecological awareness, ecological concerns, faith in eco-friendly products and eco-friendly purchasing behavior among the respondents. The study results were derived by using descriptive analysis, factor analysis, and correlation technique. According to the results, there was significant influence of pro-environmental concerns on the green buying behavior of the subjects. The researchers also reported that the awareness of consumers regarding environment friendly products influenced their green purchasing behavior.

Yang and Zhang (2012) investigated the elements which affect the green procurement practices of consumers in China. The sample for the study was 144 top managers and purchasing experts from Hubei province of China. Five point Likert scale was used for measuring items which consisted of items belonging to sessions such as basic knowledge regarding green purchasing and practices of green purchasing. The tool was administered through E-

mailing and telephonic interviews. The factor analysis of data was done by SPSS software which identified five factors i.e., activities of waste segregation, cost of ecological management, consumer/supplier pressure, leadership commitment and law and regulation awareness. Regression analysis indicated that green procurement practice was positively correlated with the factors: consumer/supplier pressure, leadership commitment; and law and regulation awareness. It was also revealed that green procurement practice was negatively correlated with the cost of ecological management.

Finzer et al (2013) studied the buying preference of fruits and vegetables of 245 households in southern Delhi. Survey method was administered using questionnaire in order to know preferred places of purchases and attitude towards organic products. The study also followed in-depth interview with 62 key informants. The results revealed that majority of the households preferred purchasing of fruits and vegetables from street vendors than from specific shops. 47% of the sample was aware about the chemical pesticides and insecticides that may be hidden in the fruits and vegetables. This factor influenced the purchasing decision of 86% of the households. 41% of the households were aware about the organic fruits and vegetables. The study also revealed a promising fact that 62% of the sample expressed willingness to pay more for organic products.

Guenther, Hueske, Stechemesser and Buscher (2013) conducted a multilevel case study on the 'Why Not' - Perspective of green buying. The study was conducted in three stages. In the initial stage the challenges for green purchasing were identified from six municipalities of five European countries. During next stage, the findings emerged from first stage were combined with literature review to form a barrier framework for green procurement by analyzing individual level and organizational level purchasing. In the last stage, the hypotheses formed were tested, and conclusion was derived. The techniques used for data collection were interviews, questionnaires and content analysis. The study showed that consumers of different services rated barriers as differently. The findings also revealed that the element ‘own influence' had positive correlation with majority of the barriers. The researchers expressed hope that the study will serve as a guiding force to frame new strategies to overcome the challenges in green buying.

Ayadi and Lapeyre (2014) studied the consumer's ‘Willingness To Pay’ (WTP) during eco-friendly purchases. The study was conducted by experimental method by randomly assigning 262 consumers to one of the nine situations. First of all, the advertisements for particular eco product was shown to each participant through online along with the ecological message matching to that category. The price of the product was kept hidden. The participants declared their willingness to pay for the product. The

manipulated price was shown at this moment. The participants then would exercise their final decision regarding purchasing considering the economic risk and environmental benefits. WTP was assessed by using open ended questions. Dichotomous scale was used to assess consumer's purchase intentions. The findings showed that there was a mediating effect of WTP on the relationship between buyer's perception and buying intention.

Dagher and Itani (2014) conducted a study on the factors that affect the green purchase behavior among Lebanese consumers. The required data was collected from 101 respondents using a questionnaire having items representing four factors. The factors considered for the tool were perceived seriousness on environmental problems, perceived environmental responsibility, perceived effectiveness of environmental behavior and concern for self image in environmental protection. Five point Likert scale was used to measure the responses. Correlation and regression analysis revealed that three factors were positively correlated with green purchase behavior i.e. perceived seriousness on environmental problems, perceived environmental responsibility and concern for self image in environmental protection. The major contributory factor was perceived seriousness on environmental problems.

Anvar and Venter (2014) studied the attitude and purchase behavior of green products among generation Y consumers of South Africa. The data was collected using a questionnaire from 200 respondents between the age group

18 to 25, selected through convenient sampling. The items in the questionnaire were adopted from the reliable and valid tools identified through the review of literature. Regression analysis was conducted. The results indicated that the factors such as social influence, environmental awareness and price positively influenced the attitude towards green purchasing. It was also revealed that there was difference between men and women in the green purchase behavior.

Studies on Green Transport

Nilson and Kuller (2000) studied the travel behavior and environmental concern of public and civil servants in Lund of South Sweden. The first survey was performed among 71,000 residents of Lund. The questionnaire for the survey comprised of areas such as annual driving distance, travel behavior and acceptance of traffic restrictions. The second survey was conducted among 107 civil servants of Lund. The survey tool comprised of items representing traffic restrictions, knowledge and attitude. The findings revealed that both the groups were identical in environmental concern, hazard/efficacy perceptions as well as car affection. But there were differences in choices of restrictions between both the groups. The researchers recommended that implementation of novel action plans and focus on basic attitudes would be helpful to encourage green travel behavior among the people.

Khan and Morris (2009) studied the green travel behavior of Americans. The study intended to find out whether the green ideology of people affects their green travel behavior. Both national and California data was gathered from the public census of 2000 and National Household Survey of 2001. The indicators of green ideology were framed by making use of voter records, public party memberships and hybrid auto memberships. The results confirmed that green beliefs and values possessed by individuals influenced their green travel behavior. Unlike the other communities, the green communities settled near cities and railway transits where they could easily access the eco-friendly transport facilities. The researchers also made a prediction that the green travel behavior may lead to green beliefs also.

Harvey, Thorpe and Fairchild (2013) studied the attitude of drivers towards eco-friendly driving. The study included eight focus groups of fleet drivers. Survey was conducted among 350 drivers investigating their attitudes towards fuel saving, green goods and the role of incentives. The findings showed that ecological concern was not given a high priority by drivers. Poor financial incentive was a major barrier as revealed by majority of the drivers. According to majority of the respondents, convenience was more important than saving from fuel efficiency.

Kaplan (2015) explored the sustainable transportation practiced by students in Kent State University of USA. In the initial phase of the study the

cycling and walking habits of students were observed in fixed time intervals. During the second phase an online survey was performed among 668 students to explore their transportation behavior. In the third phase the facilities and barriers affecting sustainable transport in the campus were examined. The study revealed a low level of cycling and walking habits among the students in the campus, since majority of them depended on private vehicles. Lack of facilities like sidewalks, street walks, and bike keeping spaces were pointed out by the respondents as the major barriers for sustainable transport in the campus.

Kai and Haokai (2016) studied the factors affecting green commuting of Chinese consumers. The study was performed by extending the theory of planned behavior in order to derive the impact of subjective factors on green travel practices. Survey was conducted by administering questionnaire among 1355 commuters settled in Beijing and Shanghai selected by random sampling. The tool included subjective factors, travel behavior and socio-demographic profiles of the subjects. The data analysis was done following structural equation modeling and factor analysis. The findings confirmed that the factors such as environmental concern, attitude and intentions had greater explanatory power regarding green commuting. The study also confirmed that the factor 'intentions' was the major predictor of green commuting.

Jia, Appolloni and Wang (2017) investigated the green transport behavior of Chinese urban residents. Q method was followed in the study to group individuals with identical travel characteristics. Data analysis was performed using software PCQ for Windows Academic Edition. The study identified three traveler groups such as 'green', 'light green' and 'brown' travelers. The 'green' group chose eco-friendly transport in order to be harmonious with nature. They prioritized public transport system even though they owned cars. This group did not consider the mode of transport as a platform to reflect their social status. The 'light green' group was influenced by few external factors in adopting travel choices such as personal habits, travel comfort and safety. The researchers recommended that provision of incentives would facilitate the transformation of 'light green' group to ‘green’ traveler group. The study also revealed that the 'brown' traveler group never believed that individual habits have crucial role in protecting the environment. Hence they were often dependent upon private transport system merely on the basis of individual habits and comforts.

Conclusion

During the review of related literature, the investigator could go through some of the ample studies related to Education for Sustainable Development (ESD), Environmental Education Practices and Pro-environmental behavior carried out in various countries. The investigator also reviewed specifically

studies based on sustainable agriculture, water conservation, energy conservation, waste management, green purchasing and green transport. All of the reviewed studies belonged to a period since 1999.

One among the striking points the researcher noticed is that there were only very few studies done in India in the research area. This shows that we need to go far beyond to reach up to the level of global standards in achieving the goals of sustainable development. Almost all the reviewed studies have adopted mixed method combining different methods such as grounded theory approach, observations, interviews, focus group discussions, surveys, case studies etc., rather than sticking upon a particular method.

The review revealed that there had been several attempts to integrate ESD into school curriculum all over the world. However, these attempts were not fully successful since the representation of ESD in the school curriculum was only in a peripheral level in most of the countries, as indicated by studies (Sankey, Furay& Simmons 1999;Liu, 2009) and hence didn't contribute much in developing pupil's sustainability knowledge, attitude and behavior (Olsson, Gericke and Rundgren, 2015).

The study conducted by Lee, Wong, and Luo (2000) revealed that short term Environmental Education programs provided unique opportunities for students for natural observation, natural protection, specimen collection and waste recycling. Eco-friendly activities were the key factors which brought

majority of the respondents close to nature according to Eames, Cowie and Boltsand (2008). The green activities popularly practiced by the schools as identified in review were greening the school compound, vegetable and floral gardening, water recycling, waste recycling, pollution control, energy conservation, waste management etc.

The implementation of sustainability practices in schools is not an easy task as there are a lot of barriers encountered by schools, such as lack of time, scarcity of resources (Eames, Cowie and Bolstand, 2008), poor awareness, inadequate funding, lack of trained personals, inadequate national polices, poor organizational set up, poor community collaboration, lack of recognition for ESD initiatives, and conventional disciplinary curriculum (Liu, 2009).

The investigator could identify many suggestions put forwarded by different researchers in order to improve the sustainability practices of schools. Whole school change and professional re-orientation of teachers were suggested by Nixon, Sankey, Furay and Simmons (1999). Problem solving learning and inquiry learning were recommended as best pedagogical approaches for Education for Sustainability by Green and Somervelle (2014). The researchers also suggested networking as an effective approach in extending sustainability programs of schools to community level.

Few researchers recommended the need of exploring new approaches for implementing ESD programs (Olsson, Gericke, &Rundgren, 2015) and

need to design additional curriculum and special programs (Lee, Wong, &Luo, 2000). The need of adequate teacher training was recommended by Kennelly, Taylor and Jenkins (2008). The need to pay more attention in the provision of eco-friendly playgrounds, composting sites and agricultural sites was suggested by Tanuk and Kayihan (2012). Thus the review of related literature provided clear direction to the researcher for framing objectives, to design methodology and to construct the relevant tools for the research.

CHAPTER IV
METHODOLOGY

- Variables
- Objectives
- Hypothesis
- Research method
- Sampling
- Tools used for collecting data
- Statistical techniques used for data analysis

METHODOLOGY

The present study intended to explore the 'Sustainable Lifestyle Practices' in Upper Primary Schools of Kerala. This requires a systematic description of the methodology adopted for the study. The chapter gives a detailed account of methodology employed for the study.

Methodology

Methodology plays a pivotal role in any research, since the success of research depends heavily on the appropriateness of the methodology adopted. Methodology provides a complete framework of the research being conducted. The different subheads coming under methodology are:

- Variables
- Objectives
- Hypothesis
- Research method
- Sampling
- Tools used for collecting data
- Data collection procedure
- Statistical techniques used for data analysis

Variables

There is only one variable in the present study that is 'Sustainable Lifestyle Practices'.

Objectives

1. To analyze the Science text books of Upper Primary Schools following state syllabus to explore the content representing ‘Sustainable Lifestyle Practices’.
2. To derive experts’ viewpoints on the present trend and suggestions for improvement of ‘Sustainable Lifestyle Practices’ of Upper Primary Schools.
3. To study the level of students’ perception on ‘Sustainable Lifestyle Practices’ of Upper Primary schools.
4. To find out whether there is any significant difference in students’ perception on ‘Sustainable Lifestyle Practices’ of schools between

    a) Government and Aided school students

    b) Urban and Rural students

    c) Boys and Girls

5. To find out the status of implementation of ‘Sustainable Lifestyle Practices’ by Upper Primary Schools as perceived by Eco-club in-charges.

6. To study the constraints faced by Eco-club in-charges in implementing 'Sustainable Lifestyle Practices' in schools.

Hypothesis

1. There exists significant difference in students' perception on 'Sustainable Lifestyle Practices' of schools between

   a) Government and Aided School students

   b) Urban and Rural students

   c) Boys and Girls

Methodology

Research method

The study used a combination of content analysis, interviews and survey method. It was carried out in three phases.

Phase one: Content analysis of text books

During the first phase, content analysis of state syllabus Science text books of Upper Primary level was carried out in order to identify the content connected with 'Sustainable Lifestyle Practices' represented by the text books. Unit-wise analysis of the Science text books of 5^{th}, 6^{th} and 7^{th} standards developed by SCERT, Kerala was conducted. The investigator also identified the gaps in content of 'Sustainable Lifestyle Practices' provided.

After detailed analysis of the content the investigator suggested some relevant areas of content and learning activities which could be added in order to improve the representation of 'Sustainable Lifestyle Practices' by the text books.

Need of Content Analysis

The investigator understood that the exploration of 'Sustainable Lifestyle Practices' of Upper Primary Schools will be incomplete without a detailed analysis of Upper Primary text books. Content analysis will be helpful to check the distribution and integration of content connected with 'Sustainable Lifestyle Practices' in text books. The investigator specifically chosen Science text books of Upper Primary level, since the topics regarding 'Sustainable Lifestyle Practices' were covered maximum in Science text books. The researcher hopes that content analysis of the text books will be beneficial for improving and enriching the content associated with 'Sustainable Lifestyle Practices' in Upper Primary Science text books.

Phase two: Interview

In the second phase of the research, interviews were conducted with three groups of experts such as curriculum framers of Upper Primary level, environmental experts and highly successful Eco-club in-charges of schools. Separate semi- structured interview schedules were prepared for each of these groups in order to get their views on 'Sustainable Lifestyle Practices' adopted

by the schools. Experts' suggestions were also collected to make the 'Sustainable Lifestyle Practices 'of schools better.

Phase three: Survey

In this phase the investigator conducted a survey among students and teachers of selected 72 Upper Primary Schools representing six districts; i.e., Malappuram, Kozhikode, Thrissur, Palakkad, Alappuzha and Kottayam. The qualitative phase of the study which was conducted earlier helped the investigator to fix the dimensions for the scales employed in the survey. Students' perception on 'Sustainable Lifestyle Practices' of schools was gathered using the scale designed for the same. Here the data was gathered from 841 seventh standard students selected from 72 schools who were active members of school Eco-clubs.

Data was also gathered regarding the status of implementation of 'Sustainable Lifestyle Practices' by schools. Here the data was collected from teachers in-charge of Eco-clubs of the 72 schools using a scale designed for the same. The dimensions used for both the scales were sustainable agriculture, water conservation, energy conservation, waste management and green purchasing. A questionnaire was also employed among Eco-club in-charges of schools to study the constraints in implementing 'Sustainable Lifestyle Practices' in schools.

Sampling

Sample

The sample selected for the study was 72 Upper Primary Schools selected from six districts of Kerala. The investigator understood that students and teachers actively involved in school Eco-clubs will be more resourceful regarding the 'Sustainable Lifestyle Practices' of schools. Hence the required data was collected from 841 students of 7th standard who were active members of Eco-clubs of the selected schools, as suggested by the Eco-club in-charges. Data was also gathered from 72 teacher in-charges of the school Eco-clubs, 3 curriculum framers, 3 environmental experts and 3 Eco-club in-charges of highly successful green schools.

Sampling technique

The technique of sampling followed to select Upper Primary schools for the study was stratified random sampling. Due representation was given to type of school and locale while selecting schools. Since the survey was carried out specifically among the students who were members of school Eco-clubs and Eco-club in-charges, purposive sampling was adopted here. The curriculum framers, environmental experts and highly successful Eco-club in-charges were also selected based on purposive sampling.

The survey was carried out in six districts such as Malappuram, Kozhikode, Thrissur, Palakkad, Alappuzha and Kottayam. The final 'breakup of the schools selected as sample for the study is given in Table 1.

Table 1

Final break up of sample

Sl.No.	District	Number	Govt./Aided	Urban/Rural
1	Malappuram	17	G-6 A-11	U-5 R-12
2	Kozhikode	16	G-5 A-11	U-6 R-10
3	Trissur	11	G-4 A-7	U-4 R-7
4	Palakkad	10	G-4 A-6	U-3 R-7
5	Alappuzha	8	G-3 A-5	U-3 R-5
6	Kottayam	10	G-4 A-6	U-3 R-7
	Total	72	G-26 A-46	U-24 R-48

The complete list of schools selected for the study is provided in the Appendix I

Data collection procedure

The researcher took prior permission from the heads of the institutions for executing the survey. Before administering the tool instructions were

given for teachers and students. Fixed time duration was given to complete the response sheets. After completing the survey the investigator herself collected the filled response sheets. The data was consolidated and tabulated for further analysis.

Tools used of collecting data

1. Semi-structured interview schedule for curriculum framers of Upper Primary level.
2. Semi-structured interview schedule for environmental experts.
3. Semi-structured interview schedule for Eco-club in-charges of highly successful green schools.
4. Scale of Students' Perception on Sustainable Lifestyle Practices of Schools (administered on 7^{th} standard students who are active Eco-club members of schools) (Deepthi & Meera, 2016).
5. Scale of Status of Implementation of Sustainable Lifestyle Practices by Schools (administered on Teachers in-charge of Eco- clubs of schools) (Deepthi & Meera, 2016.)
6. Questionnaire on the Constraints in Implementing Sustainable Lifestyle Practices in Schools (administered on Teachers in-charge of Eco-clubs of schools).

Description of the tools

1. Semi-structured interview schedule for curriculum framers of Upper Primary level

The experts who were members of the text book development committee of Science text books of Upper Primary level were interviewed. The researcher prepared a semi-structured interview schedule for this consisting of seven open ended questions. The questions in the interview schedule were prepared so as to derive experts' viewpoints on the representation of 'Sustainable Lifestyle Practices' in the present Science text books of Upper Primary level. Suggestions were also taken from the experts to improve the transaction of 'Sustainable Lifestyle Practices' through curriculum in a better way. The English version of the interview schedule is provided in Appendix II.

2. Semi-structured interview schedule for environmental experts

A semi-structured interview schedule was prepared to seek the opinion of environmental experts regarding the existing 'Sustainable Lifestyle Practices' of schools. There were six open ended questions in the schedule. The investigator attempted to elicit the drawbacks in the prevailing practices of schools also. Experts' suggestions to improve the green initiatives of schools were also collected. The English version of the interview schedule is provided in Appendix III.

3. Semi-structured interview schedule for highly successful Eco-club in-charges

A separate semi-structured interview schedule was prepared to conduct interview with few highly successful Eco-club in-charges. The investigator selected the schools which excelled in the SEED program of 'Mathrubhumi' daily as highly successful green schools, since the SEED program attempts to integrate majority of the 'Sustainable Lifestyle Practices'. There were six open ended questions in this schedule. The interview schedule included the questions regarding diverse 'Sustainable Lifestyle Practices' adopted by the schools, motivators and difficulties in implementing such practices in schools and experts' suggestions to make the 'Sustainable Lifestyle Practices' of the schools more productive. The English version of the interview schedule is provided in Appendix IV.

The complete list of experts interviewed is provided in Appendix V.

4. Scale of Students' Perception on 'Sustainable Lifestyle Practices' of Schools (Deepthi & Meera, 2016).

The scale is intended to assess the 'Sustainable Lifestyle Practices' implemented by Upper Primary Schools as perceived by the students. The tool is meant for collecting data from Upper Primary School students who are active members in school Eco-clubs. For designing the tool, the investigator followed the steps such as:

- Planning the scale
- Construction of the scale
- Scoring
- Trying out
- Item analysis
- Establishing reliability and validity

Planning the scale

In this stage, the investigator carried out detailed review of studies related to 'Sustainable Lifestyle Practices'. The investigator also conducted discussions with teacher in-charges of environment clubs of various schools. These along with the insights obtained to the researcher during the qualitative phase of the study helped to finalize the dimensions of the tool such as 'sustainable agriculture', 'water conservation', 'energy conservation', 'waste management', and 'green purchasing'.

Construction of the scale

The investigator explored the varied 'Sustainable Lifestyle Practices' those are relevant in the context of Upper Primary Schools in Kerala. For this she made use of internet, news paper articles, and newsletters of schools mentioning about different eco-friendly practices. Based on these the investigator framed appropriate statements under each of the five dimensions.

Different items of 'Sustainable Lifestyle Practices' coming under each of the dimensions are:

a) Sustainable Agriculture: The practice of eco-friendly farming techniques and the popularization of agriculture among the students.

E.g. School used to conduct classes on organic farming by inviting experienced persons from the field.

b) Water Conservation: The practice to restrict the misuse of water and to take effective strategies to conserve water.

E.g. Even the small leakages of pipes or water tank are checked and tackled immediately in the school.

c) Energy Conservation: The practice to minimize energy consumption and to popularize usage of alternative energy sources.

E.g. The lights and fans of some of the areas of the school are left continuously 'on' even when none is attending.

d) Waste Management: The waste management practice based on eco-friendly principles of reuse, reduce and recycle.

E.g. Plastic plates and cups are being used for serving food on various occasions in the school.

e) Green Purchasing: To promote the practice of purchasing eco-friendly products in order to reduce the impacts on environment.

E.g. School used to conduct trade fairs of eco-friendly products.

The distribution of items in the draft scale is presented in Table 2.

Table 2

The distribution of items in the Draft scale

Sl.No.	Dimensions	Items	Number of items
1.	Sustainable agriculture	1-15	15
2.	Water conservation	16-30	15
3.	Energy conservation	31-45	15
4.	Waste management	46-60	15
5.	Green purchasing	61-75	15
	Total		75

Scoring

The 'Scale of Students' Perception on Sustainable Lifestyle Practices of Schools' was designed as a three point scale. There were three responses to each of the statements such as 'completely agree', 'partially agree', and 'disagree'. The scoring was done as 2, 1, 0 for positive statements and 0, 1, 2 for negative statements.

Trying out

The 'Scale of Students' Perception on Sustainable Lifestyle Practices of Schools' was tried out among 370 Upper Primary School students selected by random sampling.

Item analysis

Item analysis was carried out to confirm the items for the final scale based on discriminating power. Responses of students were arranged in ascending order from bottom to top on the basis of the total scores gained by the respondents. Hundred responses of high scores and low scores were chosen to represent the upper and lower groups. The discriminating power of each item was obtained by testing whether the gained difference in mean scores between both the groups were significant or not. The critical ratio (t-value) of each item was calculated using the formula of Edward (1969)

$$t = \frac{\overline{X}_H - \overline{X}_L}{\sqrt{\frac{\Sigma(X_H - \overline{X}_H)^2 + \Sigma(X_L - \overline{X}_L)^2}{n(n-1)}}}$$

Where

X_H - The score on a given statement for high group

$\overline{X}_H$ - The mean score on the same statement for high group

X_L - The score on a given statement for low group

$\overline{X}_L$ - The mean score on the same statement for low group

n - Number of cases

The t-values obtained for each of the items in the 'Scale of Students' Perception on Sustainable Lifestyle Practices of Schools' is given in the Table 3.

Table 3

Details of item analysis of 'Scale of Students' Perception on Sustainable Lifestyle Practices of Schools'

Item No:	t-value	Accepted/ Rejected	Item No:	t-value	Accepted/ Rejected
1	2.73	Accepted	39	8.67	Accepted
2	2.46	Accepted	40	1.82	Rejected
3	4.67	Accepted	41	3.80	Accepted
4	1.31	Rejected	42	4.08	Accepted
5	14.01	Accepted	43	1.00	Rejected
6	2.41	Accepted	44	2.07	Accepted
7	11.21	Accepted	45	3.67	Accepted
8	4.50	Accepted	46	0.22	Rejected
9	2.09	Accepted	47	1.28	Rejected
10	1.23	Rejected	48	0.14	Rejected
11	13.03	Accepted	49	2.97	Accepted
12	6.45	Accepted	50	1.00	Rejected
13	5.08	Accepted	51	8.40	Accepted
14	1.98	Accepted	52	1.53	Rejected
15	11.63	Accepted	53	1.14	Rejected
16	2.00	Accepted	54	1.09	Rejected
17	4.69	Accepted	55	7.80	Accepted
18	1.09	Rejected	56	10.71	Accepted
19	0.96	Rejected	57	1.72	Rejected
20	1.16	Rejected	58	2.50	Accepted
21	1.00	Rejected	59	4.56	Accepted
22	0.70	Rejected	60	12.00	Accepted
23	1.28	Rejected	61	2.32	Accepted
24	5.49	Accepted	62	1.41	Rejected
25	0.57	Rejected	63	3.81	Accepted
26	5.57	Accepted	64	6.82	Accepted
27	1.97	Accepted	65	0.00	Rejected
28	10.97	Accepted	66	0.57	Rejected
29	10.82	Accepted	67	5.33	Accepted
30	2.36	Accepted	68	1.00	Rejected
31	2.94	Accepted	69	2.35	Accepted
32	1.72	Rejected	70	4.16	Accepted
33	0.30	Rejected	71	0.49	Rejected
34	1.07	Rejected	72	2.18	Accepted
35	2.87	Accepted	73	2.06	Accepted
36	3.23	Accepted	74	6.02	Accepted
37	13.34	Accepted	75	3.30	Accepted
38	0.57	Rejected			

The items having‘t’ values equal to or more than 1.96 were included in the final scale. The total number of items selected for the final scale was 47.

Establishing reliability and validity

Reliability

Test-retest method was followed to ensure the reliability of the scale. For this, the scale was administered for a group of fifty 7th standard students. The tool was administered again to the same group of students after an interval of 3 weeks. From these two sets of scores co-efficient of correlation was found out. The reliability co-efficient obtained was 0.81 which proved that the scale is reliable.

Validity

Content validity of the scale was ensured by subjecting the items of the scale for experts’ evaluation. The panel of experts included academic experts from Environmental Education, Environmental activists and green teacher leaders. As per the evaluation of the experts all the items of the scale covered significant aspects of ‘Sustainable Lifestyle Practices’. The investigator claimed that the scale is having construct validity as it was prepared based on the existing theory on ‘Sustainable Lifestyle Practices’ available through authentic sources. A tool is having face validity if it is measuring what the author had in mind. The researcher claimed that the scale possessed face

validity since all the items were constructed in the least ambiguous way by purposefully avoiding unfamiliar terms.

English version of the draft scale and response sheet is presented in Appendix VI and Appendix VII respectively. English and Malayalam versions of the final scale with response sheet are provided in Appendix VIII, Appendix IX and Appendix X respectively.

5. Scale of Status of Implementation of Sustainable Lifestyle Practices by Schools (Deepthi & Meera, 2016).

The scale aimed to assess the status of implementation of 'Sustainable Lifestyle Practices' by Upper Primary Schools. The data was gathered from Eco-club in-charges of each of the schools selected. The investigator understood that Eco-club in-charges would be more resourceful to provide accurate information regarding the status of implementation of 'Sustainable Lifestyle Practices' in the school as these teachers are leading the green initiatives of their schools.

Tool preparation

Here also the investigator followed systematic steps as done in the first tool. These are

- Planning the scale
- Construction of the scale

- Scoring
- Trying out
- item analysis and
- Establishing the reliability and validity

Planning the scale

For planning the scale, the investigator fixed the dimensions of 'Sustainable Lifestyle Practices' which are the same as in the first tool. (i.e., sustainable agriculture, water conservation, energy conservation, waste management and green purchasing).

Construction of the scale

In this stage the 'Sustainable Lifestyle Practices' those are relevant to Upper Primary Schools were chosen. Majority of the practices which were selected for the scale were the same as that of the first tool. Some additional items were also included in the scale which were answerable only by the teachers. The items were framed in the form of phrases. Some of the items selected for the scale in the five dimensions are:

a) Sustainable Agriculture

E.g. Training provided for students to prepare bio-fertilizers and bio-pesticides.

b) Water conservation

E.g. Drip irrigation facility in the school farm.

c) Energy Conservation

E.g. Usage of star labeled electrical equipments.

d) Waste Management

E.g. Activities to promote reuse by collecting used books and clothes from students.

e) Green purchasing

E.g. Formation of green purchasing team/committee.

Scoring

The ‘Scale of Status of Implementation of Sustainable Lifestyle Practices by Schools’ was a 5-point scale. For each of the items five responses were given such as 'implemented completely', 'implemented partially', 'will implement soon', 'will consider in future' and 'not interested'. The scoring pattern followed was 4, 3, 2, 1, 0 respectively.

Trying out

The draft scale was tried out among 100 Upper Primary School teachers selected from 35 schools who were Eco-club members of the

schools. This was done to find out the difficulty index and discriminating power for finalizing the most appropriate items for the final scale.

