CHAPTER II
THEORETICAL FRAMEWORK:

2.0 Introduction.
2.1 The concept of Environmental Education.
2.2 Principles of Environmental Education.
2.3 Environmental Awareness: Concept and its attributes.
2.4 Environment - as a medium of learning.
2.5 Aims; Objectives and Attributes of Environmental Education.
2.6 Environmental Education at Secondary level.
2.7 Teachers Training Programme for Environmental Education.
2.0 INTRODUCTION:

Our mounting concern with the environment is not just for ourselves, but for the entire mankind now existing and the generations to follow. This agreed that children are nation's greatest resource and that the future of civilization depends on them.

There has been sudden increase in the activities for Environmental Education (E.E.) during the last two decades. This has resulted in the development of different kinds of curricula, out of school activities and literature. The purpose is to regenerate man's interest in preservation, conservation and improvement of the environment before it is too late and reaches the point of no return.

E.E. has been perceived differently by various educationalist and thinkers. They differ in its objectives, the kinds of activities that are used to achieve the objectives and resources to attain these ends. It is the vastness and variety of the area of E.E. that necessitates to take a holistic view of the various aspects of E.E.. This will help us to see its strength and weakness and draw conclusions for the future. The purpose is to make a review of the situation in this context and examine different roles
played by E.E. at school level and see how these are achieved. Moreover, it is of interest to see how E.E. is molded in different circumstances such as those present in the wide spectrum of developing and developed countries. It is common to use the term 'environmental education' for different meanings. For the sake of clarity and to avoid ambiguity it is necessary to state, at least in brief, the meanings of E.E. in our context. This will be done here first.

Environmental Education (E.E.):

It is a process to promote the awareness and understanding of the environment, its relationship with man and his activities. It is also aimed at developing responsible actions necessary for preservation, conservation and improvement of the environment and its components.

Despite these differences of meanings, we shall include all these under the umbrella of E.E. for the purpose of this study. Any curriculum working for all or any of these objectives shall be considered as E.E. curriculum.

There are some excellent accounts that throw light on different aspects of E.E. and have provided guidelines

2.1 THE CONCEPT OF ENVIRONMENTAL EDUCATION:-

Various combinations of words such as Environmental Education (E.E.), Environmental study (E.S.) and Environmental Approach (E.A.) are being used in the literature in the context of environment and education. Although, according to semantics of the words, E.E., E.S and E.A. have different meanings in the strict sense of the terms, but one finds that these are being used synonymously and interchangeably. We consider here the implications of E.E., E.S and E.A. and see in which context these are relevant and important, and how these are related to teacher training Programmes.

Environmental Education (E.E.):

Encyclopaedia of Educational Research (Mifzel 1982) states:

Defining 'environmental education' is not an easy task. Unlike other curriculum areas, the specific content of E.E. has never been well defined. It is universally agreed, however, that environmental education should be interdisciplinary, drawing from biological, sociological, anthropological, economic political and human resources. It
is also agreed that a conceptual approach to teaching E.E. is best.

The majority also agrees that E.E. is the process of recognizing values and clarifying concepts related with environment and its problems in order to develop skills and attitudes necessary to understand surroundings. It also entails practices in decision making and self-formulating a code of behaviour about issues concerning environmental quality.

The most prevalent opinion is that E.E. can be treated as 'discipline' which heavily banks upon basics of existing subjects such as Physics, Chemistry, Mathematics, Zoology, and Botany. This opinion supports the training of specialists in E.E. which will be much needed for planning, management, development, and taking remedial steps for existing problems. Some courses (Geldorloos 1975, & Levon, 1971) have been formulated on these lines. A typical course of this type has been mentioned by Wuzzelbacher (1976) which has the following components:

1. Man and Environment
2. Population and Urbanization
3. Ecology
4. Government Policy and Citizen
At the primary level Sale and Lee (1972) describe the Objectives of E.E. as (1) to help the individuals acquire an understanding of the biophysical environment and society, (2) to encourage understanding of man as an inseparable part of his environment but with the ability of alter it in important ways through his activities or lack of it and (3) to generate understanding of the organizational strategies and social arrangements.

Definitions of Environmental Education:

The definitions of environmental education formulated by various agencies or organisations cited by Sharma (1985, PP. 9-11) in his book are given below:
1. Environmental Education Act, 1970:

"For the purpose of this Act, the term 'Environmental Education' means the educational process dealing with man's relationship with his natural and man-made surroundings and includes the relation of population, pollution, resource allocation and depletion, conservation, transformation, technology and urban and rural planning to the total human environment".

2. The First Report of the British Royal Commission on Environmental Pollution (1971) says;

"The best insurance for the environment is a commitment on behalf of the public to prevent the deterioration of air, water and land."

