Location-specific Environmental Education Input for Upper Primary Schools: A study conducted in the Sreekrishnapuram area of Palakkad district

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Discussion Paper No. 73

Kerala Research Programme on Local Level Development
Centre for Development Studies
Thiruvananthapuram

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English
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First published 2004
Editorial Board: Prof. P. R. Gopinathan Nair, H. Shaji
Printed at:
Kerala Research Programme on Local Level Development
Published by:
Dr K. N. Nair, Programme Co-ordinator,
Kerala Research Programme on Local Level Development,
Centre for Development Studies,
Prasanth Nagar, Ulloor,
Thiruvananthapuram

Cover Design: Defacto Creations

ISBN No: 81-87621-76-1

Price: **Rs 40**
US$ 5

KRPLLD 2004 0500 ENG

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1. Introduction

Relevance of environmental education

Education is an essential formal ingredient in the making of a civilized society. Its role in promoting the mental and moral development of the individual has however, undergone erosion. Education has ceased to equip the individual to relate himself/herself to the world at large and to identify the crucial elements necessary for leading a worthy life. The education being imported to the child is seen to be swamped by forces of urbanization, standardization and competition. In consequence the child gets alienated from his/her surroundings, and losses knowledge-acquiring skills as well as the capacity to relate himself /herself to the society as its responsible members.

The environment and the society area in a process of continous change. Most of these processes and their consequences are so complex and subtle that they escape comprehension. It is education that should provide the young the tools needed to comprehend the processes and accommodate to the consequences. The need for a holistic view in education is obvious.

In order to make education holistic and capable of comprehensive environmental changes and their consequences, environmental values have to be incorporated into the content of the school curriculum. The past decade has seen a marked increase in public awareness about the ecological crisis arising from human ignorance about the natural world. A way out of this impasse can come only from informed and conscious action. Ecological or environmental awareness is now recognized to be an essential and fundamental component of the total education package as is reflected in the UNESCO declaration of 1990 which says: “Environmental education is fundamental to all learning providing the elementary knowledge, skills and motivation to participate in the solution and anticipation of environmental problems thus making its indispensable contribution to sustainable development and improved quality of life”.

ACKNOWLEDGEMENTS: *I wish to thank Dr K. N. Nair, Dr P. R. Gopinathan Nair, and others at KRPLLD who gave all support. The Director of INTACH, Dr S. Satish Chandran Nair together with Dr S. Santhi gave encouragement and advice. The people of Karimpuzha, the children and teachers of the schools, the officials at Karimpuzha Panchayat office, and my family and friends stood by me at all stages.*

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2 Environmental Education: a review of research

Ecological and environmental education in schools and institutes of further and higher education has gained increased importance in recent years, both as an area of study in its own right and as a component of other disciplines. There is now a requirement in many countries to include environment in both format and informal curriculum.

Ian Robottom[1] who has done extensive work in EE in the Australian perspective argues that scientific and technological emphasis on ecology has diminished our capacity to deal with them effectively. According to him the failure to understand ecological problems as essentially political issues with social consequences has resulted in a failure to provide an appropriate form of environment education. Robottom (1990)[2] describes a project in Australia in which students and teachers in seven isolated coastal schools participated in three activities, namely, inquires into:

1. quality of local fresh water
2. quality of marine environment
3. engagement in participatory educational research especially curricular changes. This Australian project demonstrates the importance of working knowledge in redefining curriculum content and the critical community based inquiries and innovations that the students themselves came up with on their own. And the role of the academy in eliciting a process of positive change in teaching methods and interaction with the students.

Monica Hale and Jackie Hardie[3] in a review of environmental education of schools of Britain emphasized the role of the education reforms ct of 1988 which stated the need to take concrete steps for t he promotion of environmental education. EE in England is now identified as cross curricular theme rather than an individual subject and attempts to include it both a starting point and a unifying element has been stressed.

Christopher Acar[4] who has done work on environmental education in Uganda states that since the mid-1980s efforts were made to monitor, mobilize and sensitize people about fundamental issues of environmental degradation. Since 1987, environmental and Health education has become a major elemental of school curricula in Uganda as directed by the National Curriculum Development Centre. Since many of the environmental problems of Uganda are a part of the child's own daily experiences, it has been seen the environmental education in the curriculum gives the children the opportunity to reflect, focus and analyze their own situation and to appreciate the natural environment and ecological condition in which they live.

Similarly, Alan R Berkowitz[5] of the Ecological Society of America has suggested that since there is no national policy or curriculum for ecology or EE in USA, the efforts made had been diffused. The National Environmental Education Act of 1991, has made attempts to initiate innovative programs. The ecological society of America and many other citizens groups are involved in the process of developing a curriculum.

Among the South East Asian countries, Mohammed Soerhani[6] of University of Indonesia, Jakarta, Masahito Yoshida[7] of the nature conservation society of Japan, have complied significant information on the role of non-governmental bodies, professional societies, student groups and teachers organizations in developing an EE for these countries.