Item analysis

In order to determine the items for the final scale item analysis was done following Edwards' (1969) method. The response sheets were scored based on the scoring pattern described above. The response sheets were arranged in the ascending order based on the total score obtained for each of them. The upper 27% of high scores and lower 27% of low scores were taken to represent the upper and lower groups. The t-value for each item was calculated using the formula

$$t = \frac{\overline{X}_H - \overline{X}_L}{\sqrt{\frac{\Sigma(X_H - \overline{X}_H)^2 + \Sigma(X_L - \overline{X}_L)^2}{n(n-1)}}}$$

Where

X_H - The score on a given statement for high group

$\overline{X}_H$ - The mean score on the same statement for high group

X_L - The score on a given statement for low group

$\overline{X}_L$ - The mean score on the same statement for low group

n - Number of cases

The t- values obtained for each item are provided in the Table 4.

Table 4

Details of item analysis of 'Scale of Status of Implementation of Sustainable Lifestyle Practices by Schools'

Item No:	t-value	Accepted/ Rejected	Item No:	t-value	Accepted/ Rejected
1	3.39	Accepted	39	2.70	Accepted
2	2.40	Accepted	40	0.22	Rejected
3	4.08	Accepted	41	3.07	Accepted
4	2.17	Accepted	42	0.64	Rejected
5	5.17	Accepted	43	1.98	Accepted
6	1.90	Rejected	44	2.12	Accepted
7	3.98	Accepted	45	0.44	Rejected
8	4.39	Accepted	46	3.61	Accepted
9	1.78	Rejected	47	2.01	Accepted
10	3.25	Accepted	48	0.77	Rejected
11	3.70	Accepted	49	1.69	Rejected
12	1.00	Rejected	50	1.64	Rejected
13	4.93	Accepted	51	1.07	Rejected
14	0.77	Rejected	52	1.56	Rejected
15	1.58	Rejected	53	2.36	Accepted
16	1.76	Rejected	54	3.59	Accepted
17	4.28	Accepted	55	0.00	Rejected
18	2.20	Accepted	56	1.49	Rejected
19	1.84	Rejected	57	3.12	Accepted
20	2.60	Accepted	58	2.20	Accepted
21	2.20	Accepted	59	2.38	Accepted
22	1.77	Rejected	60	2.72	Accepted
23	0.43	Rejected	61	1.59	Rejected
24	0.57	Rejected	62	3.70	Accepted
25	1.68	Rejected	63	1.46	Rejected
26	2.95	Accepted	64	2.65	Accepted
27	3.31	Accepted	65	2.54	Accepted
28	3.18	Accepted	66	2.88	Accepted
29	0.42	Rejected	67	0.49	Rejected
30	1.29	Rejected	68	2.30	Accepted
31	1.43	Rejected	69	2.47	Accepted
32	0.33	Rejected	70	2.83	Accepted
33	1.68	Rejected	71	2.82	Accepted
34	2.36	Accepted	72	3.83	Accepted
35	4.12	Accepted	73	2.38	Accepted
36	1.20	Rejected	74	3.16	Accepted
37	0.33	Rejected	75	3.69	Accepted
38	2.96	Accepted			

The items that have value equal to or more than 1.96 were selected. The total number of items included for the final scale was 44.

Reliability

In order to establish the reliability of the scale test retest method was followed. The reliability co-efficient obtained for the scale was 0.79 which confirmed that the scale is reliable.

Validity

Content validity and face validity was ensured for the scale by subjecting the tool for experts' evaluation. The panel of experts consulted included Environmental Education experts, environmental activists and green teacher leaders. The experts opined that the tool assessed the specific concepts coming under 'Sustainable Lifestyle Practices' in a least ambiguous way. English version of the draft scale along with English and Malayalam versions of the final scale is provided in Appendix XI, Appendix XII and Appendix XIII respectively.

6) Questionnaire on the Constraints in Implementing 'Sustainable Lifestyle Practices' in Schools

The questionnaire is used to find out the extent to which different constraints affect the implementation of 'Sustainable Lifestyle Practices' in schools.

Planning the tool

In this stage the researcher reviewed literature regarding different constraints in executing 'Sustainable Lifestyle Practices' in schools. Along with this the interactions conducted with Eco-club in-charges of selected schools also helped to identity the major constraints in implementing 'Sustainable Lifestyle Practices' in schools.

Construction of the tool

Analyzing the different constraints, sixteen major constraints were finally selected for the tool. The items were such as

E.g. How does the following constraint affect the implementation of 'Sustainable Lifestyle Practices' of your institution?

1. Lack of funds

a) Extremely b) Moderately c) Not at all

An open ended question was also asked in the final part of the tool to mention whether there are any other constraints in implementing 'Sustainable Lifestyle Practices' in schools, which are not included in the tool.

The English version of the Questionnaire is provided in the Appendix XIV.

Stastistical Techniques Used

t-Test and Percentage Analysis.

CHAPTER V
ANALYSIS

❖ *Qualitative and quantitative analysis of the data*

ANALYSIS

The chapter covers a detailed analysis of the qualitative and quantitative data collected for the study.The qualitative data analysis includes the analysis of data from content of Upper Primary Science text books and interviews.The quantitative data analysis covers the analysis of data collected through survey.The details of analysis are as follows:

Qualitative Data Analysis

Objective 1

To analyze the Science text books of Upper Primary Schools following state syllabus to explore the contents representing 'Sustainable Lifestyle Practices'.

Content Analysis

Content Analysis of 5th standard Science Text book

The state syllabus Science text book of 5th standard is organized into ten units. The investigator conducted a unit-wise analysis to identify the contents representing 'Sustainable Lifestyle Practices'. The unit wise analysis is as follows:

Unit 1: Know the Plant World Closely

Contents of the unit:

The unit I 'Know the plant world closely' mainly focuses on the diversity of plant kingdom. The unit begins with the introduction regarding different food materials which we obtain from plants. The unit proceeds by explaining the process of photosynthesis in plants which is the fundamental process of food preparation in living world. There is description about chlorophyll and the other pigments in plants. The unit also draws the attention of students to diverse plant groups like Orchids, parasitic plants, Mushrooms, creepers and climbers. The unit attempts to make students familiar with those plants which possess supporting roots like Banyan tree, mangroves and Screw pines. The concluding portion of the unit describes about plants with storage capacity. These include plants bearing storage structures like underground stems and root tubers.

The contents connected with 'Sustainable Lifestyle Practices':

- In the introductory part of the unit, there is an activity for students to write on different food items of their daily diet and their sources. The activity helps students to recognize the ecological significance of plants as the fundamental producers in the living kingdom.

- The illustration of different medicinal plants and spices is provided in the unit with required explanations. This includes information regarding pepper, ginger, turmeric, clove and cardamom. This will help students to know more about local medicinal plants and their uses. The topic also reminds the students regarding the necessity of conserving such plants.

- An activity to observe the common plants in the locality and to note down their peculiarities in the Science diary is provided. This will motivate children to observe the local plants and to know more about their diverse uses. Such an observational habit will improve their interest in nature and bring them close to nature.

- The question posed in the middle portion of the unit of whether there is any advantage of rearing plants inside home helps the students to think in-depth regarding the scope of the same. An understanding of the advantages of such activities will motivate them to promote interior plantation activities both in school and homes.

- In the portion describing about orchids and parasitic plants, an activity is provided to identify the category in which certain specific plants belong to. This activity will improve the skills and interest of students to classify plants based on the peculiar features they possessed.

- An activity recommended in the unit is to visit a vegetable garden in the locality. By such a visit, students will be able to observe plants closely and

to categorize them as creepers, climbers, underground stems, tubers and so on. Such visits will motivate children to set up their own vegetable gardens with different varieties of vegetables.

- An assignment to prepare a wall journal by collecting information about peculiarities of mangrove plants is given in the unit. This will improve students' knowledge regarding the special features possessed by such unique plant group.

- The concluding portion of the unit recommends an activity to check the biodiversity register of Panchayath and to record the details of plants including the unique features of each of them. One more suggested activity is to prepare a biodiversity register by the school after observing plant varieties in school surroundings. The activity will improve student's knowledge about local plant diversity.

- One of the extended activities of the unit is to conduct a field trip to mangrove forest and to prepare a report on the unique features of mangrove plants. This will help students to know more about ecological significance of mangrove plants and the need to conserve them.

- An illustration of a number of organisms taking shelter on a large tree is provided in the unit. An activity to identify different varieties of organisms was given in connection with the content. This portion of unit also poses a

question of what would happen to those organisms if the tree had been cut. This portion reminds students about the consequences of deforestation.

- The unit ends with the recommendation to prepare a list of actions that the students would take to protect plants. One more recommended activity is to conduct awareness programs on biodiversity conservation in the society.

The investigator thinks that plant diversity conservation and its necessity were clearly presented in the unit. The contents of the unit will be helpful for students to think about certain effective measures to protect biodiversity.

Suggestions:

- One of the important aspects of biodiversity conservation is conservation of endangered plants. But there is no mentioning about the endangered plants and their conservation needs in the unit. According to the investigator addition of a small portion on endangered local plants will be appropriate in the unit. This will be helpful for children to identify the endangered plants in their locality and the significance of conservation of those plants.

- According to the researcher addition of few more extended activities will be appropriate to enhance students' efforts of biodiversity conservation. These are

- A field trip to one of the biodiversity parks in the locality.
- Undertake mangrove conservation program.
- Film show or documentary on deforestation and its consequences.
- Honoring of people who undertake remarkable efforts in conserving biodiversity in the locality. Provide opportunities for children to interact with such people.
- Prepare a poster on the theme 'biodiversity conservation'.

Unit 2: Life Giving Water

Contents of the unit:

The unit describes the recent water issues, diverse uses of water and the importance of water in our daily life. There is mentioning about the unique properties of water and its role as universal solvent. The classification of substances based on solubility, floating and sinking properties in water is also covered. Methods of measuring water are mentioned. Notes on water cycle, water pollution and various techniques of water conservation are included in the unit. The unit also gives descriptions about the natural disasters like flood, drought, landslide and soil erosion. A note on monsoon diseases and the measures to be taken to overcome such issues are also provided in the unit.

The contents connected with 'Sustainable Lifestyle Practices':

- The unit begins with the statements on few water issues taken from news papers. This reminds students about various man-made causes of water pollution and the consequences of those on life.
- An activity to write down the uses of water in daily life helps students to realize the role of water as an inevitable commodity in our life.
- In order to teach the concept of water level, an example of decrease in ground water level due to excessive water exploitation is provided. This instance is appropriate since many of our neighboring areas face severe water scarcity due to over exploitation of water for commercial purposes.
- A comparison provided in the middle portion of the unit is helpful for the students to realize that the proportion of pure water is much less compared to the total water quantity of the planet.
- An activity to list out the water resources in the locality is provided. This will be beneficial for the students to explore more about the water bodies in their own area.
- There is a discussion on various causes of water pollution. An activity to list out the reasons of water pollution is also provided in connection with the topic.
- A discussion on the measures to be taken to control water pollution is suggested in the unit. The unit encourages students to explore

innovative strategies to prevent water pollution and to implement those strategies in their daily life activities.

- Different water conservation methods like rain water harvesting pits, storage tanks, Silpaulin tanks are described with clear illustrations. Construction of mud walls and basins in land which allow rain water to sink into the earth are also described here. An activity to write on different methods of water conservation is also provided.
- An assignment to identify the water conservation method which is most suitable to the respective locality is also given.
- A seminar themed on 'Importance of water conservation' is suggested.
- A classroom discussion about 'rain made disasters' is suggested. There is one more suggested activity to collect the photographs of such disasters and to design a school magazine. Such activities will give students opportunity to investigate the probable causes of such disasters and to think about certain effective preventive strategies.
- The portion on monsoon disasters points out that over exploitation of mud lands, paddy fields and river banks for construction activities is the major reason for flooding in such areas.
- The concluding portion of the unit also identifies that unscientific construction, soil digging, destruction of hills and forests are the supreme causes for landslides.

- To record about ‘Natural disasters and their preventive measures’ in the science diary is an activity given in last portion of the unit.
- An activity to design a notice on ‘Preventive measures against natural calamities’ are recommended for public awareness. This will facilitate the extension of natural resource conservation efforts of the school to society.
- An extension activity is provided to design a notice on the ‘impacts of bore well construction on the water level in nearby wells’. By this activity, students will be able to generate public awareness regarding the consequences of the same.

Suggestions:

The investigator feels that the unit is conveying the message of the urgent need to conserve water for a healthy survival of life on earth. All the activities suggested in the unit are relevant to the topic and well connected with real life situations. The following suggestions are pointed out by investigator to improve the unit.

- Images of original news paper cuttings stating the water issues of the state can be included in the unit. This will make more impacts in the students as the instances quoted are taken from original situations.
- Photographs of some of the worst water pollution cases can be included specifying the places where those occurred along with the

topic ‘water pollution’. This will help the children to recognize the intensity of the issue more effectively.

- It would be beneficial if there is a mentioning on the need of well recharging to conserve more water, in the unit.
- The investigator thinks that it is necessary to include few water conservation tips useful for our day to day activities. This is very important, since such tips will guide everyone how to manage water wisely in daily activities like cooking, washing, cleaning, bathing and irrigation.
- Some extended activities to be included are
    - A talk on the impact of water pollution on animals and plants.
    - A survey on the water level of nearby water sources and to find out the reasons for lowering water level.
    - Identification of unused water bodies in the surroundings and their rejuvenation.

Unit 3: Celestial Shadow Sights

Contents of the unit:

This unit discusses the topics such as features of light, transparent, opaque and translucent objects, shadows, solar eclipse and lunar eclipse.

The contents connected with 'Sustainable Lifestyle Practices':

The investigator could not find out any of the topics that are associated with 'Sustainable Lifestyle Practices' in the unit. There is no scope for integration of any topics of 'Sustainable Lifestyle Practices' to the unit, since the contents to be covered are not connected with sustainability in any manner.

Unit 4 - Life within the Seed

Contents of the unit:

The unit 'Life within the seed' mainly deals with agriculture. The major topics covered in the unit are germination of seeds, factors needed for germination, vegetative propagation, seed dispersal methods, adaptations of plants for seed dispersal and the common food crops of foreign origin.

The contents connected with 'Sustainable Lifestyle Practices':

- The unit begins with the diary write up of a child on sprouting of different kinds of seeds that he observed at home. The introduction itself is apt to the theme since it will generate curiosity and interest among children to observe the changes that happen during the process of seed germination of different seeds.
- The experiments to prove the necessity of factors like air, water, and optimum temperature for seed germination are explained in the unit.

Also there is mentioning that sunlight and soil are essential for the growth after seed germination. The experiments are worth in building knowledge in children regarding the basis of plant cultivation.

- A demonstration of how traditional farmers make seeds to sprout in a large scale is presented in the unit. This will be beneficial for the children to explore more about the unique agricultural practices used by conventional farmers.
- An activity to group plants on the basis of the method of propagation is given. This is helpful for students to observe the propagatory phase of plants in detail and to identify the differences.
- An interesting piece of talk between a girl and Pappus seed is presented in the unit. This clearly reveals the need for seed dispersal in order to get optimum growing conditions like water, sunlight and manure.
- In the portion dealing with methods of seed dispersal, examples of seed dispersals in balsam plant, coconut tree and mahogany tree are given. Since the examples provided are well familiar, children can easily observe the mode of seed dispersal in them.
- A project work on the seed dispersal methods in local plants is suggested in the final portion of the unit. This is really helpful for children to classify the local plants based on their mode of seed dispersal. This activity will surely raise the interest in students to

observe the plants in their surroundings, to classify them and to identify the unique features helpful for seed dispersal.

- The urgent need to attain self sufficiency in producing vegetables is stressed in the unit. The unit also reminds the importance of food security and the necessity of organic farming practices.
- An assignment to give suggestions for developing a good vegetable garden is given in the last portion of the unit.
- Extended activities include preparation of a seed album collecting various plant seeds.
- One more extended activity is to collect traditional knowledge and proverbs on agriculture and to design a journal.

Suggestions:

- The basics of agriculture are covered in the unit with suitable examples and explanations. The investigator thinks that it would be better if an introduction to organic farming is given along with some basic steps to set up an organic farm. This would help students to integrate the theoretical knowledge into agricultural practices in school and home.

- Few more extended actives suggested by the researcher are:

    - An exhibition of various soil samples.
    - Establishment of a seed bank in school.
    - Exhibition of traditional agricultural devices and materials.

- Preparation of bio-fertilizers and bio-insecticides as an activity of the school Eco-club or Agricultural club.
- Launching of an agricultural magazine as an activity of Agricultural club.
- Interaction with prominent organic farmers or bio-farming experts.

Unit 5: Sources of Energy

Contents of the unit:

The unit deals with topics such as fuels, burning of fuels and role of air in burning of fuels. There is mentioning about multiplication of vehicles, conventional and non-conventional energy sources. The concluding portion of the unit throws light upon some instances of energy misuse in our routine habits.

The contents connected with 'Sustainable Lifestyle Practices':

- A note on the features of energy efficient cooking stove is provided in the unit. This is useful to understand how inefficient stoves cause energy loss and pollution problems.
- A description on fast multiplication of vehicles is given in the unit along with a convincing picture. The content is appropriate in making children to think seriously upon the consequences of vehicle multiplication.

- Pictures of different conventional and non-conventional energy sources are provided along with short notes. This comparison is useful for children to identify the advantages of non-conventional energy sources over the conventional sources. The children who imbibed the concept will surely show a positive attitude towards the use of non-conventional energy sources.
- An assignment to go through newspaper articles on non-conventional energy sources and to explore the scope of those energy sources is given.
- One more assignment is to prepare a list of devices which work on solar energy.
- An activity to list out the benefits of alternative energy sources in the Science diary is also given in connection with the content.
- The unit highlights the need to focus on alternative energy sources to overcome the energy crisis that we experience in recent times.
- The concluding portion of the unit presents various examples of energy wastage in our daily life activities. The need to depend upon public transport system to avoid unnecessary fuel consumption is mentioned here. The need to use vehicles with maximum fuel efficiency is pointed out. The energy efficiency of CFL and LED lamps is described. Sustainable methods of energy consumption such as biogas plants and fuel efficient burners are also illustrated.

- A suggested activity is to conduct a seminar on the measures to be taken to avoid unnecessary energy consumption. There is one more suggestion to prepare a project report based on the topic and to present those ideas in the meeting of Science club.
- In the last portion of the unit, an assignment is given to compare the energy consumption in different situations. Here certain examples from daily life are included like usage of bicycle, motorcycle, motor car, electric iron box, lights, fan and television. The instances given are helpful for students to recognize and compare the level of energy consumption in different situations.
- One of the extended activities given in the unit is to design a notice on energy conservation to create awareness among public. This is recommended to conduct on national energy conservation day (December 14).
- The second extended activity suggested is to conduct an energy survey in ten of the neighboring households to find out the cost and quantity of fuels used per month for various purposes.

Suggestions:

The content and the learning activities given in the unit are well suitable for creating awareness among students regarding energy conservation. The investigator hopes that with the information provided in the

unit the learner will be able to take up actions promoting energy conservation in their daily life.

- It would be better if a small note on green transportation is provided in the unit connected with the content on energy conservation. This portion can include areas like importance of adopting pedestrian walking, bicycling and public transport system. Techniques like carpooling and bike sharing also can be mentioned. The need to cut down individual ride outs in motor vehicles and to avoid long distance transport of goods for daily use can be stressed in this portion.
- Few more tips for energy conservation can be added in the winding up portion of the unit providing examples of the usage of electrical/electronic devices like computers, refrigerators, washing machines and LED/LCD Televisions. These would help to make the energy consumption practices of students more sustainable.
- Extended Activities suggested by the researcher are:
    - Establish a smart energy club in the school to monitor and limit the energy consumption of the school.
    - Organize a bicycle rally involving students to promote green transport.
    - Organize awareness programs on green transport.

Unit 6: A Little Effort, Lot of Work

Contents of the unit:

This unit mainly deals with simple machines and levers. The other topics included in the unit are concepts like fulcrum, effect, resistance inclined plane, wheel and axle. The working principle of simple machines like stapler, cutting player, scissors and see-saws are explained in the unit.

The contents connected with 'Sustainable Lifestyle Practices':

Since the unit focuses on the physical principles involved in the working of simple machines of our daily life, the investigator could not identify any contents related to 'Sustainable Lifestyle Practices. Hence there is no scope for adding any of the topics on 'Sustainable Lifestyle Practices' with the unit.

Unit 7: Windows of Knowledge

Contents of the unit:

The unit mainly deals with power of senses such as vision, hearing, smell, taste and touch. The working principle behind the sense organs like eye, ear, and tongue are explained along with illustration of internal structures of each of them. Precautions to be taken to protect our sense organs are also discussed in the unit.

The contents connected with 'Sustainable Lifestyle Practices':

- The investigator could not find any of the topics in the unit that are directly linked with 'Sustainable Lifestyle Practices' since the unit is mainly focused on structure and functioning of sense organs.
- The portion which is dealing with the measures to be taken for protecting sense organs is indirectly linked with the need to maintain individual hygiene and sanity of the surroundings.
- An extended activity provided is to observe the organisms in the surroundings and to note down the peculiarities of their sense organs. This activity will encourage children to more closely observe the organisms in their surroundings. This may be helpful for making children to admire and appreciate about the wonders of the living world.

Suggestions:

- According to the investigator the portion on 'measures to be taken to protect the sense organs' can be associated with adverse effects on sense organs by pollution and industrialization. The harmful effects caused to sense organs by air pollution can be mentioned here.

Unit 8: Keeping Disease at Bay

Contents of the unit:

The unit is focused on different contagious diseases, the mode of transmission and the microbes responsible for these diseases. Measures to be taken for destruction of mosquitoes are discussed in the unit. The importance of observing 'dry day' is explained. Precautions to be taken to prevent contagious diseases are also listed. Advantages of microbes, importance of vaccination and sanitary habits are discussed. The need to maintain social sanitation for healthy life is conveyed in the unit.

The contents connected with 'Sustainable Lifestyle Practices':

- In the introductory portion of the unit, the lack of sanitation of surroundings has been identified as the major cause behind spreading of diseases. The pictures of untidy surroundings that lead to mosquito multiplication are presented in the unit. An assignment to list out diverse reasons for excessive production of mosquitoes is provided. This portion makes students to recognize proper waste management as an immediate step to prevent diseases.
- The need to observe 'dry day' in order to prevent rapid multiplication of mosquitoes is pointed out in the unit. The significance of public involvement in activities of social sanitation is stressed. The content

provided here is appropriate for encouraging students to take initiatives in such mass cleaning programs.

- The portion on social sanitation mentions unhealthy practices of waste dumping in public places and in water bodies.
- One of the extended activities of the unit is to explore the causes of monsoon diseases and to prepare a notice on the precautions to be taken to prevent them. This portion can be related with the need for sustainable waste management

Suggestions:

- The investigator feels that the unit clearly conveys the message of need to maintain personal hygiene and social sanitation to ensure a healthy society. The contents of the unit clearly reveal the relationship between sustainable waste management and environmental health. Hence it would be beneficial if some ideas of waste management are provided along with the content on 'social sanitation'.
- News paper articles or photographs of waste dumping in public places and water bodies can be added to the topic 'social sanitation'. This would help children to realize the ignorance of public regarding scientific waste management. Also this would facilitate them to take some serious steps for raising public awareness regarding the same.

Unit 9: Space -A World of Wonders

Contents of the unit:

The unit is mainly focused on the wonders of space. There is description on man's first space expedition, artificial satellites, and satellite launching vehicles. There is an illustration on designing a rocket model. The prominent Indian space travelers are mentioned with photographs. Amazing experiences of space travelers are explained in the unit. Information about man's lunar expedition and India's achievements in space research are provided in the unit. There is mentioning about Chandrayaan. Different artificial satellites used for educational purposes, resource studies and climate studies are also mentioned. The unit concludes with the suggestion to organize a seminar on the topic 'India's role in space research'.

The contents connected with 'Sustainable Lifestyle Practices':

- The investigator was not able to find any major topics dealing with 'Sustainable Lifestyles Practices' in the unit since the unit is themed on space and its exploration.
- There is mentioning that artificial satellites help in the study of earth's natural resources. This is the only area identified by researcher that is connected with sustainability.

Suggestions:

- There is only limited scope for integration of topics on 'Sustainable Lifestyle Practices' with the contents of the unit.
- The investigator feels that teacher can provide some of the latest findings obtained by artificial satellites on status of natural resources on earth. This will be useful for the children to understand the contributions of artificial satellites in natural resource studies and management. Also this will help children to realize the severity of natural resource depletion in a better way.
- Extended activities suggested by researcher:
    - Prepare a list of artificial satellites that help in resource management studies.
    - Conduct a talk by expert on the role of artificial satellites in studying climate change.
    - Collect the photographs of artificial satellites used for studying natural resources and climate change.

Unit 10: Animal Lore

Contents of the unit:

This unit is based on animal diversity. Peculiarities of birds, bird observation, egg laying organisms, sea turtles, metamorphosis in butterfly and

butterfly parks are also discussed in the unit. Peculiar features of mammals are explained. There is a note on ecological significance of corals and the need to conserve them.

The contents connected with 'Sustainable Lifestyle Practices':

- In the introduction of the unit a piece of talk between and mother and child is given. This portion explains the peculiarities and egg laying habits of sparrow and crow as observed by the child in the talk. The introduction itself creates a curiosity among students to observe different types of birds in nature and to identify the preparations they take to keep their eggs secured.
- The portion following introduction gives clear guidelines to observe birds based on their color, size, shape, peculiarities of beak, food habits, sounds, type of nests and habitat. The procedure for observing birds is explained providing simple tricks to be followed.
- An activity is provided to observe local birds such as crow, pigeon, crow pheasant, parrot and crane and to record the details in the Science diary. The learning activity will surely strengthen children's bonding with nature by developing a habit of observing birds regularly.
- A note on rare birds in our surroundings is provided.
- A suggestion is given for students to participate in camps organized at different bird sanctuaries like Kadalundi, Thettekkad and Kumarakom.

Such visits will indeed help the students to have direct learning experiences from nature which would be more effective than classroom learning.

- There is a note on different butterflies in our surroundings and their larvae with attractive pictures. This will make students to realize that the larvae which we destroy usually are the premature forms of beautiful butterflies. The content is so meaningfully conveyed here encouraging children to conserve diverse forms of life to prevent them from being extinct.
- An interesting activity of developing a butterfly garden in the school is explained in the following portion. The description provides a new piece of information to children that butterfly gardens can be constructed by planting certain species of plants like curry leaf and citrus that can easily attract butterflies. The activity will encourage children to observe the habitat, feeding and egg laying habits of different types of butterflies. Children can also identify the endangered species of butterflies through this activity.
- A description of sea turtle, which is an endangered organism, is provided in the unit. The urgent need to conserve them from being extinct is clearly pointed out. The content is helpful for the children to explore more about different organizations and sanctuaries actively involved in the conservation of sea turtles.

- There is a separate description on corals and their ecological significance. The need to conserve corals is highlighted here.
- The unit concludes with the statement that man's actions adversely affect the survival of other living forms on earth. Various human interferences leading to biodiversity loss are listed such as deforestation, leveling of low lands and poisoning of water bodies. A seminar on the topic is also suggested in connection with the content.
- One of the extended activities is to visit a pond in the locality and to observe different organisms inhabiting the pond. Students have to think upon how the leveling of the pond affects the living beings in the pond.

Suggestions:

The content and the learning activities provided in the unit is enough in conveying the need and significance of biodiversity conservation in an intensive manner. Hence the investigator thinks that no further addition of content or activities is needed in the unit to promote biodiversity conservation practices among the students.

Conclusion

The investigator could find that the Science text book of standard 5^{th} of state syllabus covers a number of major topics that coming under ‘Sustainable Lifestyle Practices’. The themes such as biodiversity conservation, water

conservation, agriculture, energy conservation and social sanitation are represented by the text book. Out of these themes biodiversity conservation, water conservation and agriculture are well conveyed with enough content and learning activities. It would be better if few more energy conservation practices useful for daily life have been added with the unit 'sources of energy'. The content on 'social sanitation' can be improved by addition of certain sustainable waste management practices useful for daily living.

Standard sixth

The details of content analysis of sixth standard Science text book are as follows.

Unit 1: The Caskets of Life

Contents of the unit:

The unit is based on the fundamental unit of life that is the cell. The classification of organisms such as unicellular organisms and multi-cellular organisms is provided with appropriate examples. Procedure to view different types of cells through microscope is given with related pictures. Various cellular organelles are mentioned with the specific functions of each of them. A comparison of plant and animal cells is done based on the features possessed by them.

The contents connected with 'Sustainable Lifestyle Practices':

The investigator could not find any topic in the unit that is directly linked with 'Sustainable Lifestyle Practices', as the unit highlights the cell and its internal structure. However the investigator feels that the experiments provided to observe different microbes through microscope will surely make students wonder about the existence of biodiversity even in a minute drop of water.

Unit 2: The Essence of Change

Contents of the unit:

The unit deals with different forms of energy used in various situations of our daily life. Different contexts in which new forms of energy are produced are pointed out specifically in the unit. There is mentioning about mechanical energy, chemical energy, electrical energy and solar energy. The transformation of energy from one form to another form is also discussed. The change in state of matter by absorbing or releasing energy is mentioned providing suitable examples of physical change and chemical change.

The contents connected with 'Sustainable Lifestyle Practices':

- The investigator identified three places of the content in the unit that are associated with 'Sustainable Lifestyle Practices'. First of all, while describing about different energy forms, solar car is mentioned with

picture. This will enable students to understand that solar energy can be trapped and used for running vehicles which is popularly practiced in developed countries.