3. The Finnish National Commission in a Seminar held in 1974 has said:

"Environmental education is away of implementing the goals of environmental protection. Environmental education is not a separate branch of science subject of study. It should be carried out according to the principle of lifelong integral education."
4. The Report of a conference of African Educators, EDC and CREDO held at Nairobi in 1968 says:

"To create awareness and an understanding of the evolving social and physical environment as a whole, its natural, man-made cultural, spiritual resources, together with the rational use and conservation of these resources for development."

Environmental education can be regarded as the process of learning, through which participants acquire sufficient knowledge to contribute towards solving environmental problems.

The concept of environmental education can be classified as:

1. Education for the environment
2. Education about the environment and
3. Education through the environment.

(1) Education for the Environment :-

Environmental education is a pragmatic response of the defacement of the environment. Environmental education is a kind of education which will seek to make pupils fully aware of the problems connected with their environment so
that they will be able to tackle these problems with a sense of responsibility and with the technical skills which will enable them to contribute to their solutions along with other members of their community. Agarwal, (1986, P.P. 60-61) has aptly said "This awareness of environmental problems is social awareness." Such problems will be solved through collective action aimed at eradicating the social and economic causes of degradation of human environment.

(2) Education about the Environment:

Environmental Education includes conservation, outdoor and natural resource education as well as nature study but it also includes every thing that relates to man and his environment. E.E. is the study of man and how he shapes his total natural and cultural surroundings for good or ill. Man, not his technology, not the physical or biological world as a separate entity, not the arts or professions operating in segregated spheres, but all of these as they effect the quality of human life, become the pivotal concern. Man cannot be separated from the earth's ecosystem for he is the only conscious manipulator of the environment and his manipulation must be directed towards enhancing the quality of environment.
(3) Education through the Environment:

Environmental education is not a separate subject. It is a multi-disciplinary approach both to education and to the problem of environment. All the subject in the existing curriculum do have some information pertaining to environment but in their present form the subjects fail to relate to one another. Just as piecemeal attacks on environmental problems are ineffective so is piecemeal education about the environment inadequate because it does not take into account the interdependence of the pieces. E.E. must, therefore, be of wholes not of parts, if human race is to understand the totality of environments subject areas must collaborate, integrate and coordinate so that E.E. may prove effective in overcoming the environmental crisis. The multi-disciplinary approach integrates environmental education into all learning, in all subject in all grades all year long and beyond the formal school years to a lifelong education.

Environmental education should result in the knowledge, desires and ability necessary to direct one's conduct toward improving the quality of life. It should enable the individual to perceive the problems that exist and to devise solutions to them. In order for students to develop an environmental ethic; "Man is a part of this earth rather
than careless exploiter of it. If we exploit the nature in unwise manner, it will be difficult to support even a small population. But if we protect the nature, it will continue to meet the needs of all living things and not only for man.

The consideration of environment as natural heritage may be the integral part of environmental education. Only when our life is guided by respect for the earth and all living things. We will be able to live in harmony with our environment." they must now throw off their arrogance and perceive with humility, their place in the earth's ecosystem and their ability to manipulate the environment. Their energies will have shifted from material growth to environmental protection. In short, the environmental ethic must provide them with a new rationale for their existence, or all the technology and power will not sustain their existence.

2.2 PRINCIPLES OF ENVIRONMENTAL EDUCATION :-

One of the methods of developing observational skill is encouraging children to explore, experience and assess their own environment and to modify if as far as possible to suit their own needs and the needs of their community and of the society at large keeping these objectives in view,
emphasis is being increasingly laid on environmental education as an integral part of the school curriculum. The educational principles that buttress support to the inclusion of environmental education in school curriculum given by Ambast (1990, PP.15-21) are as below:

(1) Environmental education helps in programming learning experiences from 'simple to complex'. For illustration, children look at a bird, observe its colourful plumage, see it eating figs or insects or watch it flying, etc. All this gives them same awareness of the eating and flying habits of birds.

(2) Environmental education helps children to proceed from 'indefinite ideas to definite' ones. In this connection, it may be said that the first perceptions and thoughts of children are as vague as their first movement and the first attempt at speech. Environmental education helps in sharpening the development of these observational skills and hastens the transition of ideas in children's mind from indefiniteness to definitions.

(3) Environmental education helps children to proceed from concrete to the 'abstract. This is a very simple educational maxim and does not need any elaboration.
Still it may be said that environment is full of concrete things which children may examine and classify and interpret, and then draw their own conclusions and inferences about them. For example, children may observe different types of plants and animals and classify them according to their species genus family and order.

(4) Environmental education helps the ordering of learning experiences from 'empirical to the rational'. Needless to say, empirical to rational is a very important educational maxim and like other educational maxims described above, was given the pride of place by no less on educational than Herbert Spencer. This maxim is satisfied very well in environmental studies as children can observe phenomena and conclusions and rational explanations. Having argued so, they may verify their hypotheses experimentally.