Environmental Education in India

Though the need for EE is expressed in various policy and programme documents in India since 1960s, efforts remain scattered and uncoordinated. There is therefore a need for national action plan and framework both at formal and non-formal levels.

In the case of formal education, NCERT[8] attempted to give an environmental thrust to school education at the primary and middle levels. At the primary level (NCERT EE in School Curriculum) the concept of an integrated approach titled environmental studies has been followed. At the secondary level the NCERT favours the infusion of environmental concerns in the science subjects. Social Science and arts subjects at higher secondary levels lacks this infusion. But the Environmental Orientation to School Education Scheme (EOSE)[9] which aims to bring locale specific environmental issues within the purview of school teaching has overcome this lacunae. The EOSE scheme has also achieved some coordination between citizen groups, state education departments and schools. The Supreme Court ruling on EE in 1991[10] has initiated curricular changes to incorporate environmental concerns in to secondary school teaching.

Teacher education so vital for imparting environmental orientation is only recently being expressed. In 1988, the programme of Mass Orientation for School Teachers began as part of NCERT[11]. NCERT and UNESCO has prepared an environmental module for preschool teachers where fundamental concepts have been introduced. The work experience sessions initiated as Socially Useful Productive Work (SUPW) did not originally have environmental topics since they are not considered socially useful, productive or practical. But recently, the change of SUPW programme to work experience has also resulted in the inclusion of environmental concerns as one of the attitudes to be developed. The School Science Club Programme was given environmental orientation in the 1980s. The largest governmental attempt focusing on environmental education has been the Ministry of Environmental and Forests (MoEF), National Environmental Awareness Campaign (NEAC)[12]. The two centres of excellence conducting non-formal EE has been

(i) The Centre for Environmental Education (CEE, Ahemdabad)[13] which produces resource materials, conducts training programmes and formulates curricula.

(ii) The CPR EE Centre at Chennai producing EE material for schools especially with localized focus[13]

The National Museum of Natural History, Delhi is also producing large number of resource materials, exhibition panels and awareness programs aimed at making the public environmentally aware. National Literacy Mission of 1992 included EE and creating awareness about conservation on its agenda[14]

A large number of citizens groups are also involved in imparting environmental education in various parts of the country. The Popular Science Movement has environment as an essential component. Grass root movements like 'Chipko', 'Narmada Bachao Andolan', 'Save Silent Valley Campaign' etc have played a major role in raising basic questions relating ecology and human survival. The Ekalavya, role in raising basic questions relating ecology and human survival. The Ekalavya, a citizens group in Madhya Pradesh has been working on the local schools curriculum and significant attempts have been made to make it more sensitive to the environment. Kerala Sastra Sahitya Parishad (KSSP) using a variety of popularizing methods like dance, street plays and songs has played a major part in creating awareness about environmental issues. The WWF India [15], with its network of Nature Clubs in schools and colleges in almost every state has spearheaded the environmental education programme in India. The Society for Environmental Education in Kerala (SEEK) Kerala, has been pivotal in training and orienting youngsters by conducting field camps, lecturers and publishing a magazine'Soochimukhi' for the past 25 years. The INTACH Southern Regional Office for Environmental Education and Research, Trivandrum has been coordinating and conducting nature orientation camps, discussions on lifestyle philosophy for students and interested groups since 1990. The 'Kapavriksh' and environmental group in New Delhi has produced EE Manuel for school teachers (under EOSE scheme) both for Andaman & Nicobar Islands[16] and Lakshdweep [17]. About 16 groups working in various parts of the country has prepared a syllabus for EE based on local environmental conditions and curriculum[18].

3. Area of Study

The area selected for this study, Sri Krishnapuram and its neighborhood in Palakkad district is skirted by the Karimpuzha river. This mountain-locked area lies in isolation from the neighbouring countryside almost like an island and had lush green paddy fields, richly cultivated farmsteads, however, it has experienced over the past few years excessively intense landuse. Although compared with many other parts of rural Kerala, Sri Krishnapuram remains environmentally less devastated, less urbanized and less polluted, the overall destructive trends has begun here also. The loss of the vegetation cover the disappearance of paddy fields, the rapid expansion of rubber cultivation, the increasing practice of monoculture in the farmsteads, the process of extinction of local cultivars have all set in. Widespread quarrying for granite as well as for laterite blocks, erosion of land and formation of gullies have changed the topography of the area. The depletion of water resources is reflected most in the falling of groundwater levels in the dug-wells and the bore-wells. As old ponds, including temple ponds are filled in and as more springs dry up, loss of vegetation cover and destruction due to laterisation follow curtailing ground water recharge. The river has also undergone notable changes during the past few years. The natural riparian vegetation has, to a large extent, disappeared. The resultant erosion of river banks is sought to be arrested by granite retaining walls which have only exacerbated the problem. Sand-burrowing from the river beds is wide spread. This is the scenario into which an essential awareness component has been sought to be introduced.