- While discussing about the energy consumption in daily life, there is a statement that energy loss through electrical equipments should be minimized. This will be helpful to make the students more conscious in the energy consumption practices.

- In the last portion of the unit one of the assessment questions given is why there is maximum reduction in energy consumption while using LED lamps. This question enables children to compare the energy consumption of LED lamps with that of normal bulbs and to choose the one with better energy efficiency.

Suggestions:

- The investigator feels that while discussing about different energy forms, there can be a simple description on non-conventional energy forms like solar energy, wind energy, tidal energy, geothermal energy and biomass energy highlighting the advantages of them. This will make children to understand that alternative sources of energy are equally important in this era of energy crisis.
- It would be better if few tips to choose electronic appliances with maximum energy efficiency had been provided. This will help not

only the children, but also their parents to specifically choose energy efficient devices in their purchasing practices.

- The portion on energy transformation can be enriched by providing more examples of devices or contexts that use alternative energy sources like solar cooker, solar water heater, solar lamps, wind turbines and tidal power plants.
- The extended activities suggested by the researcher are:
  - To conduct a talk of expert from KSEB on 'how to reduce electricity consumption in daily life?'
  - To collect articles and newspaper cuttings on energy conservation and to design a school magazine as an activity of Energy club.

Unit 3: Flower to Flower

Contents of the Unit:

The unit is based on flowers. Various parts, internal structure and functions of flowers are explained. The process of pollination and formation of seeds is explained in detail. The role of different organisms as agents of pollination is mentioned. There are notes on artificial pollination, self pollination and cross pollination. The process of fruit formation is explained along with description on single and multiple fruits.

The contents connected with 'Sustainable Lifestyle Practices':

- The introductory part of the unit itself is presented in such a way that it will encourage children to rear a beautiful floral garden and to observe the various flowers and butterflies inhabiting in it. An attractive picture of a garden with full of flowers and butterflies is provided in this portion of the unit.
- The unit gives an account of various types of flowers in our surroundings with their unique features. Such notes will be helpful to develop children's interest in different types of flowers.
- A learning activity to classify flowers based on color, blooming time, pollination type and pollination agents are suggested. Such activities may help to develop regular observation habit among children to explore more about the specialties of different flowers in our surroundings.
- One more learning activity suggested is to prepare an album by collecting the pictures of flowers and fruits in our locality.
- One among the extended activities is to observe the inflorescence of pepper plant in its blooming season. Activities like these may help children to identify the changes appearing to plants during the change of seasons.
- Another extended activity suggested is to observe the specialties of beaks of various honey sucking birds.

Suggestions:

- Although there is no direct mentioning about 'Sustainable Lifestyle Practices', the unit attempts to create interest and curiosity among children to observe nature carefully and to develop a favorable attitude towards conservation of diverse animal forms.
- The process of pollination described in the unit is an excellent example for interdependence of living beings for survival. So teacher can highlight the need to protect birds, insects and butterflies for the success of pollination and to sustain the plant diversity.
- Although the unit is not suggesting many activities other than natural observation, it is appropriate in drawing students' attention towards natural protection and biodiversity conservation. Hence the investigator thinks that further addition of any contents on 'Sustainable Lifestyle Practices' is not required for the unit.

Unit 4: Along with Motion

Contents of the unit:

The major area covered by the unit is the physical principles of motion. There is description about different types of motion occurring inside and outside the body. Relationship between force and motion is explained. Types of motion such as oscillation and vibration are discussed with examples.

Examples of application of motion in real life situations such as functioning of bicycle, wheel, flour mill and gear are also mentioned in the unit.

The contents connected with 'Sustainable Lifestyle Practices':

There is no mentioning about any of the 'Sustainable Lifestyle Practices' in the unit. The integration of any topics regarding 'Sustainable Lifestyle Practices' into the unit will be irrelevant as the unit sticks upon the physical principles involved in motion.

Unit 5: Food for Health

Contents of the Unit:

The unit is based on the important nutrients in our diet. It covers nutrients such as carbohydrates, proteins, fats, vitamins and minerals. Specific food items abundant of each of the nutrients are mentioned. Deficiency disorders of different nutrients and the specific symptoms associated are also mentioned. The unit also provides detailed charts of nutrient content of our common fruits and vegetables. The need to include balanced food in our diet is also stressed in the unit.

The contents connected with 'Sustainable Lifestyle Practices':

- There is a single place in the unit where the investigator could observe a 'Sustainable Lifestyle Practice'. In the introductory portion a message is conveyed that it is healthier to include local vegetables and

fruits in our daily diet than consuming ready to eat junk food items available in market. This can be regarded as a 'Sustainable Lifestyle Practice' as local food items are toxic-free compared to the later.

Suggestions:

- The investigator thinks that addition of few more contents on sustainable food habits to the unit would be better.
- The need to adopt seasonal foods can be stressed to ensure toxic free diet.
- The need to reduce meat consumption and the carbon emissions from meat waste can be highlighted.
- The advantages of organically raised food items can be mentioned.
- The unit can also convey the message that purchasing of local food items should be promoted in order to avoid the carbon emissions due to long distance transport of food stuffs.
- Extended activities suggested by the researcher are
    - To organize a workshop regarding 'preparation of healthy dishes from local herbs and vegetables'.
    - Preparation of a booklet on 'healthy recipes from local herbs'.
    - Conduct a talk on 'food security'.

Unit 6: Living in Harmony

Contents of the unit:

The unit deals with ecosystems, food chains and food webs. Different trophic levels in food chain such as producers, consumers and decomposers are also being discussed. The impacts of man's exploitation of nature are described in the concluding portion of the unit.

The contents connected with 'Sustainable Lifestyle Practices':

- In the introductory part of the unit a picture of fish reared in an aquarium is presented. The picture also expresses the feeling of fish that it is not the glass case but the pond gives it the ultimate happiness. The picture tries to convey the message that artificial habitat provided by man can't replace the natural habitats of living beings in any way. This is helpful for the children to think about the advantages missed by organisms living in artificial environments.
- A picture of various organisms mingling and living in the natural environment is given in the continuing portion. The picture tries to reveal the interdependence of living beings with one another and also with their surroundings.
- In connection with the topic 'ecosystems', an activity is suggested for the students to identify and list various ecosystems in their surroundings. Pictures of different ecosystems such as paddy fields,

forest and marshy land are given. Children will be encouraged to explore diverse ecosystems in their surroundings such as sacred groves and mangrove forests by this activity. Clear guidelines on what, where and how to observe a specific ecosystem are also explained here.

- A diary write up of a student's observation of pond ecosystem under the guidance of the teacher is provided. This will be helpful to raise the curiosity among children to explore more about interactions, feeding habits and habitat of living beings in each ecosystem. The experiences explained by the student here will encourage the teachers and students to take up natural observation as a learning activity.
- Interferences of man on nature are discussed in the continuing portion of the unit. An assignment is provided to list the various consequences of leveling of marshy lands and destruction of hills. The activity is beneficial for the children to think seriously about different ecosystems which are under serious threats due to thoughtless human activities. A seminar on the topic 'man's interferences on nature and the remedial measures to be taken' is suggested in this portion of the unit.
- Extended activities include collection of newspaper articles regarding man-made causes that lead to ecosystem damage.
- One among the extended activities is to write a letter to the local self government authority to take immediate action for protecting the ecosystems in the locality.

Suggestions:

- Irrecoverable damage caused to nature by unlawful activities of man is meaningfully conveyed by the unit. The researcher hopes that the content and activities provided in the unit may help students to take up programs necessary to conserve diverse ecosystems in their surroundings.
- Still the investigator thinks that addition of few more contents to the unit will be fair in developing a favorable attitude among the students towards protection of ecosystems.
- Investigator thinks that while discussing the topic of decomposers, destruction of soil microbes due to excessive use of chemicals in agriculture may also be mentioned. This will make children to understand that how the unhealthy practices of man lead to imbalances in nature.
- While discussing about 'food chain' the imbalances caused to food chains by mass destruction of certain living groups may also be mentioned. This can be explained with the help of some examples from different parts of the world.
- The extended activity suggested by the researcher is
    - To make a list of plants, animals and insects of the locality which are significantly reduced in number in recent times. Find out the man made causes behind the problem.

Unit 7: Attraction and Repulsion

Contents of the unit:

The unit is based on the properties of magnets. Different substances which are attracted and repelled by magnets are also listed. There is description on different types of magnets like bar magnet, U magnet, disc magnet, ring magnet, arch magnet and cylindrical magnet. Uses of magnets are also being discussed. Experiments to prove the magnetic properties of substances are explained in the unit.

The contents connected with 'Sustainable Lifestyle Practices':

The investigator could not identify any of the unit contents which promote 'Sustainable Lifestyle Practices'. Since the major aim of the unit is to make students understand about magnetic properties, there is no scope for linking any of the areas of the unit with 'Sustainable Lifestyle Practices'.

Unit 8: Moon and Stars

Contents of the unit:

The unit is an attempt to make students aware about the scientific reasons behind different astronomical phenomena. The unit gives clear description of the facts behind happening of day and night. An activity using globe in provided in order to make students understand about the rotation of earth. The daily transitions occurring to the size of moon is also discussed

along with a class room experiment to prove the same. The rotation and revolution of moon is mentioned. In the concluding portion of the unit there is description about constellations like Orion and Cassiopeia. The use of star maps in astronomical studies is also mentioned here.

The contents connected with 'Sustainable Lifestyle Practices':

The investigator didn't identify any of the contents of the unit that are directly or indirectly associated with 'Sustainable Lifestyle Practices'. There is no scope for addition of the contents on 'Sustainable Lifestyle Practices' to the unit, as it is focused on developing students understanding on rotation and revolution of earth and moon.

Unit 9: Mix and Separate

Contents of the unit:

The unit is based on the chemical properties of matter. The categorization of substances such as pure substances and mixtures is done in the unit providing suitable examples. There is also description about homogeneous mixtures and heterogeneous mixtures. Different solutions and the components of each of them are listed. Various methods used in daily life to separate the components of mixtures are discussed along with suitable pictures. The filtering property of soil is mentioned in the concluding portion of the unit.

The contents connected with 'Sustainable Lifestyle Practices':

- The investigator could identify only a single area of the content in the unit that is related to 'Sustainable Lifestyle Practices'. In the concluding part of the unit it is pointed out that septic tanks should be constructed keeping a minimum distance from the nearby well. This can be considered as a sustainable water management practice restricting the contamination of water bodies by manmade causes. An assignment to write about the precautions to be taken while constructing septic tanks is also given in connection with the topic.

Suggestions:

The major objective of the unit is to develop students' understanding about molecules, mixtures and separation of mixtures. Hence the investigator feels that no further addition of topics related to 'Sustainable Lifestyle Practices' is needed in the unit.

Unit 10: For Shape and Strength

Contents of the unit:

The unit mainly deals with the topic 'skeletal system'. In the introductory portion of the unit, there is a brief description about organisms with outer shell (exoskeleton) such as snail, cockroach, crab, prawn and beetle. The importance of exoskeleton in providing shape and protection to

organisms is mentioned here. The human skeletal system is explained in detail. The specific functions of various bones in human skeletal system are also mentioned. The symptoms and first aids to be taken during breakage of bones are explained. The food items that need to be taken to improve the strength of bones are also mentioned in the last portion of the unit.

The contents connected with 'Sustainable Lifestyle Practices':

- The investigator could find only a single topic related to 'Sustainable Lifestyle Practices' in the unit.
- In the introductory part of the unit it is mentioned that certain organisms with attractive exoskeleton such as star tortoises and golden beetles are hunted massively for material benefits. It is also stated that such massive hunting practices will lead to the extinction of those organisms in the nearby future. This note will make students aware about the huge destruction of organisms with certain special features for commercial purposes.

Suggestions:

- The investigator feels that there is limited scope to integrate any of the 'Sustainable Lifestyle Practice' with the unit, since the unit is giving emphasis on the role and functions of skeletal system.

- However the investigator suggests few more extended activities in connection with the topic of excessive hunting of organisms with attractive exoskeleton. These are:
  - To make a list of organisms with beautiful outer shells, which are critically endangered due to human actions.
  - To collect the newspaper articles and photographs regarding the illegal hunting and export of organisms with attractive exoskeleton. Arrange a display of the collected materials in school on the biodiversity day.
  - Arrange documentary or film show based on the endangered organisms which are exploited for commercial purposes.

Conclusion

The Science text book of standard 6th of state syllabus does not cover 'Sustainable Lifestyle Practices' in a complete manner. The units like 'Caskets of life', 'Along with motion', 'Magnets' and 'Moon and stars' do not represent even a single topic related to 'Sustainable Lifestyle Practices'. There is only little description about energy conservation and sustainable food habits. Sustainable water management is identified only in single place i.e., in the unit, 'Acids and Alkalis'. The investigator identified that the conservation of eco systems and biodiversity is the only practice which is given stress by the text book.

Standard VII

The details of content analysis of 7th standard Science text book are as follows:

Unit 1: Reaping Gold from Soil

Contents of the unit:

The unit is based on agriculture. Different methods of plant propagation are explained in the unit. Vegetative propagation methods like layering, grafting and budding are explained giving the detailed steps to be followed. Hybridization is defined providing examples for hybrid varieties of common vegetables. Different agricultural research institutions are mentioned. Crop rotation and intercropping are described. Procedure for preparation of bio-pesticides is provided. There are notes bio-fertilizers, fiber crops, integrated farming and cattle farming.

The contents connected with 'Sustainable Lifestyle Practices':

- The introductory portion of the unit presents a beautiful picture of students involved in the rearing of school vegetable garden. The introduction conveys the message that plantation activities not only improve our health but also refresh our mind. This will surely motivate children to take up such activities in their own school.

- The introduction also attempts to impart the message that agriculture should be given due place in school activities along with curricular activities.
- It is stated that good crop yield requires a number of factors other than fertile soil, suitable climate and high quality plantation materials. This will encourage the children to explore the other factors required for optimum growth of plants.
- There are questions to students about the type of seeds to be chosen for plantation. These questions facilitate children to think more about the quality of mother plant and the specific season in which seeds to be collected.
- The types of propagation common in ladies finger, pea and brinjal plants are mentioned. This information will help children to know more about the propagation method suitable for specific vegetables which they cultivate in their vegetable garden. An activity is also provided to write in the Science diary about the propagation method commonly followed for local plants.
- There is explanation on vegetative propagation techniques like layering, grafting and budding. These will be helpful for children to experiment more on such techniques and to produce desired plant varieties in a scientific manner. An activity is also suggested in this

portion to develop a hybrid Rose variety by budding and to record the systematic changes of the new plant variety.

- An activity to visit the nearby Krishi bhavan and to prepare a report on the services provided by it is suggested in association with the content on 'agricultural research institutes'. This will provide opportunity for students to have a face to face interaction with agricultural experts and to collect information regarding novel agricultural practices implemented by them.
- Few recommendations to improve the soil fertility in an eco-friendly manner are provided in the unit. One among them is to leave the plant remains at the agricultural field after harvesting. This will help to enhance the soil fertility because such remains are good sources of organic matter after degradation. Intercropping and crop rotation are some other eco-friendly methods suggested to enhance the soil fertility.
- The need to follow organic farming to avoid the adverse effects of chemical fertilizers and pesticides is stressed in the unit. The procedure for preparing bio-pesticides from Tobacco essence, Neem extract and Neem oil emulsion is explained. Children can easily prepare these bio-pesticides since the raw materials for preparation are cost effective and easily accessible.
- Bio-fertilizers such as cow dung, green manure, bio-compost and fertilizer from fish waste are also mentioned. Such information will

encourage children to adopt such eco-friendly alternatives for fertilizing their agricultural fields.

- A seminar on the topic 'Preparation of bio-fertilizers and bio-insecticides is suggested linked with the content.
- An example of an interview between a student and farmer is given in the unit. Here the child is asking about the methods to be followed to control pests in agricultural fields. The farmer is giving information about biological methods to control agricultural pests. Drip irrigation is also explained by the farmer. An activity to prepare a questionnaire to conduct interview with agricultural experts is also suggested.
- There is a statement in the unit that purchasing of eco-friendly products should be promoted. This is the only area where investigator could identify a green purchasing practice.
- There is mentioning about integrated farming which integrates agriculture with cattle and poultry farming. This will help children to realize the benefits of integrated farming where the wastes from animal farming are used to improve the fertility of agricultural fields.
- An activity to prepare an album on integrated farming practices is suggested in the winding up portion of the unit.

Suggestions:

The unit covers detailed information on various sustainable agricultural practices.

- The extended activities suggested by the researcher are
  - To conduct a demonstration class on plant propagation methods inviting agricultural experts to school.
  - To conduct a visit to an integrated farm in the locality and to write a report.

Unit 2: Wonders of Visible Light

Contents of the unit:

The unit deals with physical principles associated with light. Regular reflection, diffuse reflection, refraction and lateral inversion are covered by the unit. Angle of incidence, angle of reflection, types of lenses and spherical mirrors are also discussed. The principle behind rainbow formation, process of reflect formation, Kaleidoscope and Periscope are covered in the unit.

The contents connected with 'Sustainable Lifestyle Practices':

None of the contents of the unit are linked with 'Sustainable Lifestyle Practices' in a direct manner. But in the concluding portion of the unit, there is an activity to make a color wheel with a used CD to show the union of colors. This activity can be interpreted as an example for reuse of electronic waste. Although the concept of waste management practice associated with the activity is not mentioned in text book, the teacher can incidentally integrate such learning activities with 'sustainable waste management practices'.

Unit 3: Acids and Alkalis

Contents of the unit:

As the title indicates the unit mainly deals with acids and alkalis. Acids used in daily life and laboratories are listed. Reaction of acids with metals and general properties of acids are explained. Reaction of acids with alkalis is also described. Neutralization, pH value and pH of soil are discussed. The procedure for manufacturing of soap is also explained in the unit.

The contents connected with 'Sustainable Lifestyle Practices':

- There are no topics in the unit which are associated with 'Sustainable Lifestyle Practices' except a single topic on soap manufacturing. According to the investigator the activity of soap manufacturing can be regarded as a 'Sustainable Lifestyle Practice' as it promotes self sufficiency among children to produce toxic free products. Such activities will motivate students to take up large scale production of eco-friendly products in school and to market them for the welfare of the school.

Unit 4: Through the Alimentary Canal

Contents of the unit:

The unit mainly deals with digestive system. Autotrophic nutrition, heterotrophic nutrition, parasitic plants and insectivorous plants are discussed.

The structure of tooth is provided with illustration. Types of teeth like incisors, canines, pre-molars and molars are mentioned. The structure of digestive system and functions of different parts of it are explained. Different processes of digestive system such as ingestion, digestion, absorption, assimilation and excretion are explained. The role of kidneys and skin in excretion is mentioned. The need to follow healthy food habits and personal hygiene is highlighted in the concluding portion of the unit.

The contents connected with 'Sustainable Lifestyle Practices':

The investigator couldn't identify any of the contents of the unit that are related with 'Sustainable Lifestyle Practices'. There is no scope for addition of any topics regarding 'Sustainable Lifestyle Practices' to the unit as the unit is themed on the biological processes of digestion and excretion.

Unit 5: When Current Flows

Contents of the unit:

The unit is based on electric circuit. Open and closed circuits are mentioned. Conductors and insulators are defined in the unit. Important symbols used to represent the components of an electric circuit are specified. There are notes on electric wires, different types of switches, safety fuse and electromagnets. Instances of domestic electricity wastage are pointed out. Certain occasions probable for electric shock to occur and the first aids to be taken are discussed in the last portion of the unit.

The contents connected with 'Sustainable Lifestyle Practices':

- In the concluding part of the unit, four instances are provided for electricity wastage in households. These are
  - Leaving the rooms without switching off the bulbs and fans.
  - Keeping the TV in 'on' position even though no one is watching.
  - Using the bulbs unnecessarily even in day time.
  - Keeping open the refrigerator unnecessarily.
- All the instances provided are happening frequently in our households. Such examples will help children to realize the huge wastage of electricity due to irresponsible actions. These will be thought provoking for students to explore certain effective strategies to limit the electricity wastage in daily life.
- An assignment is also provided for students to identify more examples of energy wastage in their daily life.
- A recommendation to choose star labeled electronic appliances is also given in this unit. This will be a new piece of information to students that will help to promote green purchasing practices among them.
- There is one more suggestion to design booklets and posters to raise awareness about the misuse of electricity.

- One among the extended activities is to make a list of electronic appliances at home and to identify those with star labeling.
- Another extended activity is to compare the electricity bills in various months and to implement certain actions to reduce the power consumption.

Suggestions:

Extended activities suggested by the researcher:

- To conduct an interview with experts in energy conservation and to collect information regarding measures to be taken to reduce the electricity consumption in daily life.

Unit 6: For a Pollution-free Nature

Contents of the unit:

The unit emphasizes the need to prevent air, water and soil pollution to ensure Sustainable Development. There is mentioning on humidity, water absorption capacity and organic content of soil. Soil erosion is also mentioned. Water pollution, water purification and functioning of a water treatment plant are explained. The common air pollutants and their sources are also listed in the unit.

The contents connected with 'Sustainable Lifestyle Practices':

The investigator noticed that the unit is directly linked with

'Sustainable Lifestyle Practices'.

- In the topic related with 'soil', unhealthy practices that lead to deterioration of soil are pointed out. Wrong practices such as excessive use of chemical pesticides and the land filling of plastic wastes are mentioned.

- The content also suggests measures such as waste segregation, bio-composting and reuse of plastic wastes to prevent the contamination of soil.

- In connection with the topic 'pollution of water bodies', the description given by an old man regarding the present state of a stream in his area is presented. In this note the old man states that the water in the stream was so pure in the past. But the excessive dumping of waste made the water body contaminated and useless. This note helps students to realize the intensity of water pollution happening to water bodies in recent times.

- The unit also suggests a learning activity to develop an action plan to prevent the pollution of water bodies in the locality.

- The water reuse technique by water purification is explained in the unit. Reuse of water by treatment is a sustainable water management practice. The working of water treatment plant is also explained.

- A learning activity to design a poster or notice to raise awareness about careful consumption of water is also suggested.

- Another learning activity to suggest some measures to reduce air pollution and to list them in Science diary is also provided.

- The concluding portion of the unit attempts to impart the message that we need a development without harming air, water, soil and biodiversity. This portion also suggests a seminar to conduct on 'Sustainable Development'. Some areas to be highlighted in the seminar are suggested such as:

    - Planting trees
    - Improving public transport system.
    - To follow pollution control laws.
    - Scientific treatment of wastes.
    - Stop throwing plastic wastes and electronic wastes to soil.

Suggestions:

The investigator feels that the unit clearly conveys the adverse effects caused to nature by industrialization and urbanization. It also reminds the need to take effective strategies to maintain the purity of air, water and soil.

- It would be better if a short description on 'carbon foot print' had been mentioned in the unit. This will make children aware about individual

and societies' contribution in the total carbon emissions.

- In the concluding portion of the unit the concept of 'Sustainable Lifestyle' can be introduced as an adoptable practice to prevent the deterioration of natural resources.

The extended activities suggested by the researcher are:

- To conduct a visit to the spots known for eco-friendly living and to prepare a report about it.

Unit 7: Pressure in Liquids and Gases

Contents of the unit:

The major area covered by the unit is 'pressure'. Gaseous pressure and liquid pressure are defined. Experiments to prove the existence of both gaseous and liquid pressure are explained. Instances for these in daily life situations are also provided. The relationship between depth and pressure is explained. An experiment to design a Pressure gauge is demonstrated in the last portion of the unit.

The contents connected with 'Sustainable Lifestyle Practices':

The investigator could not identify any content areas of the unit which represent 'Sustainable Lifestyle Practices'. Since the unit is based on physical principles related to 'pressure' there is no scope for integration of any contents on 'Sustainable Lifestyle Practices' with the unit.

Suggestions:

- There is scope for reuse of objects such as used glass jars, PVC pipes, funnels, syringes, straws and wooden pieces for the experiments based on pressure suggested in the unit. Hence the teacher can encourage students to collect such materials for reusing them for experiments. Here the message of 'sustainable waste management' can be incidentally conveyed by the teacher.

Unit 8: Breath and Blood of Life

Contents of the unit:

The unit is based on respiratory system and circulatory system. The functioning of respiratory system is explained specifying various parts of the system. There are notes on the processes of inspiration and expiration. Respiratory organs in various organisms are also mentioned. The functioning of human circulatory system is explained. In the final portion of the unit a demonstration to make a model stethoscope is also provided.

The contents connected with 'Sustainable Lifestyle Practices':

The investigator was not able to find out any of the contents in the unit those are connected with 'Sustainable Lifestyle Practices' directly or indirectly. Since the unit is dealing with the structure and functions of human

systems, there is no scope to integrate any of the content areas of ‘Sustainable Lifestyle Practices’ with the unit.

Unit 9: Paths of Heat Flow

Contents of the unit:

The unit is based on 'heat'. Different contexts in which heat is produced are listed. The methods of heat transmission such as conduction, convection and radiation are provided. A note on the expansion of solids and liquids due to absorption of heat is explained. Daily life situations for the same are also given. Sea breeze and land breeze are mentioned. There are notes on the precautions to be taken to avoid adverse situations during thunder storm and heavy rain.

The contents connected with ‘Sustainable Lifestyle Practices’:

- There is mentioning about the practice of using casserole, thermal cooker and thermal flasks to save the heat in cooked food and drinks. This can be considered as a ‘Sustainable Lifestyle Practice’ since such practices help to avoid the heating of food again and again thereby save a lot of energy and fuel.

Suggestions:

- It would be better if there had been a mentioning in the concluding portion of the unit regarding the rise of atmospheric temperature year

by year. Along with this the need to reduce carbon emissions due to human actions can also be pointed out.

- In connection with the topic on uses of wind, the use of wind in producing electricity can be highlighted. The places famous for the same can also be mentioned. This would make students to understand the role of wind as an alternative energy source.

The extended activity suggested by the investigator is

- To make a list of few effective ways to reduce the heat loss during cooking.

Unit 10: Safety in Food Too

Contents of the unit:

The unit mainly covers the area 'food security'. Various techniques of food preservation like sugaring, salting, pickling and drying are mentioned. The process of pasteurization, common food contaminants and food preservatives are discussed. Precautionary measures to be taken to prevent food borne diseases are listed. The approved marks and certifications to ensure the quality of food items are also mentioned.

The contents connected with 'Sustainable Lifestyle Practices':

- There is only single topic in the unit that is directly related with 'Sustainable Lifestyle tPractices'.

- The unit begins with a number of food preservation techniques by which we can preserve and store the seasonal fruits and vegetables. Methods such as sugaring, salting, drying, pickling and making jams are mentioned. These can be considered as sustainable food management practices since such practices help to avoid the wastage of a large quantity of seasonal food items. The content area makes students to understand the advantages of food preservation and thereby motivates them to follow such practices in daily life.

Suggestions:

The extended activities suggested by the investigator are

- To suggest few measures to avoid the wastage of food in home and school.
- To conduct a workshop on preparation of healthy dishes from seasonal fruits and vegetables.
- Organize a talk on 'food security' by an expert from the field.

Conclusion

The investigator feels that the area of ‘sustainable agriculture’ is well conveyed by the 1st unit (‘Reaping gold from soil’) of 7th standard Science text book. Various eco friendly farming techniques and the need to adopt organic farming practices are covered by the unit. The unit 6, ‘For a pollution-free nature’ gives a detailed picture of causes and consequences of

soil, water and air pollution. The unit also put forwards a number of strategies to maintain the purity of natural resources. According to the investigator this unit can also include a brief description on green purchasing and eco-labeling to develop awareness among students regarding the same. It would be better if there have been a brief description on 'carbon foot print' in the unit.

The unit 'When current flows' throws light upon some situations of electricity misuse and reminds the need to opt for star labeled electronic appliances. Other than these, it is identified that the representation of content on 'Sustainable Lifestyle Practices' is negligible in the text book. The units 'Wonders of visible light'; 'Through the alimentary canal'; 'Pressure in liquids and gases'; 'Breath and blood of life' do not cover any of the contents related to 'Sustainable Lifestyle Practices'. In the units 'Acids and alkalis'; 'Paths of heat flow' and 'Security in food too' there are single places where certain 'Sustainable Lifestyle Practices' are indirectly mentioned.

Objective 2

To derive experts' viewpoints on the present trend and suggestions for improvement of 'Sustainable Lifestyle Practices' of Upper Primary Schools.

Analysis of the Data of Interview with Curriculum Framers of Upper Primary level

The data gathered from interview with curriculum framers were

analyzed. Three experts were interviewed who were members in textbook development committee of Upper Primary Science text book designed by SCERT, Kerala. The views and suggestions put forwarded by the experts are the following.

Significance of mainstreaming 'Sustainable Lifestyle Practices' in the curriculum

Though school text books provide a lot of content on environmental concepts, students' environmental responsibility has not been reflected completely in their day today actions concerned with resource management or conservation. For bridging this gap it is essential that curriculum should provide more opportunities for children to connect every bit of environmental knowledge to eco-friendly actions. By mainstreaming 'Sustainable Lifestyle Practices' in the curriculum learners will be more oriented and equipped to implement the same in their own lifestyles and thereby will be able to contribute to global sustainability more effectively.

Scope of Upper Primary Science curriculum in promoting 'Sustainable Lifestyle Practices'

The experts were of the opinion that Upper Primary Science curriculum has more scope in conveying the message of practicing sustainability in individual lifestyles.