(5) A corollary of the foregoing principle which is so dear to the hearts of educationists is that education should help the child in 'process of self-development'. This means that children should be encouraged to conduct their own investigations and draw their own conclusions. They should be told as little as possible
and made to discover as much as possible. This principle is very much consistent with what thinking man always do in life, namely, self instruction which has been the warp and woof of human progress and discovering things for themselves is possible maximally in programmes of environmental education.

(6) Education of the child must follow 'the same sequence as existed in the education of mankind,' considered historically. This means that the genesis of knowledge in the individual should follow nearly the same course as the genesis of knowledge in the race. This principle can be followed both in letter and spirit in programmes of environmental education. Children when taken out to a forest and made to camp there, can very well acquire, interpret and appreciate the sequence in which knowledge was developed by man.

(7) The next important educational principle of environmental education is the pleasurable excitement. This principle can be appreciated by one who has seen the children's becoming faces and the intense delight on them when they are picking up flowers and insects or hoarding pebbles and shells.

(8) The eighth principle of environmental education is that
It makes child's education 'Problem-based', for understanding environment and the hazards of its pollution, the pollution of air and water, the destruction of wild life the dereliction of land, etc. are problems that all of us should solve in order to save mankind from extinction.

(9) The last but not the least important principles of environmental education is its 'social relevance', its relevance to man's interaction with his physical and social environment, its relevance to changing human attitudes which curve man to hate man and beget hatred on one.

According to Roth, Pella and Schoonfeld C; (1970, PP. 62-63) says. There have been few attempts to formulate sets of principles for environmental education. Because of its multi-disciplinary nature it borrows principles from many fields. The principles of environmental education may be envisaged as under:

1. Man is a rational animal.
   - He has developed tools for modifying his surroundings.
   - He can make decision affecting the environment.
   - He must live in partnership with nature and in
2. Environmental improvement requires cooperative effort.
- Planning is a means of foreseeing the effects of our actions (The systems approach).
- Data gathering is necessary to assure optimum environmental decisions.
- The patterns of land use reflect the values of a society.
- The growth syndrome has placed a premium on development at the expense of the environment.
- The attainment of environments of quality depends on the communication of ideas-can aim of education.
- Environmental education is inter-disciplinary, multi-disciplinary and trans-disciplinary.
- Environmental education operates at the grassroots level and is concerned with individual behaviour.
- Environmental education involves students in activities.
- Environmental education necessitates field studies, rural or urban and experiences beyond the classroom.
- Environmental education develops an ethic contributing to the quality of life: (a) it respect...
individual life style (b) it is based on constructive attitudes.

3. The sharing of resources is a global concern.
- Materials of the earth become resources through human perception of potential uses.
- Earth resources are unevenly distributed and unequally consumed.
- The consumption of resources may convert them into irretrievable forms or into substances dangerously harmful to living organisms.
- Recycling of industrial production and ecologically balanced agricultural production are means of maintaining sustained yields from resources.
- The people of the world are all astronauts on spaceship earth.
- The earth is our only home; it contains our life support systems.
- The limits of the human population-carrying capacity of the earth are currently unknown but observations indicate the desirability of some forms of population limitation and redistribution.

The above-mentioned principles were taken into account in designing the materials and strategies for this
study.

Guiding Principles: environmental education should;

* consider the environment in its totality natural and built, technological and social (economic, political, cultural-historical, moral aesthetic);
* be a continuous life long process, beginning at the preschool level and continuing through all formal and non-formal stages;
* be interdisciplinary in its approach, drawing on the specific content of each discipline in making possible a holistic and balanced perspective;
* examine major environmental issues from local, national, regional and international points of view so that students receive insights into environmental conditions in other geographical areas;
* Focus on current and potential environmental situations while taking into account the historical perspective;
* promote the value and necessary of local, national and international co-operation in the prevention and solution of environmental problems;
* explicitly consider environmental aspects in plans for development and growth;
enable learners to have a role in planning their learning experiences and provide an opportunity for making decisions and accepting their consequences;

relate environmental sensitivity, knowledge, problem solving skills and values clarification to every age, but with special emphasis on environmental sensitivity to the learner's own community in early years;

help learners discover the symptoms and real causes of environmental problem;

emphasize the complexity of environmental problems and thus the need to develop critical thinking and problem-solving skills;

Utilize diverse learning environments and a broad array of educational approaches to teaching/learning about and from the environment with due stress on practical activities and first-hand experience.