- The curriculum is more effective in bringing about an evident behavioral change among learners favoring eco-friendliness compared to the past.
- Since Science is not divided into individual subjects in Upper Primary level, there is more scope to integrate majority of the concepts of 'Sustainable Lifestyle Practices' within the same subject.
- The curriculum maintained continuity in representing the areas like sustainable agriculture, biodiversity conservation, water conservation, and energy conservation in the Science text books of 5^{th}, 6^{th} and 7^{th} standards.
- The units related to 'Sustainable Lifestyle Practices' are arranged in accordance with the seasonal variations. Hence whatever the students learned in classrooms regarding the subject can be practiced by them through direct interactions with nature itself.
- The curriculum envisaged the establishment of green campus in every school.
- As per the vision of state government, priority was given in the curriculum to encourage the setting up of biodiversity parks in every school. This would be helpful to broaden the student's vision from the routine agricultural practices to conserve diversity of living forms.
- There are a lot of possibilities in the curriculum to interact, observe and learn from nature.

- There is scope in the curriculum to relate each topic with the prevailing ecological issues and there by curriculum attempts to develop ecological concern of the learners.

Major learning outcomes related to 'Sustainable Lifestyle Practices' aimed by the curriculum

The major learning outcomes associated with 'Sustainable Lifestyle Practices' aimed by the curriculum are:

- To observe and interact with nature continuously.
- To identity the diversity of living forms.
- To classify living beings based on their peculiar features.
- To take up measures to conserve biodiversity.
- To establish a vegetable garden in home and school to promote food security and self sufficiency in food production.
- To initiate social forestry programs.
- To identify the imbalances in ecosystems caused by human interferences.
- To identify agricultural practices harmful to nature.
- To realize the ecological significance of organic farming.
- To explore the possibilities of integrated farming.
- To identify various instances of water misuse in daily life.
- To practice some effective measures to conserve water.

- To identify instances of energy wastage in our day to day practices.
- To implement certain strategies which facilitate energy conservation.
- To realize the importance of personal and social hygiene for healthy living.
- To take some effective steps to prevent the pollution of air, water and soil.

The areas of 'Sustainable Lifestyle Practices' given space in the curriculum

The Science curriculum of Upper Primary level has given due representation of majority of the areas that are related to 'Sustainable Lifestyle Practices'. The areas are

- Sustainable agriculture
- Biodiversity conservation
- Energy conservation and
- Water Conversation

Areas which can be included in the curriculum to make it greener

The experts identified the following areas related to ‘Sustainable Lifestyle Practices’ which can be included in the curriculum to make it greener.

- Need of plant cultivation to reduce sound pollution

- Few organic farming techniques
- Farming practices suitable for urban living like roof gardening and urban gardening.
- Ecological significance of lichens as air pollution indicators.
- Ecological imbalance created due to the entry of foreign animal or plant species to native living groups.
- Frequent appearance of wild animals and birds in human settlements as sign of biodiversity loss.
- Sustainable waste management techniques.
- Importance of traditional ecological knowledge in daily living.
- Eco-friendly festival celebration.
- An introduction to eco-friendly building design.
- Importance of green purchasing.

Difficulties experienced by the experts while integrating the concepts of 'Sustainable Lifestyle Practices' into curriculum

The experts didn't face much difficulty while incorporating the concepts of 'Sustainable Lifestyle Practices' into curriculum. Yet few constraints identified by them are the following:

- Since the area of 'Sustainable Lifestyle Practices' is wide, there was little difficulty to restrict the contents to specific topics.

- There was no provision to include the examples of model systems promoting ‘Sustainable Lifestyle’ functioning under private sector, in the curriculum.
- There was difficulty to include examples of ecosystems which are uniformly applicable to diverse geographical localities.
- Changing governments influence the curricular revisions. Hence the continuity of 'Sustainable Lifestyle Practices' aimed by the curriculum could not be fully retained after each revision.

Suggestions to facilitate effective transaction of 'Sustainable Lifestyle Practices’ through the curriculum

- The essence of 'sustainability' should be retained in the curriculum irrespective of the changing socio-political conditions.
- The fundamentals of 'Sustainable Lifestyle Practices' should be incorporated into curriculum from the Lower Primary Level itself.
- The examples of eminent persons implementing 'Sustainable Lifestyle Practices’ should be included in the curriculum in their life time itself rather than in their absence.
- Teachers should be resourceful and competent to make use of every chance to relate each topic in the curriculum with 'Sustainable Lifestyle Practices’

- Teachers should be encouraged to form ‘self learning groups’ to explore more possibilities to implement ‘Sustainable Lifestyle Practices' aimed by the curriculum.
- There should be special training programs in order to equip teachers for effective transaction of ‘Sustainable Lifestyle Practices’ aimed by the curriculum.

Analysis of the Data of Interview with Environmental Experts

Improvement in 'Sustainable Lifestyle Practices’ of schools

Environmental experts opined that there has been a favorable change in the 'Sustainable Lifestyle Practices' of schools within recent years. In majority of the schools Eco-clubs attempt to make a purposeful behavioral change among learners to impart environmental protection and conservation. The Aided and Government schools of the state are much active in green movement. It is a positive trend that eco-friendliness has been prioritized by many of the Unaided schools also recently. The contribution of National Green Corps (NGC), SEED programme of ‘Mathrubhumi’ daily and ‘Nalla Padam’ project of ‘Malayala Manorama’ daily are notable in leading the schools in the green track.

Drawbacks in 'Sustainable Lifestyle Practices’ of schools

The major drawbacks pointed out by the experts, regarding ‘Sustainable Lifestyle Practices' of schools are the following:

- Since the teacher in-charges of the Eco clubs of schools change for short duration, particularly in Government schools, the 'Sustainable Lifestyle Practices' of schools often lack continuity.
- In schools where a single teacher in-charge handles the charge of both Science club and Eco club, the efforts for implementing 'Sustainable Lifestyle Practices' are not found to be achieving complete success.
- There is wrong practice in some schools that the teacher in-charge of the Eco club is fixed not based on the genuine interest to involve in environment-friendly activities. In such cases the 'Sustainable Lifestyle Practices' are carried out only for namesake.
- In some schools, the Eco club could not function in full swing since the political interests of teachers interfere with its activities. Hence the whole school fails to function as a single team to achieve the goals of 'Sustainable Lifestyle Practices'.
- Green purchasing was not found to be fully successful in most of the schools due to shortage of funds and personal interests of members of the purchasing committee.
- Some schools involve in the 'Sustainable Lifestyle Practices' only for winning competitions and for getting publicity. In such cases the actual spirit of those practices are not fully carried into individual lifestyles and actions of learners in home and school.

Need of assessment of 'Sustainable Lifestyle Practices' of schools

All the experts strongly agreed that the 'Sustainable Lifestyle Practices' of schools should be assessed every year in various dimensions like sustainable agriculture, water conservation, energy conservation, waste management and green purchasing. But 'Sustainable Lifestyle Practices' of schools should not be limited to qualify certain ecological criteria but they should be reflected in the overall learning culture of the school shaping eco-friendly habits in students which retain for long term.

Need of training for teachers on 'Sustainable Lifestyle Practices'

The experts opined that all teachers need to be provided orientation on 'Sustainable Lifestyle Practices' by Education Department as a part of in-service training every year. This will really help them to implement 'Sustainable Lifestyle Practices' in the schools more effectively.

Environmental Agencies and programs with which schools can collaborate

The environmental experts recommended some of the active environmental agencies and programs with which schools can collaborate and work. These are:

- Paryavaran Mithra: A national level program to promote environmental sustainability by creating green student leaders.

- National Green Corps (NGC): A program offered by Ministry of Environment and Forests of Government of India. NGC promotes environmental activities in schools all over the country through school Eco clubs
- Smart Energy Programme (SEP): Sponsored by Energy Management Centre of Kerala State in order to promote sustainable consumption and conservation of energy by school students.
- WWF INDIA: An Indian part of WWF which functions as an autonomous body based on New Delhi. It launches Environmental Education and Education for Sustainable Development programs beneficial for educational institutions.
- OISCA (Organization for Industrial Spiritual and Cultural Advancement) International: An International agency working for environmentally sustainable development.
- 'Friends of Nature': A Malabar based NGO promoting environmental protection.
- Malabar Natural History Society: An NGO based at Calicut, working for Environmental Education, natural protection and biodiversity conservation.
- SEED (Student Empowerment for Environmental Development): A program initiated by 'Mathrubhumi' daily aimed to inculcate

sustainable consumption and environmental protection practices among school students.

- 'Nalla Padam': A project of 'Malayala Manorama' daily which promotes environmental, social and cultural activities among school students.
- Society for Environmental Education Kerala (SEEK): An NGO based on Payyannur engaged in nature education and conservation.
- 'Chandrakantham': NGO based on Nilambur which provides opportunities to interact with nature by arranging nature living camps.
- 'Niravu' : NGO focusing on Sustainable waste management and organic farming based on Calicut
- 'Uravu': A Wayanadu based NGO promoting eco-friendly products and provides training to design such products especially from bamboo.

Suggestions to improve the 'Sustainable Lifestyle Practices' of schools

The environmental experts suggested the following recommendations for improving the ' Sustainable Lifestyle Practices' of schools.

- The teacher in-charge of the Eco club or Nature club of the school should be an experienced person in environmental matters. He should be a role model showing genuine interest and service mentality for the welfare of nature.

- It is desirable that the same teacher in-charge may lead the Eco club for long term rather than changing the in-charges yearly. This will help schools to retain the continuity of 'Sustainable Lifestyle Practices'.
- Young, enthusiastic teachers who are interested in environmental protection and conservation can form a team to assist the Eco club in-charge for executing the 'Sustainable Lifestyle Practices'.
- Formation of a 'Green teacher network' of neighboring Districts/Panchayaths would be beneficial for exchanging innovative ideas regarding implementing 'Sustainable Lifestyle Practices' in schools.
- Schools should be encouraged to conduct 'Environmental Fairs' every year. This would help to familiarize learners with environment-friendly products and services which they could adopt in daily lifestyle.
- The theory and practice of Environmental Education should be mainstreamed in the school curriculum.

Analysis of the Data of Interview with Eco Club in- Charges of Highly Successful Green Schools

Eco club in-charges of three highly successful green schools were interviewed. The investigator selected the schools which excelled in the SEED program of 'Mathrubhumi' daily as highly successful green schools, since the SEED program attempts to integrate majority of the 'Sustainable

Lifestyle Practices'. Two among them were in-charges of Eco clubs of schools those achieved topmost position in the state in green activities. The third one is the Eco club in-charge of a highly active green school in Malappuram District.

Areas of 'Sustainable Lifestyle Practices' focused by the highly successful green schools

The highly successful green schools attempted to integrate majority of the 'Sustainable Lifestyle Practices'. All of the three Eco club in-charges gave equal priority to the efforts of sustainable agriculture, biodiversity conservation, water conservation, energy conservation and waste management. The in-charges responded that they felt difficulty in restricting plastic wastes completely in school. The schools didn't give enough focus to green purchasing.

The factors motivating the Eco club in-charges to take up 'Sustainable Lifestyle Practices'

The Eco club in-charges identified the following factors as motivators in their efforts to execute 'Sustainable Lifestyle Practices':

- Environmental vision of the school management
- Support, recognition and facilities provided by the management
- Support and recognition from local bodies

- Support and recognition from media
- Strong support and guidance from Krishi Bhavans
- Support of Alumni members of the school
- Environmental camps provided by the State Forest Department
- Enthusiasm shown by students to take part in 'Sustainable Lifestyle Practices'
- Personal examples of development of good character, co-operation and service mentality in students who are actively engaged in 'Sustainable Lifestyle Practices'.
- Success stories of development of strong family bonds by involving family members in 'Sustainable Lifestyle practices' initiated by the school.

Difficulties experienced by the Eco club in-charges in promoting 'Sustainable Lifestyle Practices'

The Eco club in-charges faced the following hindrances in their efforts to implement 'Sustainable Lifestyle Practices' in schools.

- Availing funds to implement various initiatives of 'Sustainable Lifestyle Practices' in school is a major problem faced by Eco club in-charges.

- Gathering resources to proceed with ‘Sustainable Lifestyle Practices’ is another issue. It becomes the individual responsibility of the Eco-club in- charge to find resources for the same.
- The 'Sustainable Lifestyle Practices' were not given the complete acceptance by parents, teachers and public in the initial stages of implementation.
- Few teachers used to show indifferent attitude to ‘Sustainable Lifestyle Practices’. According to them it is the sole responsibility of the Eco club in-charge to put into practice such activities.
- It is difficult to find productive time for ‘Sustainable Lifestyle Practices’ connected with agriculture in school working hours. Hence the ‘green teams’ of teachers and students need to work during holidays and vacation time to compensate the pending duties in agricultural field.
- Availing eco-friendly products for the daily use of school is a problem. This is due to high cost of green products and lack of priority given to green purchasing by the society itself.
- It is observed that students’ interest and involvement in green practices gradually decrease as they shift from lower classes to higher classes.

Various 'Sustainable Lifestyle Practices' adopted by highly successful green schools

The highly successful green schools adopt a wide variety of 'Sustainable Lifestyle Practices' such as:

Agriculture and biodiversity conservation:

- Vegetable gardening
- Medicinal plant gardening
- Setting up of mini-forest in school compound
- Social forestry program
- Wet land and up-land Paddy cultivation
- Collection and plantation of local Mango plants of different varieties.
- Distribution of excess plants collected by the school to districts with less Mango tree population.
- Honoring of oldest trees in the locality.
- Promoting proverbs regarding local plants and herbs.
- Donating selected plant species to students for setting up of 'butterfly garden' at home.
- Setting up of a 'star forest' by encouraging students and teachers to donate a plant which stands for their birth star. This facilitates the conservation of so many rare plant species.

- Conducting ‘Environmental Summit’ by inviting neighboring schools and discussing relevant environmental issues of the locality.
- Conducting Agricultural parliament
- Exhibition of local flowers.
- Arranging live cooking shows using local leaves and herbs having nutrient value.
- Fish culture.
- Setting up of water filled pots for birds during summer.

Water conservation:

- Rain pit construction in the school compound before the onset of monsoon and leveling of these pits before summer in order to prevent evaporation.
- Setting up of bunds in the nearby rivers to conserve water during summer.
- Recharging water to the unused wells and ponds in the surroundings in order to rejuvenate them.
- Survey of ponds in the area and programs to conserve them by seeking support from local bodies and government.
- Field studies to find out the reasons for falling down of water level in the wells of the locality.

Energy conservation:

- Organizing workshops/ training sessions to students for making LED lamps.
- Awareness programs on minimal energy consumption by providing classes of experts from KSEB.
- Distributing solar lamps to households in underdeveloped villages.
- Distributing hand fans to hospitals in the locality.
- Energy surveys in households of the area by involving students.
- Energy saving programs during festive seasons.

Waste management:

- Introducing pipe composting facility to households in the locality.
- Forming a stitching unit in the school to design cloth bags from waste clothes.

Action plan for 'Sustainable Lifestyle Practices' of schools

The Eco club in-charges were of the opinion that short term action plans lasting for two to three months were found to be more successful rather than setting up action plan for the whole year, for implementation of 'Sustainable Lifestyle Practices' of schools.

Suggestions to improve the 'Sustainable Lifestyle Practices' of schools

The Eco club in-charges put forwarded the following suggestions to improve the 'Sustainable Lifestyle Practices' of schools.

- Give maximum opportunity for students to have direct learning experiences from the environment.
- Make sure that students are well aware of the consequences of man-made impacts on nature.
- Try to integrate every topic with ecological issues while teaching.
- A well trained and enthusiastic green leadership is very much essential to guide and motivate the entire school community to achieve the green goals.
- The Eco club in-charge of the school should be capable of effective time management in order to balance the academic duties as well as environmental activities.
- The teachers who take in-charge of the Eco clubs should be exempted from other additional duties.
- Teachers should be individual role models by implementing 'Sustainable Lifestyle Practices' in their own lifestyles.
- Schools should follow the models of successful Eco schools to move further in 'Sustainable Lifestyle Practices'.

- Students, teachers and parents who contribute remarkably to popularize 'Sustainable Lifestyle Practices' should be duly honored with appreciation, prizes and certificates in time.
- There should be congenial working atmosphere in each school ensuring the complete co-operation of the entire school community to achieve the goals of 'Sustainable Lifestyle Practices'.
- Collaborative effort of schools with local bodies is essential for executing 'Sustainable Lifestyle Practices' in a more effective manner.

Quantitative Data Analysis

The analysis of the data from survey is given as follows:

Objective 3

To study the level of students' perception on 'Sustainable Lifestyle Practices' of Upper Primary Schools.

For this investigator tabulated the total score of 841 students from 72 schools regarding their perception on 'Sustainable Lifestyle Practices' in their schools. The statistical constants of students' perception on 'Sustainable Lifestyle Practices' of schools is obtained as given in Table 5.

Table 5

Statistical constants of students' perception on 'Sustainable Lifestyle Practices' of schools

Statistical constants	
Mean	46.86
Median	46.00
Mode	46.00
Std. Deviation	9.836
Skewness	0.328
Kurtosis	-.024

The table shows that the mean of students' perception on 'Sustainable Lifestyle Practices' of schools is 46.86.The median is 46 and mode of the distribution is 46.The Standard Deviation obtained is 9.836.The skewness is 0.328 and kurtosis is -0.024.

The High, Low and Average groups were fixed by calculating the Mean+SD, Mean-SD and in between values respectively.The students with values above M+SD were considered as High group.Those with values below the M-SD were considered as Low group and the values coming in between the M+SD and M-SD were taken as Average group. The investigator calculated the percentage of each group from the frequencies corresponding to each group as in Table 6.

Table 6

Level of students' perception on 'Sustainable Lifestyle Practices' of schools

Level	Frequency	Percentage
High	176	20.93%
Average	505	60.05%
Low	160	19.02%
Total	841	100.0

From the above table it is clear that 60.05% of the students perceived that the 'Sustainable Lifestyle Practices' in their school is average and 20.93% of the students perceived that their school practices are at high level and 19.02% of students perceived that their school practices is low. So it can be concluded that most of the students perceived the 'Sustainable Lifestyle Practices' in their schools as average.

Objective 4

1. To find out whether there is any significant difference in students' perception on 'Sustainable Lifestyle Practices' of schools between.

    a) Government and Aided school students

    b) Urban and Rural students

    c) Boys and Girls

a) Test of Significance of difference between mean scores of Government and Aided school students' perception on 'Sustainable Lifestyle Practices' of schools

The details of Test of Significance of difference between mean scores of Government and Aided school students' perception on 'Sustainable Lifestyle Practices' of schools are presented in Table 7.

Table 7

Test of Significance of difference between mean scores of Government and Aided school students' perception on 'Sustainable Lifestyle Practices' of schools

Group Statistics						
Dimensions	Type of school	N	Mean	Std. Deviation	t	Level of Significance
Sustainable agriculture	Govt	309	13.20	4.21	1.96	0.05
	Aided	532	12.64	3.58		
Water conservation	Govt	309	8.38	2.34	1.84	NS
	Aided	532	8.07	2.38		
Energy conservation	Govt	309	11.04	3.23	4.99	0.01
	Aided	532	9.94	2.81		
Waste management	Govt	309	6.41	2.36	2.33	0.05
	Aided	532	6.78	1.97		
Green purchasing	Govt	309	9.00	2.94	1.09	NS
	Aided	532	8.77	2.97		
Sustainable Lifestyle Practices	Govt	309	48.03	10.87	2.51	0.05
	Aided	532	46.19	9.13		

It was found that the 't' value of students' perception on 'Sustainable Lifestyle Practices' of schools between Government and Aided school

students was 2.51. Since the 't' value is greater than 1.96 the difference is significant at 0.05 level.

The 't' value of Government and Aided school students' perception on 'sustainable agriculture' practices of schools was calculated. As the 't'-value obtained was 1.96, the difference is significant at 0.05 level.

The 't' value of Government and Aided school students' perception on 'water conservation' practices of schools was found out. Since value obtained was 1.84, the difference is not significant at 0.05 level.

The t-value of Government and Aided school students' perception on 'energy conservation' practices of schools obtained was 4.99. The value showed that the difference is significant at 0.01 level.

The t-value of Government and Aided school students' perception on 'waste management' practices of schools obtained was 2.33. Since the value is greater than 1.96, the difference is significant at 0.05 level.

The t-value obtained for Government and Aided school students' perception on 'green purchasing' practices of schools was 1.09. As the obtained value is lesser than 1.96, the difference is not significant at 0.05 level.

b) Test of Significance of difference between mean scores of Urban and Rural students' perception on 'Sustainable Lifestyle Practices' of schools

Details of Test of significance of difference between mean scores of Urban and Rural students' perception on Sustainable Lifestyle Practices of schools are presented in Table 8.

Table 8

Test of significance of difference between mean scores of Urban and Rural students' perception on Sustainable Lifestyle Practices of schools

Group Statistics						
Dimensions	Locale	N	Mean	Std. Deviation	t	Level of significance
Sustainable agriculture	Rural	557	12.80	3.77	0.46	NS
	Urban	284	12.93	3.97		
Water conservation	Rural	557	8.13	2.35	0.92	NS
	Urban	284	8.29	2.40		
Energy conservation	Rural	557	10.48	2.99	1.90	NS
	Urban	284	10.06	3.06		
Waste management	Rural	557	6.66	2.15	0.33	NS
	Urban	284	6.61	2.07		
Green purchasing	Rural	557	8.95	3.05	1.44	NS
	Urban	284	8.65	2.76		
Sustainable Lifestyle Practices	Rural	557	47.03	9.38	0.66	NS
	Urban	284	46.54	10.68		

The t-value obtained for student's perception on 'Sustainable Lifestyle Practices' of schools between Urban and Rural students was 0.66. The value confirmed that the difference is not significant at 0.05 level.

The 't' value for students' perception on 'sustainable agriculture' practices of schools between Urban and Rural students was 0.46. As the value is lesser than 1.96, the difference obtained is not significant at 0.05 level.

The t-value for students' perception on 'water conservation' practices of schools between Urban and Rural students was found to be 0.92. The difference is not significant at 0.05 level, as the value obtained is lesser than 1.96.

The t-value for students' perception on 'energy conservation' practices of schools between Urban and Rural students was calculated. The obtained t-value 1.90 confirmed that, the difference is not significant at 0.05 level.

The t-value for students' perception on 'waste management' practices of schools between Urban and Rural students was 0.33. Since that value is lesser than 1.96 the difference is not significant at 0.05 level.

The t-value for students' perception on 'green purchasing' practices of schools between Urban and Rural students was found to be 1.44. The ‘t’ value lesser than 1.96 revealed that the difference is not significant at 0.05 level.

c) Test of Significance of difference between mean scores of Boys and Girls perception on 'Sustainable Lifestyle Practices' of schools

The details of Test of Significance of difference between mean scores of Boys and Girls perception on 'Sustainable Lifestyle Practices' of schools are presented in Table 9.

Table 9

Test of Significance of difference between mean scores of Boys and Girls perception on 'Sustainable Lifestyle Practices' of schools

Group Statistics						
Dimensions	Gender	N	Mean	Std. Deviation	t	Level of significance
Sustainable agriculture	Boys	425	12.70	3.83	1.10	NS
	Girls	416	12.99	3.84		
Water conservation	Boys	425	8.22	2.35	0.43	
	Girls	416	8.15	2.39		
Energy conservation	Boys	425	10.38	3.09	0.38	
	Girls	416	10.30	2.94		
Waste management	Boys	425	6.54	2.16	1.44	
	Girls	416	6.75	2.08		
Green purchasing	Boys	425	8.87	2.96	0.15	
	Girls	416	8.84	2.96		
Sustainable Lifestyle Practices	Boys	425	46.70	9.74	0.49	
	Girls	416	47.03	9.94		

The ‘t’ value obtained for students’ perception on 'Sustainable Lifestyle Practices’ of schools between Boys and Girls was 0.49. The difference is not significant at 0.05 level.

The t-value for students' perception on 'sustainable agriculture' practices of schools, between Boys and Girls was found to be 1.10. Since the value is lesser than 1.96, the difference is not significant at 0.05 level.

The obtained t-value for students' perception on 'water conservation' practices of schools, between Boys and Girls was 0.43. As the value is lesser than 1.96, the difference is not significant at 0.05 level.

The t-value for students' perception on 'energy conservation' practices of schools, between Boys and Girls was found to be 0.38. The value indicated that the difference is not significant at 0.05 level.

The t-value for students' perception on 'waste management' practices of schools, between Boys and Girls was 1.44. As the value obtained is lesser than 1.96, the difference is not significant at 0.05 level.

The obtained t-value for students' perception on 'green purchasing' practices of schools, between Boys and Girls was found to be 0.15. The value confirmed that the difference is not significant at 0.05 level.

Hence only the first part of the hypothesis stating that ‘there exists significant difference in students’perception on ‘Sustainable Lifestyle Practices’ of schools between Government and Aided school students’ , is accepted whereas the second and third parts are rejected.

Objective 5

To find out the status of implementation of 'Sustainable Lifestyle Practices' by Upper Primary Schools as perceived by Eco-club in-charges.

The status of implementation of 'Sustainable Lifestyle Practices' by Upper Primary Schools as perceived by Eco-club in-charges were found out in various dimensions.

Sustainable Agriculture

The details of status of implementation of 'sustainable agriculture' practices are presented in Table 10.

Table 10

Details of status of implementation of 'sustainable agriculture' practices by schools

(Percentage in brackets)

Sl. No.	Sustainable Lifestyle Practice	Completely implemented	Partially implemented	Would Implement soon	Would consider in future	Not interested
1	Active encouragement given to organic farming	18 (25%)	45 (62.5%)	2 (2.8%)	7 (9.7%)	0 (0%)
2.	Ensuring the complete participation of students in agricultural activities	21 (29.2%)	40 (55.6%)	7 (9.7%)	4 (5.6%)	0 (0%)

Sl. No.	Sustainable Lifestyle Practice	Completely implemented	Partially implemented	Would Implement soon	Would consider in future	Not interested
3.	Ensuring the protection of planted seedlings	33 (45.8%)	37 (51.4%)	1 (1.4%)	1 (1.4%)	0 (0%)
4.	Active observance of 'Farmers day'	51 (70.8%)	15 (20.8%)	3 (4.2%)	3 (4.2%)	0 (0%)
5.	Honoring of Local farmers	21 (29.2%)	22 (30.6%)	6 (8.3%)	23 (31.9%)	0 (0 %)
6.	Active participation of the school in various agricultural contests	20 (27.8%)	17 (23.6%)	5 (6.9%)	29 (40.3%)	1 (1.4%)
7.	Classes provided by organic farming experts/ agricultural scientists	38 (52.8%)	19 (26.4%)	2 (2.8%)	13 (18%)	0 (0%)
8.	Proper harvesting of vegetables	29 (40.3%)	27 (37.5%)	2 (2.8%)	14 (19.4%)	0 (0%)
9.	Exhibition of harvested vegetables	23 (31.9%)	22 (30.6%)	11 (15.3%)	14 (19.4%)	2 (2.8%)
10.	Offering prizes to the best student farmers	14 (19.4%)	9 (12.5%)	14 (19.4%)	35 (48.6%)	0 (0%)

Analysis revealed that the practice of 'Active encouragement given to organic farming' was completely implemented by 25% of the sample, partially

implemented by 62.5%, would implement soon by 2.8%, would consider in future by 9.7% and not interested by none of the sample.

'Ensuring the complete participation of students in agricultural activities was completely implemented by 29.2%, partially implemented by 55.6%, would implement soon by 9.7%, would consider in future by 5.6% and not interested by none of the sample.

The practice of 'Ensuring the protection of planted seedlings' was completely implemented by 45.8%, partially implemented by 51.4% , would implement soon by 1.4%, would consider in future by 1.4% and not interested by none of the sample.

'Active observance of farmer's day' was completely implemented by 70.8%, partially implemented by 20.8%, would implement soon by 4.2%, would consider in future by 4.2% and not interested by none of the sample.

'Honoring of local farmers' was completely implemented by 29.2%, partially implemented by 30.6%, would implement soon by 8.3%, would consider in future by 31.9% and not interested by none of the sample.

'Active participation of the school in various agricultural contests' was completely implemented by 27.8%, partially implemented by 23.6%, would implement soon by 6.9%, would consider in future by 40.3% and not interested by 1.4% of the sample.

'Classes provided by organic farming experts/ agricultural scientists' was completely implemented by 52.8%, partially implemented by 26.4%, would implement soon by 2.8%, would consider in future by 18% and not interested by none of the sample.

'Proper harvesting of vegetables' was completely implemented by 40.3%, partially implemented by 37.5%, would implement soon by 2.8%, would consider in future by 19.4% and not interested by none of the sample.

'Exhibition of harvested vegetables' was completely implemented by 31.9%, partially implemented by 30.6%, would implement soon by 15.3%, would consider in future by 19.4% and not interested by 2.8% of the sample.

Offering prizes to the best student farmers was completely implemented by 19.4%, partially implemented by 12.5%, would implement soon by 19.4%, would consider in future by 48.6% and not interested by none of the sample.

Water Conservation

The details of status of implementation of 'water conservation' practices by schools are presented in Table 11.