2.3 ENVIRONMENTAL AWARENESS: CONCEPT AND ITS ATTRIBUTES

A look at various curricula from different places provides a wide range of objectives. These include both prescriptive and suggestive. Environmental Education (E.E.) is mostly considered as a process to develop awareness, knowledge and understanding about the environment; positive
attitudes towards it, and commitment to protect and improve it. To achieve this at secondary level it requires assistance to gain and develop basic skills and concepts. Help is also required to stimulate creative work and to give opportunities for making first-hand observations and their analysis. This approach results in the development of an awareness of personal environmental responsibilities (Martin, 1975). Thus it entails development of environmental awareness, skills, problem solving, value clarification, attitude and relating concepts to local environment and resources.

This is the first step in E.E. and is reflected in various curricula in different forms. Womersley and Stokes (1981) include awareness in objectives: 'to foster awareness of and concern about economic, social, political and ecological interdependence in urban and rural areas.' 'Keep Britain Tidy Group' has developed instructional material whose stated aim is 'connected with environmental awareness and language development.' Another similar aim is to develop empathetic relationship with various members of community and understanding their role and importance. (Rajput et al. 1980). Here the world 'community' has been used in the wider sense and includes flora and fauna. Sometimes the objective
related to environmental awareness is focused on a single issue. An example of this may be seen in the following (KBTG):

"To promote environmental awareness towards the elimination of litter and littering and to inquire into its related aspects of recycling, packaging, waste disposal and consumerism."

Here attention has been drawn to the problem of litter and littering and the instructional material has been woven around this specific theme.

E.E. is often considered as a medium for the development of information processing skills. In this case the methods of making first hand observations, recording of physical and social events, conduction of physical and social experiments and communication of results are its main characteristics (Horris and Meurig, 1972). Studies are based on child's own natural or physical surroundings and he is expected to develop skills which will help him in the study of other environments. When the objective is the development of skills, the 'how' of learning is more important that 'what' and 'how much' (NCERT, 1983 a). seen in this way skills are content free.
The difficulty with this kind of identification of skills is that they are not independent of each other and there is much of overlap. Hence they pose difficulty in evaluation. The skills can also be categorized into three groups, namely study skills, basic skills and social skills. Skills such as mapping, collecting and classifying materials, experimenting, preparing interviews and questionnaires and the reading of photographs and documents are classified as study skills. Whereas the skills required to master the study skills, for example skill of numeracy and literacy are known as basic skills. The third group of social skills which also includes attitude and respect towards environment and people is self-explanatory.

The idea behind the emphasis on the development of skills is that they are tools for any environmental study programme. They can also be considered as the processes of inquiry. Equipping children with these skills or processes may be helpful to them in their future life. It is also felt that the approach of emphasizing the development of skills is that exclusive nor that the whole curriculum should be covered in this way (Harris, 1972).

At the level of E.E., a common objective is relating
the concepts of science/biology/chemistry etc. to the environment of the child. The purpose here is to make academic education more meaningful and lasting. 'science project' aims at helping the children to learn science through first hand experience through their exposure to selected environment. 'Outdoor Biology Instructional Strategies' states (Laetsch, 1977):

'The activities introduce basic concepts of ecology in interest-catching ways. Youngsters investigate the interrelationships and interactions of plants, animals and physical environment, including the man's role in the natural scheme. Such first hand experience forms the basis for the understanding of the basic biological relationships. This understanding is necessary to develop the public consciousness required to support appropriate management of man's environment'.

The concern for the environment has emerged as a prominent social issue affecting the people of all walks of life. Singh (1984, PP. 2-4) quoted Toffler in his book, Future shock points out," changes occur in our society at a blinding rate. Polluted water, polluted air, solid waste, energy crisis radio-active debris, noise pollution improper
and over use of pesticides and fertilizers, unwise management of natural resources and unprecedented population growth have convinced that we are encountered with serious environment-crisis." Our country is no exception to these effects.

For the purpose of the study, it is necessary to examine the theoretical organisation of belief (knowledge dependency), intent (attitudes) and action (responsibility) components in order to understand general awareness among the people towards environment and its related issues.

![Diagram of Awareness](image)

Fig. 1.1 AWARENESS

Evidently, any comprehensive environment education programme, requires ascertaining self-perception of student belief (knowledge) intent (attitudes) and action (responsibility) in order to get better insight into their
specific areas and problems. Thus the present inquiry has a more meaning, which includes the investigations pertaining to all the necessary aspects mentioned above. In brief, Environmental Awareness is the impact which determines the following aspects:

1. The complex inter-relationship between man and his total human impact on environment.
2. Achievement of knowledge, abilities and skills related to solving environmental problems.
3. A personal commitment and acceptance of responsibility for population, nature, nutrition and health, Ecological balance, pollution, foresting, landusage, Environmental conservation and willingness to co-operate with others to meet the ends.
4. A concern for the quality of life with all its variety of expressions.
5. Sensitivity towards environmental problems and willingness to get involved in the national and international policies to solve the same.