Table 11

Details of status of implementation of 'water conservation' practices by schools

Sl. No.	Sustainable Life style Practice	Completely implemented	Partially implemented	Would Implement soon	Would consider in future	Not interested
11.	Provision of cups under each of the pipes	15 (20.8%)	28 (38.9%)	12 (16.7%)	17 (23.6%)	0 (0%)
12.	Setting up of rain water harvesting tanks/ rain pits	9 (12.5%)	18 (25%)	5 (6.9%)	40 (55.6%)	0 (0%)
13.	Installation of posters/notices aiming minimum water consumption	59 (81.9%)	10 (13.9%)	2 (2.8%)	1 (1.4%)	0 (0%)
14.	Tackling of leakages of pipes and water tanks in time	65 (90.3%)	5 (6.9%)	1 (1.4%)	1 (1.4%)	0 (0%)
15.	Facility for roof water harvesting from the school building	9 (12.5%)	5 (6.9%)	7 (9.7%)	51 (70.8%)	0 (0%)
16.	Drip irrigation facility in the school farm	14 (19.4%)	10 (13.9%)	7 (9.7%)	39 (54.2%)	2 (2.8%)
17.	Fixing watering time only at morning or evening	58 (80.6%)	6 (8.3%)	4 (5.6%)	4 (5.6%)	0 (0%)

The practice of 'provision of cups under each of the pipes' was completely implemented by 20.8%, partially implemented by 38.9%, would implement soon by 16.7%, would consider in future by 23.6% and not interested by none of the sample.

'Setting up of rain water harvesting tanks / rain pits' was completely implemented by 12.5%, partially implemented by 25%, would implement soon by 6.9%, would consider in future by 55.6% and not interested by none of the sample.

Installation of posters/notices aiming minimum water consumption was completely implemented by 81.9%, partially implemented by 13.9%, would implement soon by 2.8%, would consider in future by 1.4% and not interested by none of the sample.

'Tackling of leakages of pipes and water tanks in time' was completely implemented by 90.3%, partially implemented by 6.9%, would implement soon by 1.4%, would consider in future by 1.4% and not interested by none of the sample.

'Facility for roof water harvesting from the school building' was completely implemented by 12.5%, partially implemented by 6.9%, would implemented soon by 9.7%, would consider in future by 70.8%, and not interested by none of the sample.

‘Drip irrigation facility in the school farm' was completely implemented by 19.4%, partially implemented by 13.9%, would implement soon by 9.7%, would consider in future by 54.2% and not interested by 2.8% of the sample.

'Fixing watering time only at morning or evening' was completely implemented by 80.6%, partially implemented by 8.3%, would implement soon by 5.6%, would consider in future by 5.6% and not interested by none of the sample.

Energy Conservation

The details of status of implementation of ‘energy conservation’ practices by schools are presented in Table 12.

Table 12

Details of status of implementation of 'energy conservation' practices by schools

Sl. No.	Sustainable Lifestyle Practice	Completely implemented	Partially implemented	Would Implement soon	Would consider in future	Not interested
18.	Usage of LED/CFL bulbs	9 (12.5%)	45 (62.5%)	4 (5.6%)	14 (19.4%)	0 (0)
19.	Usage of biogas for cooking	19 (26.4%)	20 (27.8%)	9 (12.5%)	24 (33.3%)	0 (0)
20.	Offering prizes to students who perform excellently in minimizing electricity consumption	13 (18%)	10 (13.9%)	9 (12.5%)	40 (55.6%)	0 (0)
21.	Usage of LED/LCD monitors in computers of the school	45 (62.5%)	25 (34.7%)	0 (0%)	2 (2.8%)	0 (0)
22.	Energy survey conducted by the school	28 (38.9%)	16 (22.2%)	9 (12.5%)	19 (26.4%)	0 (0)
23.	Usage of star labeled electrical equipments	13 (18%)	22 (30.6%)	9 (12.5%)	28 (38.9%)	0 (0)
24.	Practice of unplugging electrical equipments from sockets after daily use	54 (75%)	11 (15.3%)	3 (4.2%)	4 (5.6%)	0 (0)

The practice of 'Usage of LED/CFL bulbs in school' was completely implemented by 12.5%, partially implemented by 62.5%, would implement soon by 5.6%, would consider in future by 19.4%, and not interested by none of the sample.

The practice of 'Usage of biogas for cooking' was completely implemented by 26.4%, partially implemented by 27.8%, would implement soon by 12.5%, would consider in future by 33.3%, and not interested by none of the sample.

'Offering prizes to students who perform excellently in minimizing electricity consumption' was completely implemented by 18%, partially implemented by 13.9%, would implement soon by 12.5%, would consider in future by 55.6% and not interested by none of the sample.

'Usage of LED/LCD monitors in computers of the school' was completely implemented by 62.5%, partially implemented by 34.7%, would implement soon by none, would consider in future by 2.8% and not interested by none of the sample.

'Energy survey conducted by the school' was completely implemented by 38.9%, partially implemented by 22.2%, would implement soon by 12.5%, would consider in future by 26.4% and not interested by none of the sample.

'Usage of star labeled electrical equipments' was completely implemented by 18%, partially implemented by 30.6%, would implement soon by 12.5%, would consider in future by 38.9%, and not interested by none of the sample.

'Practice of unplugging electrical equipments from sockets after daily use' was completely implemented by 75%, partially implemented by 15.3%, would implement soon by 4.2%, would consider in future by 5.6% and not interested by none of the sample.

Waste Management

The details of status of implementation of ‘waste management’ practices by schools are presented in Table 13.

Table 13

Details of status of implementation of 'waste management' practices by schools

Sl. No.	Sustainable Lifestyle Practice	Completely implemented	Partially implemented	Would Implement soon	Would consider in future	Not interested
25.	Banning of plastic covers within the school compound	41 (56.9%)	26 (36.1%)	5 (6.9%)	0 (0%)	0 (0)
26.	Daily sanitation of school premises	61 (84.7%)	6 (8.3%)	3 (4.2%)	2 (2.8%)	0 (0)
27.	Usage of eco-friendly plates and cups for serving food in various occasions	49 (68.1%)	12 (16.7%)	5 (6.9%)	6 (8.3%)	0 (0)
28.	Provision of separate waste bins for discarding bio-degradable and non-biodegradable wastes	50 (69.4%)	19 (26.4%)	1 (1.4%)	2 (2.8%)	0 (0)
29.	Provision of separate waste bin for each of the classroom of the school	62 (86.1%)	5 (6.9%)	1 (1.4%)	4 (5.6%)	0 (0)
30.	Communicating with PTA/MPTA members through mobile SMS/E mail	16 (22.2%)	25 (34.7%)	4 (5.6%)	27 (37.5%)	0 (0)
31.	Activities to promote reuse by collecting used books and clothes from students	14 (19.4%)	15 (20.8%)	3 (4.2%)	40 (55.6%)	0 (0)
	es taken by the school to hand over plastic wastes to waste recycling centers	9 (12.5%)	19 (26.4%)	4 (5.6%)	52.8%)	2 (2.8%)

The practice of 'Banning of plastic covers within the school compound' was completely implemented by 56.9%, partially implemented by 36.1%, would implement soon by 6.9%, would consider in future by none and not interested by none of the sample.

'Daily sanitation of the school premises' was completely implemented by 84.7%, partially implemented by 8.3%, would implement soon by 4.2%, would consider in future by 2.8% and not interested by none of the sample.

'Usage of eco-friendly plates and cups for serving food in various occasions' was completely implemented by 68.1%, partially implemented by 16.7%, would implement soon by 6.9%, would consider in future by 8.3%, and not interested by none of the sample.

'Provision of separate waste bins for discarding bio-degradable and non-biodegradable wastes' was completely implemented by 69.4%, partially implemented by 26.4%, would implement soon by 1.4%, would consider in future by 2.8% and not interested by none of the sample.

'Provision of separate waste bin for each of the classrooms of the school' was completely implemented by 86.1%, partially implemented by 6.9%, would implement soon by 1.4%, would consider in future by 5.6% and not interested by none of the sample.

'Communicating with PTA or MPTA members through mobile SMS or E-mail was completely implemented by 22.2%, partially implemented by 34.7%, would implement soon by 5.6%, would consider in future by 37.5% and not interested by none of the sample.

'Activities to promote reuse by collecting used books and cloths from students' was completely implemented by 19.4%, partially implemented by 20.8%, would implement soon by 4.2%, would consider in future by 55.6% and not interested by none of the sample.

'Initiatives taken by the school to handover plastic wastes to waste recycling centers' was completely implemented by 12.5%, partially implemented by 26.4%, would implement soon by 5.6%, would consider in future by 52.8%, and not interested by 2.8% of the sample.

Green Purchasing

The details of status of implementation of 'green purchasing' practices by schools are presented in Table 14.

Table 14

Details of status of implementation of 'green purchasing' practices by schools

Sl. No.	Sustainable Life- style Practice	Completely implemented	Partially implemented	Would Implement soon	Would consider in future	Not interested
33.	Ensuring quality/efficiency of electronic items while purchasing for school	52 (72.2%)	12 (16.7%)	5 (6.9%)	3 (4.2%)	0 (0)
34.	Awareness programs on green purchasing	11 (15.3%)	19 (26.4%)	7 (9.7%)	35 (48.6%)	0 (0)
35.	Purchasing only for the need of the school	63 (87.5%)	7 (9.7%)	2 (2.8%)	0 (0)	0 (0)
36.	Priority given by school to purchase items that are reusable	9 (12.5%)	28 (38.9%)	4 (5.6%)	31 (43.1%)	0 (0)
37.	Insisting minimal packaging of products purchasing for school uses	36 (50%)	27 (37.5%)	1 (1.4%)	8 (11.1%)	0 (0)
38.	Purchase of goods from local shops and farmers for school uses	51 (70.8%)	17 (23.6%)	0(0)	4 (5.6%)	0 (0)
39.	Avoiding purchase of items which are harmful to nature	49 (68.1%)	16 (22.2%)	1 (1.4%)	6 (8.3%)	0 (0)
40.	Priority given to products which have green certification / eco mark	3 (4.2%)	20 (27.8%)	4 (5.6%)	45 (62.5%)	0 (0)
41.	Online purchase of different products for school use	1 (1.4%)	7 (9.7%)	7 (9.7%)	52 (72.2%)	5 (6.9%)
42.	Introducing books / directories/magazines to students, providing information on green products	9 (12.5%)	33 (45.8%)	6 (8.3%)	24 (33.3%)	0 (0)
43.	Exploration to find out the new possibilities in green purchasing	8 (11.1%)	23 (31.9%)	9 (12.5%)	32 (44.4%)	0 (0)
44.	Formation of green purchasing team/committee	2 (2.8%)	3 (4.2%)	8 (11.1%)	58 (80.6%)	1 (1.4%)

The practice of 'Ensuring quality /efficiency of electronic items while purchasing for school' was completely implemented by 72.2%, partially implemented by 16.7%, would implement soon by 6.9%, would consider in future by 4.2% and not interested by none of the surveyed schools.

'Awareness programs on green purchasing' was completely implemented by 15.3%, partially implemented by 26.4%, would implement soon by 9.7%, would consider in future by 48.6% and not interested by none of the sample.

'Purchasing only for the need of the school' was completely implemented by 87.5%, partially implemented by 9.7%, would implement soon by 2.8%, would consider in future by none and not interested by none of the sample.

'Priority given by school to purchase items that are reusable' was completely implemented by 12.5%, partially implemented by 38.9%, would implement soon by 5.6%, would consider in future by 43.1% and not interested by none of the sample.

'Insisting minimal packaging of products purchasing for school uses' was completely implemented by 50%, partially implemented by 37.5%, would implement soon by 1.4%, would consider in future by 11.1% and not interested by none of the sample.

‘Purchase of goods from local shops and farmers for school uses’ was completely implemented by 70.8%, partially implemented by 23.6%, would implement soon by none, would consider in future by 5.6% and not interested by none of the sample.

'Avoiding purchase of items which are harmful to nature' was completely implemented by 68.1%, partially implemented by 22.2%, would implement soon by 1.4%, would consider in future by 8.3% and not interested by none of the sample.

‘Priority given to products which have green certification or eco- mark' was completely implemented by 4.2%, partially implemented by 27.8%, would implement soon by 5.6%, would consider in future by 62.5% and not interested by none of the sample.

'Online purchase of different products for school use' was completely implemented by 1.4%, partially implemented by 9.7%, would implement soon by 9.7%, would consider in future by 72.2% and not interested by 6.9% of the sample.

'Introducing books/directories/magazines to students providing information on green products' was completely implemented by 12.5%, partially implemented by 45.8%, would implement soon by 8.3%, would consider in future by 33.3% and not interested by none of the sample.

'Exploration to find out the new possibilities in green purchasing' was completely implemented by 11.1%, partially implemented by 31.9%, would implement soon by 12.5%, would consider in future by 44.4% and not interested by none of the sample.

'Formation of green purchasing team/ committee' was completely implemented by 2.8%, partially implemented by 4.2%, would implement soon by 11.1%, would consider in future by 80.6% and not interested by 1.4% of the sample.

Objective 6

To study the constraints faced by Eco-club in-charges in implementing 'Sustainable Lifestyle Practices' in schools.

The details of constraints faced by Eco-club in-charges in implementing 'Sustainable Lifestyle Practices' in schools are presented in Table 15.

Table 15

Details of constraints faced by Eco-club in-charges in implementing Sustainable Lifestyle Practices in schools

Sl. No.	Constraint	Not all affected	Moderately affected	Extremely affected
1.	Lack of funds	8 (11.1%)	24 (33.3%)	40 (55.6%)
2.	Lack of resources	6 (8.3%)	45 (62.5%)	21 (29.2%)
3.	Poor leadership	43 (59.7%)	22 (30.6%)	7 (9.7%)
4.	Inadequate training	7 (9.7%)	36 (50%)	29 (40.3%)
5.	Poor involvement of staff	44 (61.1%)	25 (34.7%)	3 (4.2%)
6.	Poor involvement of students	57 (79.2%)	13 (18%)	2 (2.8%)
7	Poor support from management/authorities	55 (76.4%)	14 (19.4%)	3 (4.2%)
8	Lack of recognition for green initiatives	50 (69.4%)	20 (27.8%)	2 (2.8%)
9.	Lack of priority given to Sustainable Lifestyle Practices	46 (63.9%)	24 (33.3%)	2 (2.8%)
10.	Lack of time	15 (20.8%)	13 (18 %)	44 (61.1%)
11.	Curriculum load	16 (22.2%)	28 (38.9%)	28 (38.9%)
12.	Poor support from parents	37 (51.4%)	26 (36.1%)	9 (12.5%)
13.	Poor involvement of local bodies	32 (44.4%)	33 (45.8%)	7 (9.7%)
14.	Lack of collaboration with environmental agencies and NGO's	15 (20.8%)	50 (69.4%)	7 (9.7%)
15.	Poor awareness regarding Sustainable Lifestyle Practices	42 (58.3%)	28 (38.9%)	2 (2.8%)
16.	Poor assessment of Sustainable Lifestyle Practices	5 (6.9%)	29 (40.3%)	38 (52.8%)

The table shows that the constraint 'Lack of funds' was extremely affecting a higher percentage of the surveyed schools i.e., 55.6%. Analysis also revealed that it was moderately affecting 33.3% and not at all affecting 11.1% of the schools.

The constraint 'Lack of resources' was extremely affecting 29.2% of the schools, moderately affecting 62.5% and not at all affecting 8.3% of the surveyed sample.

It was revealed that 'Poor Leadership' was extremely affecting a lesser percentage of the sample i.e., 9.7% and moderately affecting 30.6%. Percentage analysis also confirmed that 59.7% of the sample was not at all affected by 'Poor leadership' as a constraint in implementing Sustainable Lifestyle Practices.

40.3% of the sample was found to be extremely affected by ‘Inadequate training’. The constraint was moderately affecting 50% and not at all affecting a lesser percentage of the sample that is 9.7%.

'Poor involvement of staff' was found to be extremely affecting 4.2%, moderately affecting 34.7% and not at all affecting 61.1% of the surveyed schools.

It was revealed that 'Poor involvement of students' was extremely affecting a minor percentage of the sample i.e., 2.8%. 18% of the schools

were found to be moderately affected by the constraint. A majority of the surveyed schools (i.e., 79.2%) were not at all affected by the constraint.

'Poor support from management/ authorities was extremely affecting only 4.2% of the sample, moderately affecting 19.4% and not at all affecting a greater percentage i.e., 76.4% of the schools surveyed.

The constraint 'Lack of recognition for green initiatives' was extremely affecting a minor percentage (i.e., 2.8%) of the sample. It was moderately affecting 27.8% and not at all affecting a majority of the surveyed schools, i.e., 69.4%.

It was confirmed that only 2.8% of the sample was extremely affected by the constraint 'Lack of priority given to Sustainable Lifestyle Practices'. 33.3% of the sample was moderately affected and 63.9% was not at all affected by the constraint.

'Lack of time' was found to be one of the major constraints in implementing 'Sustainable Lifestyle Practices' in schools since it was extremely affecting a higher percentage of the sample i.e., 61.1%. 18% of the sample was moderately affected and 20.8% was not at all affected by the constraint.

'Curriculum load' was reported as an extremely affecting constraint to 38.9% of the sample, moderately affecting to 38.9% and not at all affecting to 22.2% of the sample.

Analysis revealed that 'Poor support from parents' was felt extremely affecting 12.5% of the sample, moderately affecting 36.1% and not at all affecting more than half of the sample surveyed i.e., 51.4%.

'Poor involvement of local bodies' was extremely affecting the implementation of 'Sustainable Lifestyle Practices' of 9.7% of the sample, moderately affecting 45.8% and not at all affecting 44.4% of the sample.

Only 9.7% of the sample was reported to be extremely affected by 'Lack of collaboration with environmental agencies and NGO's'. The constraint was moderately affecting a majority of the sample i.e., 69.4% and not at all affecting 20.8% of the sample.

'Poor awareness regarding Sustainable Lifestyle Practices' was extremely affecting only 2.8% of the sample, moderately affecting 38.9% and not at all affecting a major percentage of the sample that is 58.3%.

'Poor assessment of Sustainable Lifestyle Practices' was revealed as one among the major constraints since it was reported as extremely affecting by more than half of the sample that is 52.8%. The constraint was found to be moderately affecting 40.3% and not at all affecting 6.9% of the sample.

It was also revealed that none of the Eco-club in-charges pointed out any other constraints which affect the implementation of 'Sustainable Lifestyle Practices' of their schools other than the 16 constraints identified by the investigator.

CHAPTER VI

SUMMARY OF FINDINGS AND SUGGESTIONS

- Study in retrospect
- Summary of major findings
- Discussion of results
- Suggestions
- Educational implications
- Scope for further research

SUMMARY OF FINDINGS AND SUGGESTIONS

The chapter provides an overview of the study conducted. The major findings of the study, suggestions and educational implications are included in the chapter.

Study in Rertrospect

Restatement of the problem

The present study is entitled as “AN EXPLORATORY STUDY ON SUSTAINABLE LIFESTYLE PRACTICES IN UPPER PRIMARY SCHOOLS OF KERALA.”

Variables of the study

There is only one variable in the present study that is 'Sustainable Lifestyle Practices'.

Objectives

1. To analyze the Science text books of Upper Primary Schools following state syllabus to explore the content representing ‘Sustainable Lifestyle Practices’.

2. To derive experts' viewpoints on the present trend and suggestions for improvement of the 'Sustainable Lifestyle Practices' of Upper Primary Schools.

3. To study the level of students' perception on 'Sustainable Lifestyle Practices' of Upper Primary schools.

4. To find out whether there is any significant difference in students' perception on 'Sustainable Lifestyle Practices' of schools between

    a) Government and Aided school students

    b) Urban and Rural students

    c) Boys and Girls

5. To find out the status of implementation of 'Sustainable Lifestyle Practices' by Upper Primary Schools as perceived by Eco-club in-charges.

6. To study the constraints faced by Eco-club in-charges in implementing 'Sustainable Lifestyle Practices' in schools.

Methodology

Sample

The study was based on a sample of 72 Upper Primary Schools representing six districts of Kerala selected through stratified random sampling. The data was collected from seventh standard students who were

active members of school Eco-clubs and teacher in-charges of Eco-clubs of each school. Here purposive sampling was used. The total number students selected for data collection was 841 and that of teachers was 72. The investigator also collected data from three curriculum framers, three environmental experts and three Eco-club in-charges of highly successful green schools.

Tools and techniques used for data collection

1. Semi-structured interview schedule for curriculum framers of Upper Primary level
2. Semi-structured interview schedule for environmental experts
3. Semi-structured interview schedule for highly successful Eco-club in-charges
4. Scale of Students' Perception on 'Sustainable Lifestyle Practices' of Schools (Deepthi & Meera, 2016)
5. Scale of Status of Implementation of Sustainable Lifestyle Practices by Schools (Deepthi & Meera, 2016).
6. Questionnaire on the constraints in implementing 'Sustainable Lifestyle Practices' in schools.

Statistical techniques used

t-test and Percentage analysis

Summary of Major Findings

Objective- 1

The first objective of the study was to analyze the Science text books of Upper Primary Schools following state syllabus to explore the content representing ‘Sustainable Lifestyle Practices’.

Findings of content analysis of 5th standard Science textbook

- The contents of 5th standard science text book covered major areas of 'Sustainable Lifestyle Practices' such as sustainable agriculture, biodiversity conservation, water conservation and energy conservation.
- Out of the different areas, biodiversity conservation is maximum covered giving focus to plant and animal diversity conservation, providing appropriate content and learning activities.
- Sustainable waste management is indirectly conveyed connected with the topic individual and social hygiene in the unit 'Keeping diseases at bay'.
- The concept of 'green purchasing' is not mentioned in any of the units.

- Addition of a brief note on endangered local plants will be appropriate connected, with the topic of 'plant diversity conservation', in the first unit 'Know the plant world closely'.
- A short description regarding the basic steps to develop an organic farm will be suitable connected with the unit 'Life within the seed'.
- The unit 'Life giving water' can be supplemented with certain relevant information and photographs regarding some of the worst water pollution cases of the state.
- Some basic tips to conserve water in daily life activities such as cooking, washing, cleaning and irrigation can be included related with the content on water conservation in the unit 'Life - Giving Water'.
- Few practical ideas of waste management practices, which would be useful in daily life situations, can be provided along with the topic 'individual and social hygiene' in the unit 'Keeping diseases at bay'.
- The need of adopting green transport systems by choosing public transport system, vehicle sharing, bicycle riding and pedestrian walking can be highlighted connected with the topic 'energy conservation' in the unit 'Sources of energy'.
- Some basic tips for energy conservation can be conveyed through the unit 'Sources of energy', by providing examples of usage of electrical devices such as television, refrigerator, washing machine, mixer grinder, iron box and computer.

Findings of content analysis of 6th standard Science textbook

- Sixth standard Science textbook does not cover the areas of 'Sustainable Lifestyle Practices' completely.
- The area which is meaningfully conveyed in a complete manner is ecosystem and biodiversity conversion.
- There is little description about energy conservation and sustainable food habits.
- Water conservation is mentioned only in single place.
- Green purchasing has not been mentioned in any of the units.
- Certain instances of energy wastage through electrical equipments are mentioned in the unit 'Essence of change'. Few more tips to choose electrical and electronic equipments with maximum energy efficiency can be included in the unit.
- The content on energy transformation in the unit 'Essence of change' can be enriched by providing examples of devices those work on alternative energy sources.
- The unit 'Flower to Flower' suggested natural observation as a learning activity in many places. This is indirectly related to biodiversity conservation as such activities will increase students' interest in nature and develop favorable attitude towards biodiversity conservation.

- Inclusion of 'sustainable food habits' will be appropriate connected with the unit 'Food for health'. The importance of organically raised food items can be highlighted in the unit.
- The purchase of local food items in order to avoid the carbon emissions due to long distance transport of food items can also be mentioned in the unit 'Food for health'.
- Consequences of man's interferences on nature and the remedial measures are suggested in the unit 'Living in harmony'.
- The destruction of soil microbes due to excessive use of chemicals in agriculture can be integrated with the topic ‘decomposers’ in the unit 'Living in harmony'.
- In the unit 'Living in Harmony', imbalances occurring in food chains can be explained by providing relevant examples which happened in specific parts of world.
- Huge destruction of certain animal groups with attractive exoskeleton for commercial purposes is discussed in the unit 'For shape and strength'.

Findings of content analysis of 7th standard Science textbook

- The 7th standard Science text book represented the area of 'sustainable agriculture in a complete manner. The need to adopt organic farming and eco-friendly farming techniques are described in the first unit 'Reaping gold from soil'.

- The causes and consequences of air, water and soil pollution and the measures to be taken to control these are discussed in the unit 'For a pollution-free nature'.
- Some situations of electricity misuse in daily life and the need to opt for star labeled electrical equipments are mentioned in the unit ‘When current flows’
- Few food preservation techniques to avoid the wastage of seasonal fruits and vegetables are discussed in the unit 'Safety in food too'.
- Brief notes on carbon foot print and green purchasing can be added in the unit 'For a pollution-free nature'. The concept of ‘Sustainable Lifestyle’ can also be introduced in the unit as a remedy for deterioration of natural resources.

Objective-2

The second objective of the study was to derive experts’ viewpoints on the present trend and suggestions for improvement of ‘Sustainable Lifestyle Practices’ of Upper Primary Schools.

Viewpoints and suggestions from curriculum framers of Upper Primary level

- The Upper Primary Science curriculum is more effective in bringing about an evident behavioral change among learners favoring eco-friendliness compared to the past.

- Since Science is not divided into individual subjects in Upper Primary level, there is more scope to integrate majority of the concepts of 'Sustainable Lifestyle Practices' within the same subject.
- The curriculum maintained continuity in representing the areas like agriculture, biodiversity conservation, water conservation, and energy conservation in the Science text books of 5^{th}, 6^{th} and 7^{th} standards.
- The units related to 'Sustainable Lifestyle Practices' are arranged in accordance with the seasonal variations. Hence whatever the students learned in classrooms regarding the subject can be practiced by them through direct interactions with nature itself.
- The curriculum envisaged the establishment of green campus in every school. As per the vision of state government, priority was given in the curriculum to encourage the setting up of biodiversity parks in every school. This would be helpful to broaden the student's vision from the routine agricultural practices to conserve diversity of living forms.
- There are a lot of possibilities in the curriculum to interact, observe and learn from nature.
- There is scope in the curriculum to relate each topic with the prevailing ecological issues and there by curriculum attempts to develop ecological concern of the learners.

- The science curriculum of Upper Primary level has given due representation of majority of the areas that are related to 'Sustainable Lifestyle Practices'. The areas are
  - Sustainable agriculture
  - Biodiversity conservation
  - Energy conservation and
  - Water Conversation
- The experts identified the following areas related to ‘Sustainable Lifestyle Practices’ which could be included in the curriculum to make it greener.
  - Need of plant cultivation to reduce sound pollution
  - Few organic farming techniques
  - Farming practices suitable for urban living like roof gardening, urban gardening and vertical gardening.
  - Ecological significance of lichens as air pollution indicators.
  - Ecological imbalance crated due to the entry of foreign animal or plant species to native living groups.
  - Frequent appearance of wild animals and birds in human settlements as a sign of biodiversity loss.
  - Sustainable waste management techniques.
  - Importance of traditional ecological knowledge in daily living.

- Eco- friendly festival celebration.
- An introduction to eco- friendly building design.
- Importance of green purchasing.

➢ There was no provision to include the examples of model systems promoting ‘Sustainable Lifestyle’ functioning under private sector, in the curriculum.

➢ Changing governments influence the curricular revisions. Hence the continuity of 'Sustainable Lifestyle Practices' aimed by the curriculum could not be fully retained after each revision.

➢ The essence of 'sustainability' should be retained in the curriculum irrespective of the changing socio-political conditions.

➢ The fundamentals of 'Sustainable Lifestyle Practices' should be incorporated into curriculum from the Lower Primary Level itself.

➢ The examples of eminent persons implementing 'Sustainable Lifestyle Practices’ should be included in the curriculum in their life time itself rather than in their absence.

➢ Teachers should be resourceful and competent to make use of every chance to relate each topic in the curriculum with 'Sustainable Lifestyle Practices’

- Teachers should be encouraged to form ‘self learning groups’ to explore more possibilities to implement ‘Sustainable Lifestyle Practices' aimed by the curriculum.

- There should be special training programs in order to equip teachers for effective transaction of ‘Sustainable Lifestyle Practices’ aimed by the curriculum.

Viewpoints and suggestions from environmental experts

- Environmental experts opined that there has been a favorable change in the 'Sustainable Lifestyle Practices' of schools within recent years. In majority of the schools Eco-clubs attempt to make a purposeful behavioral change among learners to impart environmental protection and conservation.
- The Government and Aided schools of the state are much active in green movement. It is a positive trend that eco-friendliness has been prioritized by many of the Unaided schools also recently.
- The contribution of National Green Corps (NGC), SEED programme of ‘Mathrubhumi’ daily and ‘Nalla Padam’ project of ‘Malayala Manorama’ daily are notable in leading the schools in the green track.
- Since the teacher in-charges of the Eco clubs of schools change for short duration, particularly in Government schools, the 'Sustainable Lifestyle Practices' of schools often lack continuity.

- In schools where a single teacher in-charge handles the charge of both Science club and Eco club, the efforts for implementing 'Sustainable Lifestyle Practices' are not found to be achieving complete success.
- There is wrong practice in some schools that the teacher in-charge of the Eco-club is fixed not based on the genuine interest to involve in environment-friendly activities. In such cases the 'Sustainable Lifestyle Practices' are carried out only for namesake.
- In some schools, the Eco-club could not function in full swing since the political interests of teachers interfere with its activities. Hence the whole school fails to function as a single team to achieve the goals of 'Sustainable Lifestyle Practices'.
- Green purchasing was not found to be fully successful in most of the schools due to shortage of funds and personal interests of members of the purchasing committee.
- Some schools involve in the 'Sustainable Lifestyle Practices' only for winning competitions and for getting publicity. In such cases the actual spirit of those practices are not fully carried into individual lifestyles and actions of learners in home and school.
- The 'Sustainable Lifestyle Practices' of schools should be assessed every year and grading the schools based on assessment should be done. But such an assessment should not be limited to qualify a certain ecological criteria but should be reflected in the overall learning

culture of the school developing eco-friendly habits among students lasting for long term.

- The teacher in-charge of the Eco-club or Nature club of the school should be an experienced person in environmental matters. He should be a role model showing genuine interest and service mentality for the welfare of nature.
- It is desirable that the same teacher in-charge may lead the Eco club for long term rather than changing the in-charges yearly. This will help schools to retain the continuity of ‘Sustainable Lifestyle Practices’.
- Young, enthusiastic teachers who are interested in environmental protection and conservation can form a team to assist the Eco-club in-charge for executing the ‘Sustainable Lifestyle Practices’.
- Formation of a 'Green teacher network' of neighboring Districts/ Panchayaths would be beneficial for exchanging innovative ideas regarding implementing ‘Sustainable Lifestyle Practices' in schools.
- Schools should be encouraged to conduct 'Environmental Fairs' every year. This would help to familiarize learners with environment-friendly products and services which they could adopt in daily lifestyle.
- The theory and practice of Environmental Education should be mainstreamed in the school curriculum.
- Experts suggested few environmental agencies and NGO's with which schools can collaborate and work in the field of 'Sustainable Lifestyle

Practices'. The agencies are: Paryavaran Mithra, National Green Corps (NGC), Smart Energy Program (SEP), WWF INDIA, OISCA International, 'Friends of Nature', SEED- Mathrubhumi, Nalla padam- Malayala Manorama, Society for Environmental Education Kerala (SEEK), Chandrakatham (NGO based on Nilambur promoting eco-friendly living), 'Niravu' (NGO focusing on sustainable waste management and organic farming based on Calicut), 'Uravu'- (A Wayanadu based NGO promoting eco-friendly products).

Viewpoints and suggestions from Eco-club in-charges of highly successful green schools

- The highly successful green schools attempted to integrate majority of the 'Sustainable Lifestyle Practices'. All of the three Eco- club in-charges gave equal priority to the efforts of sustainable agriculture, biodiversity conservation, water conservation, energy conservation and waste management. The in-charges responded that they felt difficulty in restricting plastic wastes completely in school. The schools didn't give enough focus to green purchasing.
- The Eco-club in-charges identified the following factors as motivators in their efforts to execute 'Sustainable Lifestyle Practices':
  - Environmental vision of the school management
  - Support, recognition and facilities provided by the management

- Support and recognition from local bodies
- Support and recognition from media
- Strong support and guidance from Krishi Bhavans
- Support of Alumni members of the school
- Environmental camps provided by the State Forest Department
- Enthusiasm shown by students to take part in 'Sustainable Lifestyle Practices'
- Personal examples of development of good character, co-operation and service mentality in students who are actively engaged in 'Sustainable Lifestyle Practices'.
- Success stories of development of strong family bonds by involving family members in 'Sustainable Lifestyle practices' initiated by the school.

➢ The Eco club in-charges faced the following hindrances in their efforts to implement 'Sustainable Lifestyle Practices' in schools.

- Availing funds to implement various initiatives of 'Sustainable Lifestyle Practices' in school is a major problem faced by Eco club in-charges.
- Gathering resources to proceed with 'Sustainable Lifestyle Practices' is another issue. It becomes the individual

responsibility of the Eco-club in- charge to find resources for the same.

- The 'Sustainable Lifestyle Practices' were not given the complete acceptance by parents, teachers and public in the initial stages of implementation.
- Few teachers used to show indifferent attitude to ‘Sustainable Lifestyle Practices’. According to them it is the sole responsibility of the Eco club in-charge to put into practice such activities.
- It is difficult to find productive time for ‘Sustainable Lifestyle Practices’ connected with agriculture in school working hours. Hence the ‘green teams’ of teachers and students need to work during holidays and vacation time to compensate the pending duties in agricultural field.
- Availing eco-friendly products for the daily use of school is a problem. This is due to high cost of green products and lack of priority given to green purchasing by the society itself.
- It is observed that students’ interest and involvement in green practices gradually decrease as they shift from lower classes to higher classes.

➢ The highly successful green schools adopt a wide variety of ‘Sustainable Lifestyle Practices’ such as:

Agriculture and biodiversity conservation:

- Vegetable gardening
- Medicinal plant gardening
- Setting up of mini-forest in school compound
- Social forestry program
- Wet land and up land Paddy cultivation
- Collection and plantation of local Mango plants of different varieties.
- Distribution of excess plants collected by the school to districts with less Mango tree population.
- Honoring of oldest trees in the locality.
- Promoting proverbs regarding local plants and herbs.
- Donating selected plant species to students for setting up of 'Butterfly garden' at home.
- Setting up of a 'star forest' by encouraging students and teachers to donate a plant which stands for their birth star. This facilitates the conservation of so many rare plant species.
- Conducting 'Environmental Summit' by inviting neighboring schools and discussing relevant environmental issues of the locality.
- Conducting Agricultural parliament
- Exhibition of local flowers.

- Arranging live cooking shows using local leaves and herbs having nutrient value.
- Fish culture.
- Setting up of water filled pots for birds during summer.

Water conservation:

- Rain pit construction in the school compound before the onset of monsoon and leveling of these pits before summer in order to prevent evaporation.
- Setting up of bunds in the nearby rivers to conserve water during summer.
- Recharging water to the unused wells and ponds in the surroundings in order to rejuvenate them.
- Survey of ponds in the area and programs to conserve them by seeking support from local bodies and government.
- Field studies to find out the reasons for falling down of water level in the wells of the locality.

Energy conservation:

- Organizing workshops/ training sessions to students for making LED lamps.

- Awareness programs on minimal energy consumption by providing classes of experts from KSEB.
- Distributing solar lamps to households in underdeveloped villages.
- Distributing hand fans to hospitals in the locality.
- Energy surveys in households of the area by involving students.
- Energy saving programs during festive seasons.

Waste management:

- Introducing pipe composting facility to households in the locality.
- Forming a stitching unit in the school to design cloth bags from waste clothes.

➢ Short term action plans lasting for two to three months were found to be more successful rather than setting up action plan for the whole year.

➢ Give maximum opportunity for students to have direct learning experiences from the environment.

➢ Make sure that students are well aware of the consequences of man-made impacts on nature.

➢ Try to integrate every topic with ecological issues while teaching.

➢ A well trained and enthusiastic green leadership is very much essential to guide and motivate the entire school community to achieve the green

goals. The Eco-club in-charge of the school should be capable of effective time management in order to balance the academic duties as well as environmental activities.

- The teachers who take in-charge of the Eco-clubs should be exempted from other additional duties.
- Teachers should be individual role models by implementing 'Sustainable Lifestyle Practices' in their own lifestyles.
- Schools should follow the models of successful Eco schools to move further in 'Sustainable Lifestyle Practices'.
- Students, teachers and parents who contribute remarkably to popularize 'Sustainable Lifestyle Practices' should be duly honored with appreciation, prizes and certificates.
- There should be congenial working atmosphere in each school ensuring the complete co-operation of the entire school community to achieve the goals of 'Sustainable Lifestyle Practices'.
- Collaborative effort of schools with local bodies is essential for executing 'Sustainable Lifestyle Practices' in a more effective manner.

Objective -3

The third objective of the study was to study the level of students' perception on 'Sustainable Lifestyle Practices' of Upper Primary schools.

- Percentage analysis revealed that 60.05% of the students perceived that the 'Sustainable Lifestyle Practices' in their school is average and 20.93% of the students' perception of their school practices is high and 19.02% of students' perception regarding their school practices is low. So it can be concluded that most of the students perceived the 'Sustainable Lifestyle Practices' in their schools as average.

Objective- 4

The fourth objective of the study was to find out whether there is any significant difference in students' perception on 'Sustainable Lifestyle Practices' of schools between

a) Government and Aided school students

b) Urban and Rural students

c) Boys and Girls

- It was revealed that students' perception on 'Sustainable Lifestyle Practices' of schools significantly differed between Government and Aided school students. But there is no significant difference in

students' perception on 'Sustainable Lifestyle Practices' of schools between Urban and Rural students' and between Boys and Girls.

Objective- 5

The fifth objective of the study was to find out the status of implementation of 'Sustainable Lifestyle Practices' by Upper Primary Schools as perceived by Eco-club in charges.

- The 'Sustainable Lifestyle Practice' which was completely implemented by highest percentage of schools was 'Tackling of leakages of pipes and water tanks in time' (90.3%). The next higher completely implemented practices were 'Purchasing only for the need of the school' (87.5%), and 'Provision of separate waste bin for each of the classrooms of the school' (86.1%) respectively.
- The practices which were partially implemented by the highest percentage (62.5%) of schools were 'Active encouragement given to organic farming' and 'Usage of LED/CFL bulbs in school'. The next higher partially implemented practices were 'Ensuring the complete participation of students in agricultural activities' (55.6%) and, ensuring the protection of planted seedlings (51.4%) respectively.
- The practice which was reported as would implement soon by highest percentage of schools was 'Offering prizes to the best student farmers' (19.4%). The practices which were coming to next higher percentage

were ‘Provision of cups under each of the pipes’ (16.7%) and 'Exhibition of harvested vegetables (15.3%) respectively.

- The practice which was reported as would consider in future by highest percentage of schools was ‘Formation of green purchasing team/committee’ (80.6%), the practices which were coming to next higher percentage were ‘Online purchase of different products for school use’ (72.2%), and ‘Facility for roof water harvesting from the school building’ (70.8%) respectively.
- The practice which was reported as 'not interested' by the highest percentage of schools was 'Online purchase of different products for school use' (6.9%). Only 2.8% of schools reported not interested to 'Exhibition of harvested vegetables', 'Drip irrigation facility in the school farm' and ‘Initiatives taken by the school to hand over plastic wastes to waste recycling centers'.
- The ‘Sustainable agriculture’ practices which were completely implemented by highest percentage of schools were ‘Observance of farmers’ day’ (70.8%), ‘Classes provided on organic farming’ (52.8%) and ‘Protection of planted seedlings’ (45.8%) respectively.
- The ‘Water conservation’ practices which were reported as completely implemented by highest percentage of schools were ‘Tackling of leakages of pipes/water tank’ (90.3%), Notices aiming minimal water

consumption (81.9%) and 'Fixing watering time only at morning or evening' (80.6%).

- The 'Energy conservation' practices which were completely implemented by highest percentage of schools were 'Unplugging of electrical devices after daily use' (75%), 'Usage of computers with LED/LCD monitors' (62.5%) and Energy survey conducted by the school(38.9%).
- The 'Waste management' practices which were completely implemented by highest percentage of schools were 'Provision of separate waste bin for each of the classroom of the school' (86.1%), 'Daily sanitation of school premises'(84.7%), and 'Provision of separate waste bins for discarding biodegradable and non-biodegradable wastes'(69.4%) respectively.
- The 'Green purchasing' practices which were reported as completely implemented by highest percentage of schools were 'Purchasing only for the need of the school' (87.5%), 'Ensuring quality/efficiency of electronic items while purchasing for school' (72.2%) and 'Purchase of goods from local shops and farmers for school uses '(70.8%) respectively.

Objective- 6

The sixth objective of the study was to study the constraints faced by

Eco-club in-charges in implementing 'Sustainable Lifestyle Practices' in schools.

- The constraints which were reported as extremely affecting the implementation of 'Sustainable Lifestyle Practices' by major percentage of the Eco-club in-charges were 'lack of time' (61.1%), lack of funds (55.6%) and 'poor assessment of 'Sustainable Lifestyle Practices' (52.8%) respectively.
- The constraints which were reported as moderately affecting the practices of majority of the Eco-club in-charges were 'lack of collaboration with environmental agencies and NGO's (69.4%), lack of resources (62.5%) and inadequate training (50%) respectively.
- The constraints which were reported as not at all affecting the practices of majority of the Eco-club in-charges were 'poor involvement of students' (79.2%), 'poor support from management or authorities' (76.4%) and 'lack of recognition for green initiatives' (69.4%) respectively.
- None other constraint was pointed out by any of the Eco-club in-charges, other than the sixteen constraints identified by the investigator.

Discussion of Results

During the phase of content analysis of Upper Primary Science text

book, the researcher could identify a good representation of 'Sustainable Lifestyle Practices' covering the major aspects. Hence the findings from content analysis is different from many of the resesarch findings from previous researches which reported that the respective national or state curricula represented sustainability theme in a peripheral manner only (Nixon, Sankey, Furay & Simmons, 1999; Liu, 2009).

During the phase of interviews experts suggested short term action plans would be more effective for more effective implementation of 'sustainable Lifestyle Practices' in schools. Similar suggestion was pointed out by few other researchers (Lee, Wong & Luo, 2000). One of the suggestions proposed by experts during the interview phase was the need of adequate teacher training for successful implementation of 'Sustainable Lifestyle Practices' of Schools. The investigator could notice similar suggestions from other researchers also (Kennelly, Taylor & Jenkins, 2008; Nixon, Sankey, Furay & Simmons, 1999).

In the survey phase the lack of time and lack of funds were identified as extremely affecting barriers for successful implementation of 'Sustainable Lifestyle Practices' of major percentage of the schools surveyed. The investigator could identify similar barriers in the sustainability initiatives of schools reported by other researchers also (Eames, Cowie & Bolstad, 2008; Liu, 2009).

Suggestions

In the light of interactions with experts from the field and the insights obtained throughout the experience from the research field, the investigator recommended the following suggestions to improve the 'Sustainable Lifestyle Practices' of Upper Primary Schools.

- Analyze the existing 'Sustainable Lifestyle Practices' and facilities implemented in the school by self auditing.
- Explore the ideal green models implemented by various eco-sustainable schools in the locality, district or state.
- Form a green action plan by thinking over the feasibility of certain creative and innovative 'Sustainable Lifestyle Practices' in the school settings. Try to upgrade the existing green facilities.
- Analyze various successful ecological measures or strategies undertaken by the local bodies and make an attempt to collaborate with it.
- Communicate the success of Sustainable Lifestyle initiatives of the school regularly among teachers, non-teaching staff, PTA, administration and management.
- Make necessary modifications in the green action plan undertaken by the school to rectify the defects.

Sustainable agriculture and bio-diversity conservation

- Form a committee of teachers to lead the agricultural activities of the school. Rotation system can be implemented here in such a way that the members of the committee rotate after a fixed interval where as the main in-charge will be retained for long term. This will ensure the involvement of all of the teachers in the agricultural activities under an experienced green leadership.
- The Agricultural committee can prepare short term or quart yearly action plan of agricultural programs to be conducted by the school. This can be displayed on the notice board or bulletin board.
- Form 'Green teams' or Agricultural club of students to lead and monitor all the agricultural activities of the school. Discuss the action plan of Agricultural club with the student members. Let them assemble along with green committee of teachers to discuss the progress of the agricultural activities in fixed intervals.
- Arrange special training sessions or workshops inviting experts from organic farming in each academic year compulsorily. This will help children to acquire the essential knowledge in the theory and practice of sustainable agriculture. Children will be more inspired and enthusiastic if they get hands on experiences in farming techniques under the supervision of experts from the field.

- Divide the entire class into few groups. Assign duties for each group such as preparing land for cultivation, collection of seedlings, plantation, watering the plants, preparation of bio-fertilizers and bio-insecticides and regular monitoring of agricultural spaces. Take care to rotate the duties of each group in fixed intervals. This would ensure an active participation of all the students in various activities of agriculture.
- Different sections or areas of agricultural farm can be assigned to different classes. This will be beneficial since each class will take care of the area of the garden assigned to them with genuine spirit and enthusiasm.
- Conduct class-wise competitions for nurturing the best vegetable and medicinal plant gardens. Appreciate the classes with the best agricultural gardens with due recognition.
- Encourage every child to plant and protect a seedling on special days like birthdays. Let students distribute plants instead of distributing sweets on special days.
- Make a system to offer medicinal plants or fruit plants to students instead of giving cash prizes or other gifts in school competitions.
- Encourage children to nurture vegetable gardens at home. Inspect these home gardens and offer prizes to those who maintained the best gardens.

- Mothers of students who maintained the best kitchen gardens can also be appreciated with due recognition.
- Encourage children to interact with indigenous communities and collect traditional knowledge regarding various plants and farming practices. The gathered information can be used to launch a school magazine on 'Traditional ecological knowledge'.
- Observe 'traditional ecological day' (August 21st) in schools. Preparation of traditional recipes using local herbs, fruits and vegetables can be conducted on this day. Demonstration classes on this can be arranged involving experienced, resourceful persons from the locality.
- Encourage children to collect seeds of various fruits, vegetables, ornamental plants and medicinal plants. A seed bank can be set up in the school by properly sorting, labeling and displaying the collected seeds.
- Schools which lack paddy fields in surroundings can try out up- land paddy cultivation with the support of parents and local people.
- Observe vegetarian day (October 1st) in school with some suitable programs.
- Adopt a public place or barren land in the school surroundings with prior permission from local bodies and undertake greening program in such areas with co-operation of the public in the locality.

- Ensure the diversity of plant species while conducting social forestry program in schools. Avoid repeated planting of the same plant or tree species.
- Identify the oldest trees in the locality and organize programs to conserve them.
- Schools in coastal areas can take up mangrove conservation projects.
- Compulsorily observe the Agricultural day (Chingam 1st) in school with appropriate agricultural programs.
- Arrange exhibitions of conventional agricultural tools and equipments used by local farmers.
- Conduct exhibitions of various soil types, seeds and medicinal plants on agricultural day.
- Encourage children to observe different stages of plant growth, record them regularly and to report to the concerned teacher.
- Survey on local plant diversity can be conducted involving students. This will enable them to collect more information about the local plants, their species, habitat, abundance and the ecological significance.
- Give opportunity for children to observe the land preparation, fertilizing, plantation and harvesting in local paddy fields.

- Arrange visits to Krishi bhavans and Krishi vijnan kendras of the locality and give opportunity for students to interact with agricultural experts.
- Invite local farmers to schools and honor them for their remarkable efforts in agriculture.
- Encourage children to develop stories, articles, poems and paintings based on the theme 'agriculture'. All such creations can be gathered and arranged to launch a school agricultural magazine.
- Extend the green movement of school to society by conducting awareness programs and talks on importance of agriculture and bio-diversity conservation.
- Encourage social and religious institutions of the locality to distribute plants to public massively on special days or celebrations.
- Try to setup a biodiversity park in each school compulsorily including plants, butterflies, birds and fishes of different species.
- Schools can organize special programs on agricultural day such as:

➢ Exhibition of agricultural books and magazines

➢ Launching of school agricultural magazine

➢ Agricultural awareness rally

➢ Poster making competition themed on ‘agriculture’

➢ Painting competition based on ‘agriculture’

➢ Quiz competition on 'agriculture'

- Launching of ‘Agricultural calendar’
- Visit to agricultural fields
- Essay writing competition on 'Vanishing agricultural culture'/ soil erosion/ bio-diversity conservation.
- Workshop/talk/seminar on food security.
- Documentary or LCD presentation on deforestation/ land degradation/ sacred groves/ biological hot spots /mangroves.

Water conservation

- Conduct a water audit to check the excessive water consumption in various sections of the school. This would help to identity the areas where water consumption could be controlled.
- Assign a teacher-in charge to monitor the water consumption and misuse of water in the school compound.
- Check the water leaks from water tanks and pipes periodically and try to repair the leaks immediately.
- Instruct students to completely turn off the taps after use to avoid dripping. Remember that dripping taps can cause around 200 liters of water loss per day.
- Try to use push taps in the common washing areas of the school.
- Replace the old or wearied taps with water efficient new models.
- Install aerators in all the taps to minimize water consumption.

- Install dual flush toilets in school.
- Keep cups compulsorily near to each of the pipes of school compound. This would help to reduce water loss that may arise due to hand washing and dish washing in running water.
- Set up rain water harvesting systems such as rain pits, water tanks and barrels in school premises before the onset of monsoon. Take care to level the rain pits before summer to avoid evaporation through the rain pits.
- Construct few pits of convenient sizes near to the school well in rainy season to improve the infiltration into soil. These additional pits would help to raise the water level in the well.
- Set up roof water harvesting system and check the functioning of it regularly.
- Make use of stored rain water for watering plants, flushing the toilets and cleaning purposes.
- Collect used water from washing areas of the school through separate pipes and use it for irrigation purpose.
- Give instructions to cleaning staff and kitchen staff to minimize water consumption.
- Use water for cleaning common areas, only when it is unavoidable. Otherwise use brooms to clean up outer spaces like yards, sidewalks and corridors.

- Fix stickers in areas like washrooms, toilets, bathrooms, kitchen and canteen in order to remind students and staff to restrict the over consumption of water.
- Organize lectures/ talks/ training programs to equip students, teachers, parents and public for sustainable water management.
- Monitor the cleanliness and maintenance of water tanks, wells and other water storages of the school regularly.
- Avoid use of excess cleaning liquid while cleaning floor and kitchen utensils in order to avoid water loss.
- Ensure that the school is not polluting any of the water sources of the surroundings by dumping wastes of any kind.
- Try to set up a water recharging system to refill the overflowed water from water tank to school well.
- If possible set up a water meter in the school to check the water consumption in fixed duration.
- Keep suggestion boxes in school to collect innovative ideas of water conservation from teachers, students and parents. Take actions to implement those ideas which would be more feasible and relevant in the school settings.
- Undertake river or pond rejuvenating programs by cleaning activities and cultivation of appropriate plants on the shores.

- Check whether there are any water bodies in the area which are out of usage for a prolonged time. Collaborate with the local bodies to rejuvenate these by cleaning and recharging.
- Review the water conservation plan of the school annually to effect required modification for improving the same.
- Communicate the achievements of school in water conservation to the public through social media, school blog and press release.

Water conservation in gardens

- Cultivate more native plant species in the school garden to avoid excess watering required for exotic plant species.
- Cultivate the plants of the same species together in the same area of the garden. This would be helpful to avoid excessive watering since the water requirements of different kinds of plants vary from one another. Similarly water needs of established plants would be less compared to that of newly planted ones.
- Fix a specific time in morning or evening for irrigational purposes. This would help to avoid water loss due to excessive evaporation.
- Observe the agricultural spaces of the school regularly to check the growth of weeds and unwanted plants. Remove them immediately to avoid excess water loss during irrigation.

- Make use of an organic layer of dried and decayed leaves and plant parts to cover the soil surrounding the cultivated plants. This would be beneficial in maintaining the soil humidity and improving the water retaining capacity of soil.
- Make use of drip irrigation facility for watering school gardens instead of using hoses. This would help to save huge amount of water.

Energy conservation

- Form a 'Smart Energy Club' in school to promote sustainable energy management in the school.
- Conduct an energy audit in school to identify the energy loss from various sources.
- Encourage the use of energy efficient devices/star labeled equipments in school.
- Monitor the electricity consumption in school regularly by students and teachers and provide clear guidelines to reduce it.
- Appreciate students and teachers who put remarkable efforts in energy conservation.

Sustainable waste management

- Evaluate the current waste management practices of school. A waste auditing can be conducted to find out the major wastes generated by

the school and their sources. This can be a beginning step prior to form school action plan for waste management.

- The initial step of waste management is waste separation. For this, waste bins of different colors can be kept after labeling neatly. There should be separate bins for food wastes, paper wastes and non-bio degradable wastes.
- Set up a bio-compost facility in the school, by collecting all the biodegradable wastes and practice composting regularly. Avoid land filling of wastes since it is harmful to soil, water and air. Never burn plastic wastes in school premises since it is extremely toxic.
- Contact with members of the local body to co-ordinate the school's efforts for recycling of wastes.
- Form a waste management committee involving teachers, students, parents, local body members and local environmental agencies.
- Recruit student volunteers to monitor the waste management programs of school and offer prizes to those who perform excellent in such programs.
- Consider waste reduction as a priority of the institution since it is more environmentally beneficial than the efforts for recycling.
- Try to integrate waste recycling with regular class room activities. Compost making, production of recycled paper or designing scientific

models from wastes could be practiced in connection with classroom learning.

- Try to maintain continuity in the school recycling programs.
- Appreciate the students and staff who come up with innovate thoughts of recycling. Recognize them with prizes and certificates. Their names and the recycling effort can be posted in the school blog or newsletters.
- Give good publicity to the waste management initiatives of the school through social media, newspapers, brochures, diaries, and posters. This would be helpful to motivate the neighboring institutions to follow the particular institutional model of waste management.
- Encourage teachers and students to design a logo for the waste management program of the school. Provide eco-friendly stickers, badges or caps to the volunteers who perform waste recycling.

Reduce

Waste reduction is a necessary step to be implemented by any institution which aims for sustainable waste management

Reduction of paper waste:

- Take printouts for office uses only in unavoidable situations. Otherwise read the information from the screen or desktop. Do 'spell check' compulsorily if typing on a computer before printing the required texts.

- Practice double side photocopying of paper whenever it is needed. This would be much helpful to reduce paper wastes. Set up school computers and printers for default double sided printing.
- Avoid individual paper notices for circulating among teachers and students. Instead of this single notice can be displayed on notice board.
- Try to communicate with teachers and office staff through E-mails if it is possible. Circulate newsletters and publications of school through E-mails or upload on school website.
- Share and use newspapers and periodicals with other classes instead of subscribing them for every class.
- Encourage students to use both sides of paper while writing project reports or assignments.
- Encourage children to copy down information from blackboard or projector instead of circulating photocopied notes.
- Keep a box in office to collect papers used on single side. These can be reused for draft works, calculations and for making writing pads.

Reduction of food waste:

- Encourage students to take only the required food and to consume it completely. Observe the eating habits of students and appreciate those who never used to waste food.

- Try to donate unused food to local charity groups or orphanages. If this not possible compulsorily compost the food waste in the bio-compost.
- Get students' and teacher's feedback whenever a new food recipe is prepared for midday meal. This will help a lot to reduce the wastage of food.
- Try to avoid the distribution of packed food on special occasions in school. The packed food purchased from outside usually carries more than the required quantity with excessive packaging.
- Conduct workshops for manufacturing jams, jellies and squashes from fruits and vegetables in order to help students to preserve excess local food items and to limit food waste.
- Conduct waste-free lunch contests in school to promote sustainable food practices.

Reduction of plastic waste:

- Search for suppliers who offer take back facility of plastic packaging materials and covers whenever a product is ordered to school.
- Completely avoid disposable dishes, cups, spoons, straws and food carriers from the school canteen.
- Explore making of paper pens instead of plastic pens and give sufficient hands on experience for students for making them in work

experience periods. Practice filling of seeds of useful plants in these pens and encourage students to use them.

- Completely avoid plastic flex, banners, badges, caps and posters during special days of schools like Arts fest, Sports and Science fairs.
- Set up a collection box for used ball point pens. Encourage students to reuse those pens by replacing the old refills.
- Encourage children to use steel kettles, bottles or flasks instead of plastic water bottles.
- Encourage children to avoid chocolates, sweets and soft drinks in school premises since these will create a lot of plastic wastes.
- Encourage students to use ink pens.

Reuse:

- Promote reusable products in school office, class rooms and kitchen. Encourage reuse of office items like paper, files, envelops, pens, rubber bands and paper clips.
- Monitor and ensure that used toner cartridges of printers are recharged timely to avoid the spoilage of them.
- Make use of used plastic cans, bottles, tyres and barrels for raring plants in school garden. In schools with limited agricultural spaces plastic bottles can be reused to set up a hanging garden.

- Organize some reuse projects as a part of curriculum of Science or Social Science. Encourage children to bring reusable items of toys, books and clothes with permission from parents and conduct stalls for selling those items to the needy people. Conduct this program in collaboration with the school Science club, Eco club, NSS, Scouts and Guides and PTA. Use the profit from such trades for conducting eco-friendly programs in school. Charity programs can also be arranged by the school by donating the reusable items to the deserved.
- Conduct art competitions to make innovative art works using thrown away or used items.
- Conduct workshops for making eco-friendly products like paper bags, cardboard files and cloth bags by providing classes of skilled experts from environmental agencies or NGOs.
- Host Science programs/Science fair to give opportunity for students to make scientific equipments, machines or models from waste materials.

Recycle:

- Practice event recycling after special events in schools like youth festivals, sports day, science fairs, games and different contests. This is a good practice since each event will be hosted in public spaces and generates a lot of wastes.

- Do maximum recycling of paper, glass, plastic, metal and electronic wastes.
- Schools can organize the following programs to promote waste management:

➢ Discussions could be conducted on how to celebrate zero waste festivals.