2.4 ENVIRONMENT- AS A MEDIUM OF LEARNING:

It is trite to say that a primary school child has
been so much burdened with books that he has no time to enjoy the thrills of childhood. He is made to work on his books as though he were an adolescent and is forced to scamper around fun and frolic without actually participating in them. How sad his plight is still more pitiable if he studies in school. His daily schedule is very tight then. He goes to school early in the morning and returns home late in the afternoon soon after that, he hurriedly eats his victuals and goes straight to study for he has a lot of home work to finish.

At the class I to IV level children would acquire knowledge in an incidental and informal way and would be able to retain it permanently contrasted with this cramming difficult words given in the science and social studies books does not result in permanent learning. Moreover learning through environment is very enjoyable and fruitful. One other benefit that would learn many desirable attitudes and would also develop observational skills and scientific approach.

Children in class I to IV therefore should be taught only literacy and numeracy and that too for part of the school day for the rest they should be left to play or taken out an excursion to a nearby grove, cornfield, form, river or
pond and observe animals, fisher, birds, plants, flowers etc. This would not only help children study many things about their environment but would also give them an opportunity to walk in the open to breathe same salubrious air, to watch the shimmering rays of a genial sun or to hark at a kohl singing from the branch of a blooming tree. Believe me all this is learning much better and more permanent than the lessons included in the present books of science and social studies.

These observations would help children acquire knowledge according to their felt needs knowledge which would not stifle or stultify their originality as book learning most often does: Pupil while on excursion are free to dart from one object to another and examine and explore it and discuss about it. Thus excursion substitutes passive receptivity of the class-room with joyful experiential and active learning.

The teacher may also use this occasion to help children learn new words which describe man and his environment. This opportunity can also be used for teaching children literature on nature prescribed in their course.

Besides the teaching of children literature there are many other learning out comes attainable through the
exploration of environment; one very important among them is the development of the senses and sensibilities of the child. Apart from senses, children's sensibilities also develop while they observe their environment the beauty of nature. Sensibilities develop in them because the children experience the beauty of nature and not read about it within the leaden walls of a placid classroom and this experience is the backbone of their emotional development, for emotions cannot be taught like a geometrical theorem a chemical formula or any cognitive paradigm. Emotions relate to heart i.e. to feelings and therefore, the methods of developing mind cannot be applied to them. It is the method of developing heart that develop emotions and sensibilities. And when one's sensibilities have been developed one would lead a happier and contented life.

One other important objective of studying the environment is that student can learn through it a lot of Botany, Zoology, Sociology, History and Economics. There are trees of one or the other kind in energy part of our country. They may also later learn the economics significance of trees and forests in our daily life in terms of fruits, medicines, timber and other products such as rubber etc. obtained from
them. Similarly, students can learn a lot about different animals and birds.

The environment is thus used to learn 'from' and 'about' it. The concepts of established disciplines are closely related to the environmental observations. This is also known as environmental approach and also includes the development of (i) positive attitude towards environment and (ii) environmental awareness (Saxena et al. 1983). In this approach, environment serves as a laboratory and a resource centre.

2.5 AIMS; OBJECTIVES AND ATTRIBUTES OF ENVIRONMENTAL EDUCATION :-

Aims :-

The specific aims of E.E. fall into three groups (Vidart, 1978):

1. Cognitive aims: These include importing knowledge about environment and an ability to think which will enable the individual and his social group to work out political solution to the wide variety of problems connected with environment.
2. Normative aims: These relate to the inculcation of ecological awareness which will be conducive to the creation of modification of value models enabling the individual and the group to identify the factors that upset the environment equilibrium (which is nothing other than the ecological equilibrium) and protest against them.

3. Technical and applicative aims: This means planning collective practices which preserve, improve or restore the quality of life, as understood by the community in the light of formal and informal education in such a way that the demands made by economic development do not conflict with the biological rhythms of the ecosystem.

On the basis of the objectives of E.E., one can draw certain conclusions about its special features. The most important feature is that it is inter-disciplinary in nature. This is so because environmental problems and issues are not confined to the rigid boundaries of physics, chemistry, mathematics, zoology or any other established discipline but it involves an amalgamation, not even conglomeration, of many of the well known subjects. As we shall see later, this unique character creates some problems also for the
propagation of E.E..

Objectives :-

The objectives of E.E. programmes are drawn on the basis of the objectives described in Belgrade charter. In practical terms the objectives of E.E. have been stated by Stapp et al. (1970 P.80) as follows:

1. A clear understanding that man is inseparable part of a system, consisting of man, cultural and biophysical environment and the man has ability to alter the interrelation of this system.

2. A broad understanding of the biophysical environment both natural and man-made, and its role in the contemporary society.

3. A fundamental understanding of the biophysical environmental problems confronting man, how these problems can be solved and the responsibilities of the citizens and government to work towards their solution.

4. Attitude of concern for the quality of biophysical environment that will motivate citizens to participate in biophysical environment problem solving.
The objectives also vary according to the needs of the society in question. For example, the problems of developing and developed countries are different, there may be variation in objectives due to this also. In the Indian context, this may mean inclusion of (1) appreciation of many religions and develop a sense of respect for all of them. (2) appreciation of the cultural unity in the diversity of the country, and (3) to develop a sense of belongings for poor and downtrodden, among the objectives, thus development of sense of concern for the environment both physical and cultural, its problems, ability to solve those problems and ability to evaluate the environmental measures and programmes forms important part of E.E.. A probable concept map stating aims and objectives in conceptual terms is shown (Young, 1981). Here objectives have been divided into eight categories: Identification perception, Interdependence, interaction, Caring, controls, change and challenges. Each category has three levels: personal development, social relations and environmental perceptions. This 'cringe' includes 'for one' self and one's actions at personal level, 'for other's feelings. Values, actions for ones role in groups' at social level and 'for total environment and for elements in it' at perception level. Similarly other
categories of objectives have been visualized.

Attributes :

There is increasing literature on E.E. and some of it describes its characteristics. The commonly agreed characteristics are (Unesco, 1981);

1. Environmental education should be integrated into the whole system of formal education at all levels;
2. Environmental education should be interdisciplinary in nature;
3. Environmental education should adopt a holistic perspective which will examine the ecological, social, cultural and other aspects of particular problems;
4. E.E. should be centred on practical problems related to real life; and
5. E.E. should aim of building up sense of values.

2.6 ENVIRONMENTAL EDUCATION AT SECONDARY LEVEL:–

Lycille C. Gregorio, UNESCO PROAP, edited by R. C. Sharma and M. C. Tan. (1990, P. 311). The source book is an attempt to provide answers to some of the issues and constraints in implementing environmental education programme at secondary school level. It may be, used by teacher
trainers, supervisors and science teachers in preparing environmental education curricula and teacher education programmes both at pre-service and in service levels.

The book is divided into two parts: First part deals with the knowledge base, and second with pedagogical aspects. Both parts have twelve chapters each. There are four appendices showing exemplar lesson plans, sample instruments for determining environmental literacy and behaviour patterns and training tests for teachers. In developing the chapters of the source book, the following were seen as primary considerations: (1) providing knowledge to the science teachers and generating a sense of urgency in view of the growing environmental crises; (2) establishing a relationship and providing a framework between the content and teaching of science and environmental component; (3) identifying objectives for environmental education in science teaching; (4) formulating curricula and requisite skills, (5) promoting basic skills in developing problem-solving approach (6) making teacher's training effective by using pre-and post-training tests. (7) knowing and practicing teaching strategies relevant to environmental education and the basic disciplinary and (8) developing criteria for evaluation and implementation of environmental education.
The above considerations were articulated because of the constraints faced in implementing environmental education programmes. Some of these are (1) the rigidities of the formal system in the prescription of the curricula both in the school and teacher training institutions which prevent the inclusion of environmental education into the school programme's (2) the complex interdisciplinary nature of environmental education, its inclusion in various disciplines and consequent changes in teacher education programmes conflicts with the tradition bound approaches; (3) the lack of properly trained teachers to handle the environmental education programme; (4) the necessity of using a different approach in environmental education activity and field-based programme which is not considered in conformity with the usual classroom interaction and (5) the problems related to teacher training such as: (a) paucity of resource persons to conduct the training programme (b) lack of authentic updated material information regarding environment and its associated problems, (c) non-availability of tools to assess the impact of the training programmes, (d) lack of research in the field of environmental education methodologies and competencies and (e) resistance to change on the part of the teachers.
The source book on environmental education is the outcome of the Regional Training Course which was organized by UNESCO-PROAP at the institute for Science and Mathematics Education Development, University of Philippines.


The discussion in the first part of the source book are focused on the concept of environment and environmental education. Areas of environmental concern are presented e.g. hazardous products, indiscriminate use of technology, use of technology, as in the green revolution programme, destructive
fishing techniques, destruction of mangrove forests and forest resource and energy mega projects. The chapters also present the concept of ecology, the components common to the ecosystems and their structures and functions, energy flow, nitrogen cycle in the biosphere, and how human activities affect these processes and the local and global scale, the problems discussed refer to degradation of forest, water pollution, due to energy and mineral extraction, warning of the earth and ozone depletion. There is an introduction of environmental management in the context of sustainable development, as well as suggestions for environmental management and impact assessment activities.