➢ Talks or poster presentations could be conducted on the topic ‘Individual, institutional and society's role in sustainable waste management’.

➢ Arrange short films or documentaries describing the ill effects of unscientific waste treatment.

➢ Video clippings or documentaries on sustainable waste management techniques could be displayed.

Green purchasing

- Form a green purchasing team or committee in school to take initiative in green purchase practices.
- Explore more possibilities of green products that can be purchased for the daily use of school.
- Provide classes to students on various eco labels/ecomarks/green certifications of products.

- Conduct awareness programs on the advantages of green products for students and parents.

Educational Implications

- To embrace the sustainability principles in the overall culture of the school is not an easy task. It requires careful planning and systematic action which should be modified and refined under eminent green leadership.
- The co-ordinated and whole-hearted commitment from the entire school community including students, teachers, heads of the institution, non-teaching staff, administration, parents and local bodies are needed to materialize the green goals of each school.
- Self auditing would be a beneficial strategy for schools to improve their efforts in green movement.
- Awareness programs addressing students, teachers and communities should be intensified in order to create a favorable behavioral change and attitude among them to protect the environment.
- Since 'Lack of time' is the major constraint experienced by majority of the schools, there should be more focus on effective time management to balance teaching-learning activities and the green initiatives of the schools.

- Sufficient funds and resources should be allotted to schools by Government and local bodies for implementing 'Sustainable Lifestyle Practices' since lack of funds and resources is one among the major issues faced by schools.
- Green purchasing is the least explored area by the schools. Hence government should take necessary steps to mainstream it by providing adequate training and awareness programs to popularize green products among the young generation.
- Schools need to explore more possibilities to collaborate with national and international environmental agencies and NGOs to extend their eco-friendly initiatives to the society.
- Schools upholding the environmental vision can strengthen the society to involve in responsible actions for dealing with the local environmental issues.
- By nurturing low carbon lifestyles among the learners, the schools can take an important step to tackle the climate change issue.

Scope for Further Research

- Similar studies can be conducted to investigate the trend and practice of 'Sustainable Lifestyle Practices' in Lower Primary schools, High Schools, and Higher Secondary schools.

- Comparative studies can be carried out to compare the 'Sustainable Lifestyle Practices' undertaken by schools of different states or districts.
- A study that investigates the role of media in influencing the 'Sustainable Lifestyle Practices' of schools can be undertaken.
- A comparative study of the school curricula of different states to identity the elements of 'Sustainable Lifestyle Practices' can be conducted.
- The role played by environmental agencies and NGO's in vitalizing the 'Sustainable Lifestyle Practices' of schools can be investigated.
- Case studies regarding the innovative environmental practices of highly successful green schools can be made.
- A study can be undertaken to compare the success of execution of 'Sustainable Lifestyle Practices' in Aided and Unaided schools.

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APPENDICES

APPENDIX I

LIST OF SCHOOLS SELECTED FOR THE STUDY

MALAPPURAM DISTRICT				
Sl. No	Name of School	Govt./Aided	Urban/Rural	Number of Students
1.	AUPS, Thenhipalam	A	R	13
2.	SVAUPS, Pulliparamba	A	R	12
3.	AMUPS, Ullanam North	A	U	11
4.	GMUPS, Melmuri	G	U	12
5.	GMUPS, Kottakkal	G	U	13
6.	AUPS, Chiramangalam	A	U	13
7.	AUPS, Thiruthy	A	R	11
8.	DVAUPS, Ariyallur	A	R	11
9.	GMUPS, Parakkadavu	G	R	13
10.	GUPS, Ariyallur	G	R	9
11.	GUPS, Moonniyur	G	R	10
12.	V.J.Palli AMUPS	A	R	13
13.	GUPS, Thenhipalam	G	R	11
14.	AUPS, Malappuram	A	U	14
15.	AMMAUPS, Cheloopadam	A	R	11
16.	AUPS, Velimukku	A	R	11
17.	Native AUPS, Vallikkunnu	A	R	12
KOZHIKODE DISTRICT				
1.	Mannore North AUPS, Mannore	A	R	13
2.	Mannore Krishna AUPS	A	R	11
3.	GUPS, Ramanattukara	G	U	12
4.	Ganapath AUPBS, Ramanattukara	A	U	10
5.	Nallore East AUPS	A	U	12

6.	Sreedevi AUPS, Kadalundi	A	R	9
7.	Govt. Ganapath UPS, Feroke	G	U	12
8.	LFUPS, Cheruvannur	A	U	9
9.	AUPS, Nallalam	A	U	13
10.	Pantheerankavu, AUPS	A	R	10
11.	Puthurmadom AUPS, Pantheerankavu	A	R	12
12.	Kunnumkulangara AMUPS, Pantheerankavu	A	R	12
13.	GUPS, Kodel Nadakkavu	G	R	10
14.	Mavoor MUPS, Mavoor	G	R	9
15.	Manakkadu UPS, Cheruppa	G	R	9
16.	Karuvanthiruthy BMOUPS	A	R	13
TRISSUR DISTRICT				
1.	GUPS, Choondal	G	R	17
2.	St. Thomas UPS, Koonammoochi	A	R	12
3.	GUPS, Korattikkara	G	R	12
4.	LMUPS, Perumpilavu	A	R	13
5.	GUPS, Vaduthala	G	U	11
6.	MSS UPS, Kandanisseri	A	R	12
7.	Gana Prakashini UPS, Kechery	A	R	12
8.	St. MMUPS, Kanippayyur	A	U	8
9.	AUPS, Vazhappally	A	U	11
10.	GUPS, Guruvayur	G	U	11
11.	MKM UPS, Porkkulam	A	R	9
PALAKKAD DISTRICT				
1.	GUPS, Keezhayur	G	U	13
2.	SCUPS, Chalisseri	A	R	10
3.	SBS, Thanneerkode	A	R	11

4.	GUPS, Pattambi	G	U	13
5.	GUPS, Nariparamba	G	R	11
6.	Amayur South AUPS	A	R	9
7.	AUPS, Rayiranellur	A	R	12
8.	Mannagode AUPS	A	R	12
9.	Paruthipra Muncipal UPS	G	U	9
10.	Njangattoor AUPS	A	R	14
ALAPPUZHA DISTRICT				
1.	Govt. CYMAUPS, Punnapra South	G	R	12
2.	St. Lourde Mary UPS, Vadakkal	A	R	11
3.	GUPS, Thiruvampady	G	U	14
4.	GUPS, North Aryad	G	R	11
5.	Vazhicherry North MMAUPS	A	U	12
6.	Sree TKMMUPS, Vadakkal	A	U	11
7.	VVSDUPS, Pathirappally	A	R	10
8.	Punnapra UPS, Punnapra South	A	R	12
KOTTAYAM DISTRICT				
1.	GUPS, Muttambalam	G	U	14
2.	GUPS, Velluthuruthy	G	R	13
3.	GUPS, Veloor	G	U	13
4.	St. Johns UPS, Veloor	A	U	13
5.	Panachikkad NSS UPS	A	R	12
6.	Eravinellore St. Thomas UPS	A	R	14
7.	St. Mary's UPS, Kollad	A	R	14
8.	VJPMUPS, Puthuppally	A	R	12
9.	GUPS, Malam	G	R	12
10.	Meenadom TMUPS	A	R	13

APPENDIX II

UNIVERSITY OF CALICUT

DEPARTMENT OF EDUCATION

SEMI STRUCTURED INTERVIEW SCHEDULE FOR CURRICULUM FRAMERS (SCIENCE) OF UPPER PRIMARY LEVEL

Dr. K.P. Meera
Professor
Department of Education
University of Calicut

Deepthi. R.
Research Scholar
Department of Education
University of Calicut

1. What is the significance of mainstreaming 'Sustainable Lifestyle Practices' in school curriculum?

2. What is the scope of the present Upper Primary Science curriculum in promoting 'Sustainable Lifestyle Practices' among students?

3. Which are the major learning outcomes related to 'Sustainable Lifestyle Practices' aimed by the Upper Primary Science curriculum?

4. Which are the areas of 'Sustainable Lifestyle Practices' that are given priority in the Upper Primary Science curriculum?

5. Can you suggest few more relevant areas to make the curriculum greener?

6. What are the major difficulties experienced while integrating the concepts of 'Sustainable Lifestyle Practices' into curriculum?

7. What would be your suggestions to transact 'Sustainable Lifestyle Practices' more effectively through curriculum?

APPENDIX III

UNIVERSITY OF CALICUT

DEPARTMENT OF EDUCATION

SEMI STRUCTURED INTERVIEW SCHEDULE FOR ENVIRONMENTAL EXPERTS

Dr. K.P. Meera
Professor
Department of Education
University of Calicut

Deepthi. R.
Research Scholar
Department of Education
University of Calicut

1. Is there any improvement in the 'Sustainable Lifestyle Practices' of our schools in recent times compared to the past?
2. What are the drawbacks identified by you in 'Sustainable Lifestyle Practices' of schools?
3. Do you have the opinion that the ‘Sustainable Lifestyle Practices’ of each of the schools should be assessed compulsorily?
4. Will it be beneficiary to impart compulsory training for teachers on ‘Sustainable Lifestyle Practices’ through the in-service training programs?
5. Can you suggest few environmental agencies or NGO’s with which schools can collaborate and work?
6. What suggestions you would give to improve ‘Sustainable Lifestyle Practices’ of schools?

APPENDIX IV

UNIVERSITY OF CALICUT
DEPARTMENT OF EDUCATION

SEMI STRUCTURED INTERVIEW SCHEDULE FOR HIGHLY SUCCESSFUL ECO CLUB IN-CHARGES

Dr. K.P. Meera
Professor
Department of Education
University of Calicut

Deepthi. R.
Research Scholar
Department of Education
University of Calicut

1. Which are the areas of 'Sustainable Lifestyle Practices' focused by your school?

2. Which are the factors that motivate you to take up sustainability initiatives?

3. Did you experience any difficulty in promoting ‘Sustainable Lifestyle Practices’ in your school? If so which are them?

4. Which are the diverse ‘Sustainable Lifestyle Practices’ that your school has undertaken?

5. Do you prepare any action plan for the success of ‘Sustainable Lifestyle Practices’ in your school?

6. What are your suggestions for improving ‘Sustainable Lifestyle Practices’ of schools?

APPENDIX V

EXPERTS CONSULTED FOR INTERVIEW

1. Mr. Abdul Gafoor (Curriculum framer)

- Member of Text Book Development Committee of Upper Primary Science text book of SCERT Kerala.
- National Award Winner for best teacher in 2013.

2. Mr. Manoj Kottakkal (Curriculum framer)

- Member of Text Book Development Committee of Upper Primary Science text book of SCERT Kerala.
- National Award winner for best teacher in 2014.
- Winner of Galileo Science award in 2010.
- Winner of sanitation promotion award in 1995.

3. Mr. P. Vasudevan (Curriculum framer)

- Member of Text Book Development Committee of Upper Primary Science text book of SCERT Kerala.

4. Mr. Jayaprakash Nilambur (Environmental expert)

- Director-'Chandrakantham' (Environment Learning Centre, Nilambur).

5. Mr. Hameed Ali (Environmental expert)

- District coordinator of National Green Corps (NGC), Malappuram District.

- District coordinator of Smart Energy Programme (SEP), Malappuram District.

6. Mr. Ashokan Maranchery- (Environmental expert)

- State committee member of 'Kerala jaiva Karshaka Samithi'.
- Editor of the magazine of ‘Kerala Jaiva Karshaka Samithi’ -‘*Ore Bhumi Ore Jeevan’*

7. Mr. Rajan (Eco club in-charge) Koothu paramba HSS, Thokkilangadi.

- The school secured ‘Vishista Haritha Vidyalayam’ first prize in state sponsored by SEED program of Mathrubhumi in 2015-2016.

8. Mr. Rajesh M.S. (Eco club in-charge) Purathanattukavu, Sree Ramakrishna Gurukulam Vidya Mandir HSS, Thrissur.

- The school secured ‘Vishista Haritha Vidyalayam’, Third prize in state sponsored by SEED program of Mathrubhumi in 2015-2016.

9. Mrs. Shanthy john. (Eco club in-charge) Narokkavu HSS, Nilambur.

- Winner of SEED-Mathrubhumi, best teacher coordinator award in Wandoor Educational District in two consecutive years 2014-2015, and 2015-2016.
- The school secured ‘Sreshta haritha vidyalayam’ award in Malappuram revenue District, sponsored by SEED Mathrubhumi in the year 2017-2018.

APPENDIX VI

UNIVERSITY OF CALICUT

DEPARTMENT OF EDUCATION

SCALE OF STUDENTS' PERCEPTION ON SUSTAINABLE LIFESTYLE PRACTICES OF SCHOOLS

(Draft)

Dr. K.P. Meera
Professor
Department of Education
University of Calicut

Deepthi.R
Research Scholar
Department of Education
University of Calicut

This survey is meant for studying the 'Sustainable Lifestyle Practices' of your school. After careful reading of each of the statements, you have to tick (✓) mark the suitable response in the relevant column provided in the response sheet. Please make it sure that you respond to all the statements.

1. My school encourages organic farming very much.
2. All the students do not get opportunity to take part in agricultural activities in the school.
3. Special boundaries or barriers are not laid in order to protect the plants in my school garden.
4. The 'Farmers day' is observed every year in my school with suitable programs.
5. My school does not honor the eminent farmers in our locality.
6. Exhibition of soil samples or seedlings is not conducted in the school.
7. My school used to win prizes for different agricultural activities.
8. School used to conduct classes on organic farming by inviting experienced persons from the field.
9. School used to protect the nearby farm/agricultural field.
10. The harvesting of agricultural products is done properly in the school.
11. The exhibition of harvested agricultural products is not done by the school.

12. Exhibition of conventional agricultural equipments has been conducted in the school.

13. School does not offer prizes to the students who perform excellently in agricultural activities.

14. School used to distribute seeds /seedlings of vegetables to the students.

15. Students do not get adequate training from the school to prepare bio-fertilizers and bio-pesticides.

16. School used to conduct discussions / seminars in order to make students aware about minimal consumption of water.

17. There is no system of keeping separate cups under each of the pipes in the school.

18. School used to take initiative for rain water harvesting.

19. 'Water day' is observed every year in the school with appropriate activities.

20. There is no practice of displaying notices in various parts of the school to convey the importance of minimal water consumption.

21. Even the small leakages of pipes or water tank are checked and tackled immediately in the school.

22. School does not take initiative to clean up the nearby water bodies.

23. Teachers used to inspect the sanity of the well and water tank of the school in due time.

24. The wastes from the school contaminate the nearby water bodies.

25. There is no facility to recharge the school well with the over flown water from water tank.

26. There is no facility to store and preserve the rain water fallen on the roof of school building.

27. Drip irrigation is not in practice in the school vegetable garden.

28. The school garden is watered only in morning or evening.

29. Plants are grouped and planted separately in the garden, based on the water demands.

30. The used water from washing area of the school is diverted to the school garden.

31. As there is not enough sunlight in the classrooms, some lights have to be switched on even in the day time.

32. The lights and fans of some of the areas of the school are left continuously on even when none is attending.

33. School makes use of solar energy.

34. School uses LED and CFL lamps only.

35. School does not make use of biogas for preparing mid-day meals.

36. Smokeless chulahs are not used in the school.

37. Classes by experts are provided in school for making students aware about techniques for minimizing electricity consumption.

38. There is no practice of offering special prizes to students who perform excellently in minimizing electricity consumption.

39. All the computers used in the school have LED/LCD monitors.

40. Instructions are given to students to minimize electricity consumption, particularly in the evenings.

41. School used to conduct energy survey to make the students aware of energy consumption.

42. School used to provide training for making energy efficient bulbs.

43. It is compulsory that all the electrical devices of the school should be switched off immediately after use.

44. There is no practice of unplugging the electrical equipments from sockets after daily use in the school.

45. School used to provide information about the devices with less electricity consumption.

46. The use of plastic covers has been banned in the school premises.

47. There is practice of cleaning the school surroundings daily.

48. There is no bio-compost facility maintained in the school.

49. School used to provide training for students to process and preserve fruits and vegetables without spoilage.

50. The mid-day meal prepared in the school becomes excess daily.

51. School used to take initiative to give excess food from mid-day meal to the needy in time.

52. The rice / grocery items stored in the school for cooking purpose are spoiled and wasted occasionally.

53. Plastic plates and cups are being used for serving food on various occasions in the school.

54. There is no practice of separating biodegradable and non-biodegradable wastes in the school.

55. The school used to provide training to students for making paper bags/ cardboard files.

56. School used to conduct exhibition of useful products made by students from waste materials.

57. Separate waste bins are kept in each of the classrooms of the school.

58. PTA/MPTA members are invited to the meetings through E-mail or mobile SMS.

59. School does not take initiative to collect used clothes and books from the students for promoting reuse.

60. School takes no initiative to collect and handover plastic waste to waste recycling centers.

61. School used to provide encouragement for the purchase and usage of organic food products.

62. The need to ensure efficiency of electronic items while purchasing is not conveyed by the school.

63. Instructions are given to students for purchasing eco-friendly daily use products.

64. School does not use to conduct awareness programs on eco-friendly purchasing.

65. School used to provide instruction for purchasing things only for the need.

66. School used to provide encouragement for the purchase of reusable products.

67. School used to conduct trade fairs of eco-friendly products.

68. No instruction is given to students to minimize the packaging of purchased products.

69. School used to provide encouragement for the purchase of goods from local fairs and farmers.

70. School used to provide the message to avoid purchase of goods that are harmful to nature.

71. School does not provide training for students to purchase products which have green certification / eco mark.

72. School used to provide information on the ecological benefits of online purchasing.

73. Books/ magazines/ directories providing information on the eco-friendly, daily use products are available in the school.

74. The students who use eco-friendly products are used to be appreciated in the school.

75. The school does not provide direction to purchase water efficient and energy efficient devices.

APPENDIX VII

UNIVERSITY OF CALICUT

DEPARTMENT OF EDUCATION

SCALE OF STUDENTS' PERCEPTION ON SUSTAINABLE LIFESTYLE PRACTICES OF SCHOOLS

(Draft)

RESPONSE SHEET

Name :

Male/Female:

Standard :

School :

Sl. No.	Completely Agree	Partially Agree	Disagree
1			
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Sl. No.	Completely Agree	Partially Agree	Disagree
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Sl. No.	Completely Agree	Partially Agree	Disagree
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APPENDIX VIII

UNIVERSITY OF CALICUT

DEPARTMENT OF EDUCATION

SCALE OF STUDENTS' PERCEPTION ON SUSTAINABLE LIFESTYLE PRACTICES OF SCHOOLS

(Final)

Dr. K.P. Meera
Professor
Department of Education
University of Calicut

Deepthi. R.
Research Scholar
Department of Education
University of Calicut

This survey is meant for studying the 'Sustainable Lifestyle Practices' of your school. After careful reading of each of the statements, you have to tick (✓) mark the suitable response in the relevant column provided in the response sheet. Please make it sure that you respond to all the statements.

1. My school encourages organic farming very much.
2. All the students do not get opportunity to take part in agricultural activities in the school.
3. Special boundaries or barriers are not laid in order to protect the plants in my school garden.
4. My school does not honor the eminent farmers in our locality.
5. Exhibition of soil samples or seedlings is not conducted in the school.
6. My school used to win prizes for different agricultural activities.
7. School used to conduct classes on organic farming by inviting experienced persons from the field.
8. School used to protect the nearby farm/agricultural field.
9. The exhibition of harvested agricultural products is not done by the school.
10. Exhibition of conventional agricultural equipments has been conducted in the school.
11. School does not offer prizes to the students who perform excellently in agricultural activities.
12. School used to distribute seeds /seedlings of vegetables to the students.

13. Students do not get adequate training from the school to prepare bio-fertilizers and bio-pesticides.

14. School used to conduct discussions / seminars in order to make students aware about minimal consumption of water.

15. There is no system of keeping separate cups under each of the pipes in the school.

16. The wastes from the school contaminate the nearby water bodies.

17. There is no facility to store and preserve the rain water fallen on the roof of school building.

18. Drip irrigation is not in practice in the school vegetable garden.

19. The school garden is watered only in morning or evening.

20. Plants are grouped and planted separately in the garden, based on the water demands.

21. The used water from washing area of the school is diverted to the school garden.

22. As there is not enough sunlight in the classrooms, some lights have to be switched on even in the day time.

23. School does not make use of biogas for preparing mid-day meals.

24. Smokeless chulahs are not used in the school.

25. Classes by experts are provided in school for making students aware about techniques for minimizing electricity consumption.

26. All the computers used in the school have LED/LCD monitors.

27. School used to conduct energy survey to make the students aware of energy consumption.

28. School used to provide training for making energy efficient bulbs.

29. There is no practice of unplugging the electrical equipments from sockets after daily use in the school.

30. School used to provide information about the devices with less electricity consumption.

31. School used to provide training for students to process and preserve fruits and vegetables without spoilage.

32. School used to take initiative to give excess food from mid-day meal to the needy in time.

33. The school used to provide training to students for making paper bags/ cardboard files.
34. School used to conduct exhibition of useful products made by students from waste materials.
35. PTA/MPTA members are invited to the meetings through E-mail or mobile SMS.
36. School does not take initiative to collect used clothes and books from the students for promoting reuse.
37. School takes no initiative to collect and handover plastic waste to waste recycling centers.
38. School used to provide encouragement for the purchase and usage of organic food products.
39. Instructions are given to students for purchasing eco-friendly daily use products.
40. School does not use to conduct awareness programs on eco-friendly purchasing.
41. School used to conduct trade fairs of eco-friendly products.
42. School used to provide encouragement for the purchase of goods from local fairs and farmers.
43. School used to provide the message to avoid purchase of goods that are harmful to nature.
44. School used to provide information on the ecological benefits of online purchasing.
45. Books/ magazines/ directories providing information on the eco-friendly, daily use products are available in the school.
46. The students who use eco-friendly products are used to be appreciated in the school.
47. The school does not provide direction to purchase water efficient and energy efficient devices.

APPENDIX IX

UNIVERSITY OF CALICUT

DEPARTMENT OF EDUCATION

SCALE OF STUDENTS' PERCEPTION ON SUSTAINABLE LIFESTYLE PRACTICES OF SCHOOLS

(Final)

Dr. K.P. Meera
Professor
Department of Education
University of Calicut

Deepthi R.
Research Scholar
Department of Education
University of Calicut

നിർദ്ദേശങ്ങൾ

നിങ്ങളുടെ വിദ്യാലയത്തിൽ പ്രാവർത്തികമാക്കിയിട്ടുള്ള സുസ്ഥിരജീവിതശൈലി പ്രവർത്തനങ്ങളെപ്പറ്റി മനസ്സിലാക്കുന്നതിനുള്ള ഒരു സർവ്വേ ആണ് ഇത്. ഓരോ പ്രസ്താവനയും ശ്രദ്ധാപൂർവ്വം വായിച്ചതിനുശേഷം ഓരോന്നിനും ഏറ്റവും അനുയോജ്യമായി നിങ്ങൾക്കു തോന്നുന്ന പ്രതികരണം തന്നിരിക്കുന്ന Response sheet ൽ ശരി (✓) അടയാളമിട്ട് രേഖപ്പെടുത്തുക. എല്ലാ പ്രസ്താവനകൾക്കും പ്രതികരണം രേഖപ്പെടുത്താൻ ശ്രദ്ധിക്കുക.

1. എന്റെ വിദ്യാലയം ജൈവകൃഷിയെ വളരെ അധികം പ്രോത്സാഹിപ്പിക്കാറുണ്ട്.
2. വിദ്യാലയത്തിൽ കാർഷിക പ്രവർത്തനങ്ങളിൽ ഏർപ്പെടാൻ എല്ലാ വിദ്യാർത്ഥികൾക്കും അവസരം ലഭിക്കാറില്ല.
3. വിദ്യാലയത്തിലെ തോട്ടത്തിൽ നട്ട തൈകൾ സംരക്ഷിക്കുന്നതിനായി പ്രത്യേകം തടങ്ങളും വേലികളും സ്ഥാപിക്കുന്ന പതിവ് ഇല്ല.
4. സമീപത്തെ പ്രമുഖ കർഷകരെ ആദരിക്കാൻ വിദ്യാലയം മുൻകൈ എടുക്കാറില്ല.
5. വിദ്യാലയത്തിൽ വിവിധ മണ്ണിനങ്ങൾ/വിത്തുകൾ എന്നിവയുടെ പ്രദർശനം സംഘടിപ്പിക്കാറില്ല.
6. കാർഷിക രംഗത്തെ വിവിധ പ്രവർത്തനങ്ങൾക്ക് വിദ്യാലയത്തിന് അവാർഡുകൾ ലഭിക്കാറുണ്ട്.
7. ജൈവ കൃഷിയിൽ അനുഭവ സമ്പത്തുള്ള പ്രമുഖരുടെ ക്ലാസുകൾ വിദ്യാലയത്തിൽ സംഘടിപ്പിക്കാറുണ്ട്.
8. വിദ്യാലയ പരിസരത്തുള്ള നെൽപ്പാടം/കൃഷിസ്ഥലം വിദ്യാലയം ഏറ്റെടുത്ത് സംരക്ഷിക്കാറുണ്ട്.
9. കാർഷികോൽപ്പന്നങ്ങളുടെ പ്രദർശനം വിദ്യാലയം സംഘടിപ്പിക്കാറില്ല.
10. നാടൻ കാർഷിക ഉപകരണങ്ങളുടെ പ്രദർശനം വിദ്യാലയത്തിൽ സംഘടിപ്പിക്കാറുണ്ട്.

11. കാർഷിക പ്രവർത്തനങ്ങളിൽ മികച്ച പ്രകടനം കാഴ്ച വയ്ക്കുന്ന വിദ്യാർത്ഥികൾക്ക് വിദ്യാലയം പ്രത്യേകം സമ്മാനങ്ങൾ ഏർപ്പെടുത്താറില്ല.
12. വിദ്യാർത്ഥികൾക്കായി പച്ചക്കറി വിത്തുകൾ, തൈകൾ എന്നിവയുടെ വിതരണം ഏർപ്പെടുത്താറുണ്ട്.
13. വിദ്യാലയത്തിൽ ജൈവവളം, ജൈവ കീടനാശിനികൾ എന്നിവ നിർമ്മിക്കാൻ വിദ്യാർത്ഥികൾക്ക് വേണ്ടത്ര പരിശീലനം ലഭിക്കാറില്ല.
14. ജലത്തിന്റെ മിതമായ ഉപയോഗത്തെപ്പറ്റി വിദ്യാർത്ഥികളെ ബോധവാന്മാരാക്കാനായി ചർച്ചകൾ/ സെമിനാറുകൾ വിദ്യാലയം സംഘടിപ്പിക്കാറുണ്ട്.
15. വിദ്യാലയത്തിൽ ഓരോ പൈപ്പിനു കീഴിലും കപ്പുകൾ വയ്ക്കുന്ന പതിവ് ഇല്ല.
16. വിദ്യാലയത്തിൽ നിന്നുള്ള മാലിന്യങ്ങൾ സമീപത്തെ ജലാശയങ്ങളെ മലിനമാക്കാറുണ്ട്.
17. വിദ്യാലയത്തിന്റെ മേൽക്കൂരയിൽ വീഴുന്ന മഴവെള്ളം സംഭരിച്ചു സൂക്ഷിക്കുന്നതിനുള്ള സംവിധാനം ഇല്ല.
18. വിദ്യാലയത്തിലെ പച്ചക്കറിത്തോട്ടത്തിൽ പാറ്റി നനക്കുന്ന പതിവില്ല.
19. വിദ്യാലയത്തിലെ തോട്ടം രാവിലെയോ വൈകുന്നേരമോ മാത്രമേ നനക്കാറുള്ളൂ.
20. കൂടുതൽ ജലം ആവശ്യമായ ചെടികളെയും കുറച്ചു ജലം ആവശ്യമായ ചെടികളെയും തരംതിരിച്ചാണ് തോട്ടത്തിൽ നടുന്നത്.
21. വിദ്യാലയത്തിലെ വാഷിംഗ് ഏരിയായിൽനിന്നും ഉള്ള വെള്ളത്തെ തോട്ടത്തിലേക്ക് തിരിച്ചു വിടാറുണ്ട്.
22. ക്ലാസ് റൂമുകളിൽ വേണ്ടത്ര വെളിച്ചം ലഭിക്കാത്തതിനാൽ പകൽ സമയത്തും ചില ലൈറ്റുകൾ ഇടേണ്ടി വരാറുണ്ട്.
23. വിദ്യാലയത്തിൽ ഉച്ചഭക്ഷണം തയ്യാറാക്കുന്നതിനായി ബയോഗ്യാസ് പ്രയോജന പ്പെടുത്താറില്ല.
24. വിദ്യാലയത്തിൽ പുകയില്ലാത്ത അടുപ്പുകൾ ഉപയോഗപ്പെടുത്താറില്ല.
25. വൈദ്യുതിയുടെ ഉപയോഗം കുറക്കുന്നതിനുള്ള മാർഗ്ഗങ്ങളെപ്പറ്റി അറിവ് നല്കുന്നതിനായി വിദഗ്ധരുടെ ക്ലാസുകൾ വിദ്യാർത്ഥികൾക്ക് ലഭിക്കാറുണ്ട്.
26. വിദ്യാലയത്തിലെ കംപ്യൂട്ടറുകൾ എല്ലാം LED/LCD മോണിറ്റർ ഉള്ളവയാണ്.
27. ഊർജ്ജ ഉപഭോഗത്തെക്കുറിച്ച് വിദ്യാർത്ഥികളെ ബോധവാന്മാരാക്കാനായി ഊർജ്ജ സർവ്വേ വിദ്യാലയം സംഘടിപ്പിക്കാറുണ്ട്.
28. വൈദ്യുതക്ഷമതയുള്ള ബൾബുകൾ ഉണ്ടാക്കാനുള്ള പരിശീലനം വിദ്യാലയത്തിൽ നൽകാറുണ്ട്.
29. ഓരോ ദിവസത്തെയും ഉപയോഗത്തിനുശേഷവും വൈദ്യുതോപകരണങ്ങളുടെ പ്ലഗ്ഗുകൾ സോക്കറ്റിൽനിന്നും വേർപെടുത്തി വയ്ക്കുന്ന പതിവ് വിദ്യാലയത്തിൽ ഇല്ല.
30. കുറഞ്ഞ വൈദ്യുതി ഉപഭോഗമുള്ള ഉപകരണങ്ങളെപ്പറ്റിയുള്ള വിവരങ്ങൾ വിദ്യാലത്തിൽ നിന്നും ലഭിക്കാറുണ്ട്.
31. പഴങ്ങൾ, പച്ചക്കറികൾ എന്നിവ കേടു കൂടാതെ സംഭരിച്ചു സൂക്ഷിക്കാനായി വിദ്യാർത്ഥികൾക്ക് പരിശീലനം നൽകാറുണ്ട്.