The first part suggests educational intervention, and should be viewed in its totality to cover natural and man-made environment, ecological, political, economic, technological, social, legislative, cultural and aesthetic aspects. All the topics relate to the teaching of science at the secondary level and could relate to other subject as well, The material presented in this part could serve as important source for designing and developing curricula and formulating teacher education courses.
The pedagogical aspects comprise the following chapters: Developments in Environmental Education, framework for environmental education, planning and Developing curricula on environmental education, the role of value education in environmental education, value clarification in environmental education, ethics and social responsibility towards the environment, guide for science teachers, community based environmental education, inquiry and problem solving, Games and Simulation in environmental education; Lesson planning and Development of teaching Aids, Supervision and Monitoring of Environmental Education, - classes and Research in Environmental Education. Its implications for classroom teaching and teacher training.

Part II of the source book comprising the chapters enumerated above, provides an analysis of the developments in environmental education, outlining the general strategies. It presents a broad framework for environmental education at secondary level and suggests the various steps needed in planning and developing a curriculum. Three chapters in this part are devotes to the role of values. The assumption put forward is that value education is not just cognitive learning, but manifests through behaviour in specific
situations and extends to the home and the community. The values being promoted are social responsibility, concern for others and harmony, which could be internalized through action learning and values clarification, and used in combination with other teacher approaches. The ecological principles with major moral implications for society which are included are: interrelatedness within, nature, human as part of nature; respect for nature and responsibility for its protection; attitude of harmony and balance towards nature rather than conquest and mastery; diversity of species leading to stability; conservation; maintenance of stability and productivity of an economic system and minimizing pressures on the ecosystem. The ecological principles are universal and have bearing on social, cultural, economic and political aspects of life.

The pedagogical part of the source book provides other teaching learning suggestions on, how knowledge, skills and attitudes about and for the environment can be achieved. These are through (1) assessment of community needs/resources and identifying environmental problems. (2) relating environmental, problems with science curricula, and (3) implementing environmental activities/projects for possible solutions. Some possible teaching/ learning
Methodologies are: exposing learners to problem-solving situations using field and laboratory investigations or through educational games and simulations by manipulating a model or playing roles which assist the learners to develop an understanding of/a feeling for the reality being presented. Lesson planning and development of teaching aids for environmental oriented science classes have also been given attention, with focus on science, technology and environment. The science teacher is exposed to strategies/methods for integrating the three components in classroom lessons demonstrate that environment oriented science lessons are not difficult to prepare.

The resource also discusses assessment of student performance. Various types of assessment instruments are presented with explanations of their purpose, usability, reliability and practicability.

Research in environmental education has been suggested in order to improve the implementation of the programme, as well as to realize the implications for classroom teaching.

At the present time environmental education is not viewed as a separate discipline but an integral part of the
total school curriculum. It has been said that environmental education emerged as the outcome of a reorientation of the various disciplines and of different educational experiences. This enables the learners to achieve an integrated perception of the environment and to act towards it in a way that is more rational and attune to social realities, now and in the future.

Action points have been suggested on effective utilization of the source book in country specific situations. Some of these are (1) situational analysis of existing curricula, teacher training programmes and infrastructural facilities. (2) place of environment education in the science curricula and estimation of additional requirements and (3) needs assessment of teachers in terms of (a) scope of training, keeping in view the environmental issues of the country concerned, state of existing knowledge and skills of teachers and identification of gap areas. (b) training content in terms of knowledge, pedagogy, skills and expected change in attitudes and behaviours, (c) training methodologies and applicability to the methodologies already used, (d) training resources in terms of experts, institutions and training materials, and impact evaluation feedback and continuous efforts for improvement.
To conclude, the source book is very useful for all teachers and teacher trainers not only those in science education, but other disciplines as well, for the reason that it provides necessary knowledge and methodology in major critical areas of teaching/learning and in teacher training. It should however, be used considering examples relevant to the local situations.

2.7 TEACHER TRAINING PROGRAMME FOR E.E.

The fact that there is a need for teacher training in E.E. and E.A. has been emphasized many times (Unesco 1981; Saxena 1983 a.b.) This is due to the fact that E.E. is basically interdisciplinary and applied in nature. Dealing with interdisciplinary problems is something new and it requires different kinds to skills. Perhaps it will require a different kind of teacher training programme for the new teachers and an orientation programme for those already in service. In this type of programme, first of all a kind of sensitivity towards environment is to be aroused. Secondly, the teachers are to be exposed to the classroom. These coupled with emphasis on the use of software and hardware, are necessary elements of such a programme. It may be relevant to point out here that such programmes concern teachers of all the subjects related to basic sciences and
social sciences. The other implications are related to change of curriculum, methods of teaching and evaluation tools. With regard to curriculum it implies its development according to local environmental needs and problems. The objectives of such a training programme may be summarised as:

1. To improve upon the existing environmental awareness of the participants.
2. To provide training in identifying local environmental problems and to make their systematic study.
3. To provide in-depth training in dealing with a new environmental problem.
4. To provide training in dealing with environmental issues in the class by (i) translating the implications and (ii) developing environmental awareness.

It is suggested that an inservice E.E. programme must have the following characteristics (Mitzel, 1982):

* The programme should deal with basic science as needed but it should not be science dominated.
* It should be appropriate for teachers with a wide variety of backgrounds and interest.
* It should encourage teachers to environmentize their teaching.
It should have a strong motivational impact on the participants.

It should bring teachers into direct involvement with the particular environments under consideration.

It should make a serious effort to envisage teachers in exploring their personal assumptions, values and feelings about society and self and the relationship of these to the natural world.

Sutman (1980) propagates five principles on the basis of which teacher training programmes may be developed and organised. These are:

* Experience related to an understanding of practices that will assure better the survival of the human race and improvement of their quality of man's environment must receive high priority in all.

* Appropriate basic content from the natural and social sciences must be understood before the teacher can deal effectively with environmental concerns. This means that environmental emphasis should occur towards the end of the pre-service teacher education programme.

* The teacher education programme should include appropriate content and experiences to develop and understanding of some environmental concepts, it should
not be developed of the assumptions that all the environmental concepts have been developed earlier.

* The time of teacher education programme should be developed to a culminating experience, a pooling together of ideas and a consideration of how environmental issues can be incorporated into the school curriculum.

* It should include additional experience related to the survival of technological society and to the human race in general.

Taking these as guidelines, teacher training programme may be chalked out and implemented. Various modes of training have been used, which are (Saxena, 1983): (i) Face to face training (ii) Self-learning Modules (iii) Mass Media (iv) Correspondence Course.

It has been suggested that such programmes may be woven around some themes. Some workshops on environmental approach of teaching have been organised at Regional College of Education, (NCERT), Bhopal during last few years and by many other organisations such as SIE's. Sarla Rajput (1985) emphasizes training in some skills needed for use of environmental approach, where as Mukhopadhyay (1983) lays down a detailed criterion for choosing the effective
strategy.

The Indian Context:

It can be seen that Environmental Education, environmental studies and environmental approach all three are important but in different contexts. E.A. is important to help achieve universalization of education. It gains more importance when we encounter the physical facilities available in the schools. We are aware that majority of schools have little or no equipment available and they have to bank upon local resources and community. In such a situation E.A. is the only meaningful and sensible answer for promoting functional education. This approach is likely to succeed because the requirements of primary education are vast and E.A. does not need much additional resources for its implementation. Any approach that does not take into account the realities of the situation is not likely to succeed. The other important feature of E.A., as has been pointed out earlier, is that it can also be adopted with the existing syllabus. The only change we need for its successful use is the change in the thinking of the teacher. Once the teacher is convinced that he and his environment are the best resources at his disposal, the purpose is half served. What remains is his orientation in the skills that are employed in
Developing positive attitudes towards environment is easy at primary level as it is formative stage for the children. This can be achieved by relating concepts with environment as is done in E.A.. Trees, river, local places of historical importance can easily be related to various concepts of science and social studies. At higher level of education one tends to take more generalized view of the things.

E.E. has rapidly gained importance because of deteriorating environment including deforestation, pollution of water resources, increase of sulphur dioxide, carbon-monoxide, carbon dioxide and other harmful substances in air, decreasing layers of ozone and depletion of basic resources. In the past it was through that E.E. is relevant to the big cities only. Now it has been realized that problem of environmental pollution and depletion of resources in not limited to cities only but encompasses rural areas as well.

The only difference is in the nature of problems. The inclusion of ingredients of planning and management are important for policy makers and plan enforces, whereas the general public requires information necessary to encounter
every day problems. This kind of information shall generate environmentally literate citizenry. Perhaps as we move up in education from primary to secondary and so on, E.E. has increasing importance, whereas the importance of E.A. decreases. The other reason that limits the importance of E.E. at lower level is that it requires the application of fundamental principles of different subjects such as physics, chemistry, Biology, statistics etc. For example, impurities of water can be detected, their extent measured and impurities be removed using principles of chemistry, mathematics and Biology.

Emphasis on E.E. means tackling of the problem at various levels such as development of curriculum for colleges and universities, training of specialists, teachers and teacher educators developing non-formal adult education programmes and finding appropriate solution of environmental problems. Chiras (1982 P. 1890) deals with three models for analyzing environmental issues. These are (i) Population Resources/ Pollution (ii) cause and effect analysis and (iii) Ethical analysis. On this basis the risk of environmental issues can be assessed. It is emphasized that E.E. is not against development but for its proper management.