32. ഉച്ചഭക്ഷണം ബാക്കി വന്നാൽ അത് ആവശ്യക്കാർക്ക് എത്തിച്ചു കൊടുക്കാൻ വിദ്യാലയം മുൻകൈ എടുക്കാറുണ്ട്.

33. പേപ്പർബാഗുകൾ / കാർബോർഡ് ഫയലുകൾ നിർമ്മിക്കുന്നതിനുള്ള പരിശീലനം വിദ്യാർത്ഥികൾക്ക് ലഭിക്കാറുണ്ട്.

34. പാഴ്വസ്തുക്കളിൽ നിന്നും വിദ്യാർത്ഥികൾ നിർമ്മിച്ച ഉപയോഗപ്രദമായ വസ്തുക്കളുടെ പ്രദർശനം വിദ്യാലയത്തിൽ സംഘടിപ്പിക്കാറുണ്ട്.

35. PTA/MPTA മീറ്റീംഗുകളിലേക്ക് രക്ഷിതാക്കളെ ക്ഷണിക്കുന്നത് ഇ-മെയിൽ അല്ലെങ്കിൽ മൊബൈൽ SMS ഉപയോഗിച്ചിട്ടാണ്.

36. പഴയ വസ്ത്രങ്ങൾ, ബുക്കുകൾ എന്നിവ വിദ്യാർത്ഥികളിൽ നിന്നും സ്വരൂപിച്ച് പുനരുപയോഗം പ്രോത്സാഹിപ്പിക്കാൻ വിദ്യാലയം മുൻകൈ എടുക്കാറില്ല.

37. പ്ളാസ്റ്റിക്ക് മാലിന്യങ്ങൾ മാലിന്യസംസ്കരണ കേന്ദ്രങ്ങളിൽ എത്തിക്കാനായി വിദ്യാലയം മുൻകൈ എടുക്കാറില്ല.

38. ജൈവഭക്ഷണ സാധനങ്ങൾ വാങ്ങി ഉപയോഗിക്കാൻ വിദ്യാലയത്തിൽ നിന്നും പ്രോത്സാഹനം ലഭിക്കാറുണ്ട്.

39. പരിസ്ഥിതിക്കിണങ്ങുന്ന നിത്യോപയോഗസാധനങ്ങൾ വാങ്ങി ഉപയോഗിക്കാൻ വിദ്യാലയത്തിൽ നിന്നും നിർദ്ദേശം ലഭിക്കാറുണ്ട്.

40. പരിസ്ഥിതക്കിണങ്ങുന്ന വസ്തുക്കൾ തെരഞ്ഞെടുത്ത് വാങ്ങാനായി ബോധ വൽക്കരണ പരിപാടികൾ വിദ്യാലയത്തിൽ സംഘടിപ്പിക്കാറില്ല.

41. പരിസ്ഥിതിക്കിണങ്ങുന്ന വസ്തുക്കളുടെ വിപണനമേളകൾ വിദ്യാലയത്തിൽ സംഘടിപ്പിക്കാറുണ്ട്.

42. നാടൻ ചന്തകൾ, കർഷകർ എന്നിവയിൽനിന്നും സാധനങ്ങൾ വാങ്ങുന്നതിന് വിദ്യാലയത്തിൽ നിന്നും പ്രോത്സാഹനം ലഭിക്കാറുണ്ട്.

43. പരിസ്ഥിതിക്ക് ദോഷം വരുത്തുന്ന സാധനങ്ങൾ വാങ്ങുന്നത് ഉപേക്ഷിക്കാനായി വിദ്യാലയത്തിൽ നിന്നും നിർദ്ദേശം ലഭിക്കാറുണ്ട്.

44. സാധനങ്ങൾ ഓൺലൈനായി വാങ്ങുന്നതിന്റെ പരിസ്ഥിതിപരമായ ഗുണങ്ങളെപ്പറ്റി വിദ്യാലയത്തിൽ നിന്നും അറിവ് ലഭിക്കാറുണ്ട്.

45. പരിസ്ഥിതിക്കിണങ്ങുന്ന നിത്യോപയോഗ സാധനങ്ങളെപ്പറ്റി അറിവ് നൽകുന്ന ബുക്സ്/ മാഗസിൻസ്/ ഡയറക്ടറീസ് വിദ്യാലയത്തിൽ ലഭ്യമാണ്.

46. പരിസ്ഥിതിക്ക് ഇണങ്ങുന്ന നിത്യോപയോഗ സാധനങ്ങൾ ഉപയോഗിക്കുന്ന വിദ്യാർത്ഥികൾക്ക് വിദ്യാലയത്തിൽ നിന്നും പ്രത്യേക പ്രോത്സാഹനം ലഭിക്കാറുണ്ട്.

47. ജലം, വൈദ്യുതി എന്നിവയുടെ ഉപയോഗം കുറയ്ക്കുന്ന തരത്തിലുള്ള ഉപകരണങ്ങൾ നോക്കി വാങ്ങാനായി വിദ്യാലയത്തിൽ നിന്നും നിർദ്ദേശം ലഭിക്കാറില്ല.

APPENDIX X

UNIVERSITY OF CALICUT

DEPARTMENT OF EDUCATION

SCALE OF STUDENTS' PERCEPTION ON SUSTAINABLE LIFESTYLE PRACTICES OF SCHOOLS

(Draft)

RESPONSE SHEET

Name :

Male/Female:

Standard :

School :

Sl. No.	Completely Agree	Partially Agree	Disagree
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			

Sl. No.	Completely Agree	Partially Agree	Disagree
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			
31			
32			

Sl. No.	Completely Agree	Partially Agree	Disagree
33			
34			
35			
36			
37			
38			
39			
40			
41			
42			
43			
44			
45			
46			
47			

APPENDIX XI

UNIVERSITY OF CALICUT

DEPARTMENT OF EDUCATION

SCALE OF STATUS OF IMPLEMENTATION OF SUSTAINABLE LIFESTYLE PRACTICES BY SCHOOLS

(Draft)

Dr. K.P. Meera
Professor
Department of Education
University of Calicut

Deepthi. R.
Research scholar
Department of Education
University of Calicut

This survey is meant for studying the 'Sustainable Lifestyle Practices' implemented by schools. Please tick (✓) mark the correct response in the relevant column to what extend each practice is implemented in your school.

Sl. No:	Sustainable Lifestyle Practices	Implemented Completely	Implemented partially	Will implement soon	Will consider in future	Not Interested
1.	Active encouragement given to organic farming					
2.	Ensuring the complete participation of students in agricultural activities					
3.	Ensuring the protection of planted seedlings					
4.	Observance of Farmers' day actively					
5.	Honoring of local farmers					
6.	Exhibition of soil samples and seeds					
7.	Active participation of the school in various agricultural contests					

8.	Classes provided by organic farming experts/agricultural scientists					
9.	Protection of the nearby paddy field/farm.					
10.	Proper harvesting of vegetables					
11.	Exhibition of harvested vegetables					
12.	Exhibition of conventional agricultural equipments					
13.	Offering prizes to the best student farmers					
14.	Distribution of vegetable seeds and seedlings to students					
15.	Training provided for students to prepare bio-fertilizers and bio-pesticides					
16.	Awareness programs to encourage minimal water consumption					
17.	Provision of cups under each of the pipes					
18.	Setting up of rain water harvesting tanks / rain pits					
19.	Observance of 'Water day' with appropriate programs every year					
20.	Installation of posters/notices aiming minimum water consumption					
21.	Tackling of leakages of pipes and water tanks in time					
22.	Sanitation of the nearby water bodies					
23.	Ensuring cleanliness of the school well and water tank.					
24.	Protecting the nearby water sources from school borne wastes					

25.	Well recharge facility to make use of the over flown water from water tank.					
26.	Facility for roof water harvesting from the school building					
27.	Drip irrigation facility in the school farm					
28.	Fixing watering time only at morning or evening					
29.	Plantation by grouping plants according to the water requirements					
30.	Redirecting the used water from washing area to garden.					
31.	Classrooms having adequate air and light					
32.	Practice of switching off unused lights and fans					
33.	Usage of solar energy in the school					
34.	Usage of LED/CFL bulbs in school					
35.	Usage of biogas for cooking					
36.	Usage of smokeless chulahs					
37.	Awareness classes aiming minimum usage of electricity					
38.	Offering prizes to students who perform excellently in minimizing electricity consumption					
39.	Usage of LED/LCD monitors in computers of the school					
40.	Practice of shutting down the computers that are not in continuous use					
41.	Energy survey conducted by the school					

42.	Practice of switching off computers after daily use.					
43.	Usage of Star labeled electrical equipments					
44.	Practice of unplugging electrical equipments from sockets after daily use.					
45.	Avoiding screen savers in computers					
46.	Banning of plastic covers within the school compound					
47.	Daily sanitation of school premises					
48.	Setting up of bio-compost facility					
49.	Training provided to students for processing of fruits and vegetables					
50.	Avoiding the wastage of mid-day meals					
51.	Supplying excessive mid-day meal to the deserved					
52.	Storage of rice and grocery items without spoilage					
53.	Usage of eco-friendly plates and cups for serving food in various occasions					
54.	Provision of separate waste bins for discarding biodegradable and non-biodegradable wastes					
55.	Training given for making eco-friendly bags/ files					
56.	Exhibition of useful products made by students from waste materials					
57.	Provision of separate waste bin for each of the classrooms of the school					

58.	Communicating with PTA/MPTA members through mobile SMS/E-mail					
59.	Activities to promote reuse by collecting used books and clothes from students					
60.	Initiatives taken by the school to handover plastic wastes to waste recycling centers					
61.	Priority given to purchase organic food products by the school					
62.	Ensuring quality/ efficiency of electronic items while purchasing for school					
63.	Priority given to eco-friendly products while purchasing for school use.					
64.	Awareness programs on green purchasing.					
65.	Purchasing only for the need of the school.					
66.	Priority given by school to purchase items that are reusable					
67.	Trade fairs / exhibitions of eco-friendly products organized by the school					
68.	Insisting minimal packaging of products purchasing for school uses					
69.	Purchase of goods from local shops and farmers for school uses.					
70.	Avoiding purchase of items that are harmful to nature.					
71.	Priority given to products which have green certification / eco mark.					

72.	Online purchase of different products for school use.					
73.	Introducing books/directories/ magazines to students providing information on green products.					
74.	Exploration to find out the new possibilities in green purchasing.					
75.	Formation of green purchasing team/committee.					

APPENDIX XII

UNIVERSITY OF CALICUT

DEPARTMENT OF EDUCATION

SCALE OF STATUS OF IMPLEMENTATION OF SUSTAINABLE LIFESTYLE PRACTICES BY SCHOOLS

(Final)

Dr. K.P. Meera
Professor
Department of Education
University of Calicut

Deepthi. R.
Research scholar
Department of Education
University of Calicut

This survey is meant for studying the 'Sustainable Lifestyle Practices' implemented by schools. Please tick (✓) mark the correct response in the relevant column to what extend each practice is implemented in your school.

Sl. No:	Sustainable Lifestyle Practices	Implemented Completely	Implemented partially	Will implement soon	Will consider in future	Not Interested
1.	Active encouragement given to organic farming					
2.	Ensuring the complete participation of students in agricultural activities					
3.	Ensuring the protection of planted seedlings					
4.	Observance of Farmers' day actively					
5.	Honoring of local farmers					
6.	Active participation of the school in various agricultural contests					
7.	Classes provided by organic farming experts/agricultural scientists					

8.	Proper harvesting of vegetables					
9.	Exhibition of harvested vegetables					
10.	Offering prizes to the best student farmers					
11.	Provision of cups under each of the pipes					
12.	Setting up of rain water harvesting tanks / rain pits					
13.	Installation of posters/notices aiming minimum water consumption					
14.	Tackling of leakages of pipes and water tanks in time					
15.	Facility for roof water harvesting from the school building					
16.	Drip irrigation facility in the school farm					
17.	Fixing watering time only at morning or evening					
18.	Usage of LED/CFL bulbs in school					
19.	Usage of biogas for cooking					
20.	Offering prizes to students who perform excellently in minimizing electricity consumption					
21.	Usage of LED/LCD monitors in computers of the school					
22.	Energy survey conducted by the school					
23.	Usage of Star labeled electrical equipments					
24.	Practice of unplugging electrical equipments from sockets after daily use.					

25.	Banning of plastic covers within the school compound					
26.	Daily sanitation of school premises					
27.	Usage of eco-friendly plates and cups for serving food in various occasions					
28.	Provision of separate waste bins for discarding biodegradable and non-biodegradable wastes					
29.	Provision of separate waste bin for each of the classrooms of the school					
30.	Communicating with PTA/MPTA members through mobile SMS/E-mail					
31.	Activities to promote reuse by collecting used books and clothes from students					
32.	Initiatives taken by the school to handover plastic wastes to waste recycling centers					
33.	Ensuring quality/ efficiency of electronic items while purchasing for school					
34.	Awareness programs on green purchasing.					
35.	Purchasing only for the need of the school.					
36.	Priority given by school to purchase items that are reusable					
37.	Insisting minimal packaging of products purchasing for school uses					
38.	Purchase of goods from local shops and farmers for school uses.					

39.	Avoiding purchase of items that are harmful to nature.					
40.	Priority given to products which have green certification / eco mark.					
41.	Online purchase of different products for school use.					
42.	Introducing books/directories/ magazines to students providing information on green products.					
43.	Exploration to find out the new possibilities in green purchasing.					
44.	Formation of green purchasing team/committee.					

APPENDIX XIII

UNIVERSITY OF CALICUT

DEPARTMENT OF EDUCATION

SCALE OF STATUS OF IMPLEMENTATION OF SUSTAINABLE LIFESTYLE PRACTICES BY SCHOOLS

(Final)

Dr. K.P. Meera
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Department of Education
University of Calicut

Deepthi R.
Research Scholar
Department of Education
University of Calicut

നിർദ്ദേശങ്ങൾ

വിദ്യാലയങ്ങളിൽ പ്രാവർത്തികമാക്കിയിട്ടുള്ള സുസ്ഥിര ജീവിത ശൈലീ പ്രവർത്തനങ്ങളെപ്പറ്റി മനസ്സിലാക്കുന്നതിനുള്ള ഒരു സർവ്വേ ആണ് ഇത്. ഓരോ പ്രവർത്തനവും താങ്കളുടെ വിദ്യാലയത്തിൽ എത്രത്തോളം പ്രാവർത്തികമാക്കിയിട്ടുണ്ട് എന്നത് അനുബന്ധമായ കോളത്തിൽ ഏറ്റവും അനുയോജ്യമായ പ്രതികരണം ശരി (✓) അടയാളമിട്ടു രേഖപ്പെടുത്തുക.

Sl. No	സുസ്ഥിര ജീവിത ശൈലീ പ്രവർത്തനങ്ങൾ	പൂർണമായി പ്രാവർത്തികമാക്കി	ഭാഗികമായി പ്രാവർത്തികമാക്കി	ഉടൻ പ്രാവർത്തികമാക്കും	ഭാവിയിൽ പരിഗണിക്കും	താല്പര്യമില്ല
1.	ഊർജ്ജിതമായ രീതിയിൽ ജൈവ കൃഷിക്കു നൽകുന്ന പ്രോത്സാഹനം					
2.	കാർഷിക പ്രവർത്തനങ്ങളിൽ മുഴുവൻ വിദ്യാർത്ഥികളുടെയും പങ്കാളിത്തം ഉറപ്പാക്കൽ					
3.	നട്ടതൈകളുടെ സംരക്ഷണം ഉറപ്പാക്കൽ					
4.	കർഷകദിനം സമുചിതമായ രീതിയിൽ ആചരിക്കൽ					
5.	നാട്ടിലെ പ്രമുഖ കർഷകർക്കു നൽകുന്ന ആദരം					
6.	വിവിധ കാർഷിക മത്സരങ്ങളിൽ വിദ്യാലയത്തിന്റെ സജീവ പങ്കാളിത്തം					
7.	ജൈവകൃഷി വിദഗ്ധർ/കൃഷി ശാസ്ത്രജ്ഞർ എന്നിവരുടെ ക്ലാസുകൾ					
8.	സമുചിതമായ രീതിയിൽ പച്ചക്കറി വിളവെടുപ്പ്					

Sl. No	സുസ്ഥിര ജീവിത ശൈലീ പ്രവർത്തനങ്ങൾ	പൂർണമായി പ്രാവർത്തികമാക്കി	ഭാഗികമായി പ്രാവർത്തികമാക്കി	ഉടൻ പ്രാവർത്തികമാക്കും	ഭാവിയിൽ പരിഗണിക്കും	താല്പര്യമില്ല
9.	വിളവെടുത്ത പച്ചക്കറികളുടെ പ്രദർശനം					
10.	മികച്ച വിദ്യാർത്ഥി കർഷകർക്ക് പുരസ്കാരം ഏർപ്പെടുത്തൽ					
11.	ഓരോ പൈപ്പിനു കീഴിലും കപ്പുകൾ നൽകൽ					
12.	മഴവെള്ള സംഭരണികൾ/മഴക്കുഴികൾ എന്നിവയുടെ നിർമ്മാണം					
13.	ജലത്തിന്റെ മിതമായ ഉപയോഗത്തെക്കുറിച്ച് ബോധവൽക്കരിക്കുന്ന പോസ്റ്ററുകൾ/നോട്ടീസുകൾ					
14.	പൈപ്പുകൾ, വാട്ടർടാങ്കുകൾ എന്നിവയുടെ ചെറിയ ലീക്കുകൾ കണ്ടെത്തി അപ്പപ്പോൾ പരിഹരിക്കൽ					
15.	സ്കൂൾ കെട്ടിടത്തിന്റെ മേൽക്കൂരയിൽ വീഴുന്ന മഴവെള്ളം സംഭരിക്കാനുള്ള സംവിധാനം					
16.	പച്ചക്കറിത്തോട്ടത്തിൽ പാറ്റി നനക്കാനുള്ള സംവിധാനം					
17.	പച്ചക്കറിത്തോട്ടം, പൂന്തോട്ടം എന്നിവയുടെ ജല സേചനം രാവിലെയോ വൈകുന്നേരമോ ആക്കി നിജപ്പെടുത്തൽ					
18.	വിദ്യാലയത്തിൽ സൗരോർജ്ജത്തിന്റെ ഉപയോഗം					
19.	പാചക ആവശ്യത്തിനായി ബയോഗ്യാസ് പ്രയോജനപ്പെടുത്തൽ					
20.	വൈദ്യുതി ഉപയോഗം കുറക്കുന്നതിൽ മികച്ച പ്രകടനം കാഴ്ചവയ്ക്കുന്ന വിദ്യാർത്ഥികൾക്ക് പുരസ്കാരം ഏർപ്പെടുത്തൽ					
21.	വിദ്യാലയത്തിലെ കംപ്യൂട്ടറുകളിൽ LED/LCD മോണിറ്ററുകളുടെ ഉപയോഗം					
22.	വിദ്യാലയം ഏർപ്പെടുത്തുന്ന ഊർജ്ജ സർവ്വേ					
23.	സ്റ്റാർ അടയാളമുള്ള വൈദ്യുത ഉപകരണങ്ങളുടെ ഉപയോഗം					
24.	ഓരോ ദിവസത്തെയും ഉപയോഗത്തിനുശേഷം ഇലക്ട്രോണിക് ഉപകരണങ്ങൾ സോക്കറ്റിൽനിന്നും വേർപെടുത്തുന്ന പതിവ്					
25.	സ്കൂൾഅതിർത്തിയിൽ പ്ലാസ്റ്റിക് കവറുകളുടെ നിരോധനം					

Sl. No	സുസ്ഥിര ജീവിത ശൈലീ പ്രവർത്തനങ്ങൾ	പൂർണമായി പ്രാവർത്തികമാക്കി	ഭാഗികമായി പ്രാവർത്തികമാക്കി	ഉടൻ പ്രാവർത്തികമാക്കും	ഭാവിയിൽ പരിഗണിക്കും	താല്പര്യമില്ല
26.	വിദ്യാലയ പരിസരത്തിന്റെ ദിവസംതോറുമുള്ള ശുചീകരണം					
27.	വിവിധ അവസരങ്ങളിൽ ഭക്ഷണം വിളമ്പാനായി പരിസ്ഥിതിക്കിണങ്ങുന്ന പ്ലേറ്റുകൾ, കപ്പുകൾ എന്നിവയുടെ ഉപയോഗം					
28.	അഴുകുന്ന മാലിന്യങ്ങളും അഴുകാത്തവയും നിക്ഷേപിക്കുന്നതിനായി വെവ്വേറെ വേസ്റ്റ് ബിന്നുകൾ നൽകൽ					
29.	വിദ്യാലയത്തിൽ എല്ലാ ക്ലാസ് റൂമുകളിലും വേസ്റ്റ് ബിന്നുകൾ നൽകൽ					
30.	PTA/MPTA അംഗങ്ങളുമായി മൊബൈൽ എസ്.എം.എസ്/ ഇ-മെയിൽ വഴിയുള്ള ആശയ വിനിമയം					
31.	പഴയ വസ്ത്രങ്ങൾ, ബുക്കുകൾ എന്നിവ വിദ്യാർത്ഥികളിൽ നിന്ന് സ്വരൂപിച്ച് പുനരുപയോഗിക്കാനുള്ള പ്രവർത്തനങ്ങൾ					
32.	പ്ളാസ്റ്റിക് മാലിന്യങ്ങൾ മാലിന്യസംസ്ക്കരണ കേന്ദ്രങ്ങളിൽ എത്തിക്കാൻ വിദ്യാലയം എടുക്കുന്ന മുൻകൈ					
33.	വിദ്യാലയ ആവശ്യത്തിനായി ഇലക്ട്രോണിക് ഉപകരണങ്ങൾ വാങ്ങുമ്പോൾ ഗുണമേന്മ/കാര്യക്ഷമത ഉറപ്പാക്കൽ					
34.	ഗ്രീൻ പർച്ചേസിംഗ് എന്ന വിഷയത്തിൽ ബോധവൽക്കരണ പരിപാടികൾ					
35.	സാധനങ്ങൾ സ്കൂൾ ആവശ്യത്തിനു മാത്രം വാങ്ങൽ					
36.	പുനരുപയോഗം ചെയ്യാവുന്ന സാധനങ്ങൾ വാങ്ങിക്കാൻ വിദ്യാലയം നൽകുന്ന മുൻഗണന					
37.	സ്കൂൾ ആവശ്യത്തിനായി വാങ്ങുന്ന സാധനങ്ങളുടെ പാക്കിംഗ് ഗണ്യമായി കുറയ്ക്കൽ					
38.	സ്കൂൾ ആവശ്യത്തിനായുള്ള സാധനങ്ങൾ പരമാവധി നാടൻ കടകൾ, കർഷകർ എന്നിവരിൽനിന്നും വാങ്ങിക്കൽ					
39.	പരിസ്ഥിതിക്ക് ദോഷം വരുത്തുന്ന ഉല്പന്നങ്ങൾ വാങ്ങുന്നത് ഉപേക്ഷിക്കൽ					
40.	ഗ്രീൻ സർട്ടിഫിക്കേഷൻ/എക്കോ മാർക്ക് ഉള്ള ഉൽപന്നങ്ങൾക്ക് നൽകുന്ന മുൻഗണന					

Sl. No	സുസ്ഥിര ജീവിത ശൈലീ പ്രവർത്തനങ്ങൾ	പൂർണമായി പ്രാവർത്തികമാക്കി	ഭാഗികമായി പ്രാവർത്തികമാക്കി	ഉടൻ പ്രാവർത്തികമാക്കും	ഭാവിയിൽ പരിഗണിക്കും	തല്പര്യമില്ല
41.	സ്കൂൾ ആവശ്യത്തിനായുള്ള വിവിധ സാധനങ്ങളുടെ ഓൺലൈൻ പർച്ചേസിംങ്					
42.	ഗ്രീൻ പ്രൊഡക്ട്സിനെപ്പറ്റി അറിവു നൽകുന്ന ബുക്കുകൾ/ ഡയറക്ടറീസ്/ മാഗസിനുകൾ വിദ്യാർത്ഥികൾക്ക് പരിചയപ്പെടുത്തൽ					
43.	ഗ്രീൻ പർച്ചേസിംഗിലെ നൂതന സാധ്യതകൾ അറിയാനായി നടത്തുന്ന അന്വേഷണം					
44.	ഗ്രീൻ പർച്ചേസ് ടീം/കമ്മറ്റിയുടെ രൂപീകരണം					

APPENDIX XIV

UNIVERSITY OF CALICUT

DEPARTMENT OF EDUCATION

QUESTIONNAIRE ON THE CONSTRAINTS IN IMPLEMENTING SUSTAINABLE LIFESTYLE PRACTICES IN SCHOOLS

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Instructions

Here are provided a number of factors which may act as barriers for implementing the 'Sustainable Lifestyle Practices' of your school. Please tick (✓) mark the correct response among the three options to each item, to what extend these factors affect the practices of your institution. Your faithful and genuine response is expected.

How do the following constraints affect the implementation of 'Sustainable Lifestyle Practices' in your school?

1. Lack of funds
   Extremely ☐ Moderately ☐ Not at all ☐
2. Lack of resources
   Extremely ☐ Moderately ☐ Not at all ☐
3. Poor leadership
   Extremely ☐ Moderately ☐ Not at all ☐
4. Inadequate training
   Extremely ☐ Moderately ☐ Not at all ☐
5. Poor involvement of staff
   Extremely ☐ Moderately ☐ Not at all ☐
6. Poor student involvement
   Extremely ☐ Moderately ☐ Not at all ☐
7. Poor support from management/authorities
   Extremely ☐ Moderately ☐ Not at all ☐

8. Lack of recognition for eco-friendly initiatives
   Extremely ☐ Moderately ☐ Not at all ☐
9. Lack of priority given to Sustainable Lifestyle Practices
   Extremely ☐ Moderately ☐ Not at all ☐
10. Lack of time Extremely ☐ Moderately ☐ Not at all ☐
11. Heavily loaded curriculum
    Extremely ☐ Moderately ☐ Not at all ☐
12. Poor support from parents
    Extremely ☐ Moderately ☐ Not at all ☐
13. Poor involvement of local bodies
    Extremely ☐ Moderately ☐ Not at all ☐
14. Lack of collaboration with environmental agencies or NGO's
    Extremely ☐ Moderately ☐ Not at all ☐
15. Poor awareness regarding the need of Sustainable Lifestyle Practices
    Extremely ☐ Moderately ☐ Not at all ☐
16. Poor assessment of Sustainable Lifestyle Practices
    Extremely ☐ Moderately ☐ Not at all ☐

- Please mention whether there are any other factors except these that act as constraints in implementing 'Sustainable Lifestyle Practices' in your institution.

APPENDIX XV

DETAILS OF RESEARCH PUBLICATIONS

Author's Name	Title of Paper	Details of Journal/Publisher
Deepthi R. & Dr. K.P. Meera	Traditional Ecological Knowledge (TEK): Scope and Challenges in the Modern world	Academicia, An International Multidisciplinary Research Journal, Vol. 6, Issue 10, October 2016, ISSN: 2249 – 7137 doi: 10:5958/2249-7137. 2016.0079.3.
Deepthi R. & Dr. K.P. Meera	Exploring student's awareness on Sustainable Lifestyle Practices	IOSR Journal of Humanities and Social Science (IOSR-JHSS) Volume 20, Issue 12. Ver.II (Dec. 2015) pp. 40-43. ISSN : 2279-0837 P.ISSN:2279-0845
Deepthi R. & Dr. K.P. Meera	A study on E-waste awareness among secondary school teachers	Studies in Education, Department of Educaiton, University of Kerala, Publication No. 31. Vol. 31, Number 1, January 2014, pp12-16.