Srikrishnapuram NES Block comprising seven village panchayats. The Kunthipuzha, a tributary of Bharathapuzha, flows through five of these panchayats and is known also as Thuthapuzha in some places. The panchayats of Srikrishnapuram and Karimpuzha have plateaus, valleys and plains.

Physical Features: The Karimpuzha village is situated at a distance of 30kms from Palakakd town in Mannarghat taluk, Palakkad district. The lowest administrative unit, the Karimpuzha Panchayat is constituted by Karimpuzha I and Karimpuzha II villages. The village is surrounded in the north west by Thatchanattukara, Northeast by Kuappadam and by the Karimpuzha river on the south and the east. (Refer Map 1). Karmipuzha village with a total area of 47.39 sq.km. has a population of 26,104 persons. Srikrishnapuram is approximately 15 kms southwest of Mannarghat along the Mannarghat-Ottappalam road and 20 kms north east of Attappady. Srikrishnapuram area spreads over 29.5 sq.km and has a population of 17,476 persons (Appendix 2, Table 1).

The major part of Karimpuzha village lies at an elevation between 60 to 100 metres above MSL and the rest is valley region. (Refer Map 2). Elevation and slope are the highest at atassery and Panamkunnu. Pothuvathamala has the highest elevation in this region with the peak at 138 metres above MSL. Ridge crest, side slope, foot slope, river terrace and valley are the land forms seen in this area. The plain areas of Kulikiliyad, Kottapuram and Kunnakkad have laterite soil.

Srikrishnapuram is located close to the northwestern edge of the Palakkad gap. Thuppandad

puzha flowing from the southeast joins Kanjirapuzha from the east before it joins the Nellipuzha (in the Kunthi river) flowing from the north. This forms the Karimpuzha or Thutha puzha, which later becomes the Pulenthode River. The main river, Bharatha puzha, flows to the south of this area. Sri Krishnapuram and its vicinity is roughly at 80 metres above MSL and the land gently slopes towards the west. There are a series of low east-west discontinous hillocks radiating from the main Ghats and ending at Bharathapuzha. The highest of these hillocks is to the southwest of Srikrishnapuram appearing as a steep rocky ridge, (393 meters) called Ananganmala. Between these rocky spurs there are lateritic flat-topped hillocks with valleys cut by five rivers and many small streams. Till the early 1970s the higher ridges were all forests and were owned by landlords. After the Nationalization of the Private Forests in 1971, most of the forest cover has been destroyed. Many of them remain as denuded rocky outcrops and some have been converted into rubber plantations. There are no reserved forests within this area. The Silent Valley National Park is the nearest large forest tract.

History and Culture

The much-lauded Valluvanad culture is evident in all the Panchayats of Sri Krishnapuram Block. The area is famous for its close association with Kathakali and is home to a number of artists, poets and other literary figures. The temple arts, which are a part of the Valluvanad cultural heritage, also find patronage in the innumerable temples in the area. The Parianampatta temple festival and the Sri Rama Swamy temple festival are just a few examples. Thira, Pootham and other ritual arts along with Pulluvan Pattu, Nanduruni Pattu and Pambin Thullal are exclusive to Valluvanad culture. Sepulchre urns found in some parts of Karimpuzha village testify for the human habitation of the area from ancient times.

Karimpuzha village was the cultural epicenter of erstwhile Valluvanad Taluk. This area has also stood witness to a number of historical events. The Nedumkanad Nairs who ruled over this area had their headquarters in Karimpuzha. This was conquered by Valluvanad and then by Mysore Sultan's and in 1792 by the British who annexed it with South Malabar. The second Zamorin – Eralpad – had his headquarters at Karimpuzha. The palace of the Eralpad near the famous Sri Rama Swamy temple stands in a state of neglect and dilapidation on the banks of Karimpuzha River.

The Kongasseri family, the successors of which are still part of active social life of the area were famous as Adhikaris. Sri Vayalasseri Govinda Menon, an Adhikari almost 100 years ago, took the initiative to plant trees along the Karimpuzha – Aryanbavu Road. The trees (mostly indigenous Mango varieties) still remain as testimony to the long term vision of the Adhikari. Thalavettukulam of Karimpuzha believed that ancient rulers used to behead law breakers.

This area has contributed many freedom fighters. During the 1820s Unni Moosa of Elumbasseri was shot dead by British. This rebel was given refuge in a Nair tharavad and this place is even now witness to a unique function at which both Muslim and Nair communities pay homage to Unni Moosa. In 1922, Elumbalasseri Kochunni Nair attended the Swaraj Flag Congress Conference at Nagpur. During the 1930s, local struggles and peoples organizations formed for fighting against the British rule were brutally suppressed and many

suffered in the hands of the police. During the 1940s, Karimpuzha witnessed numerous social movements – the movement which made the temple entry declaration, the Karshaka Movement, are a few of them.

Land Use

The study area has the typical Valluvanad landuse pattern. The flood plains of the rivers and the broad valleys of the hillocks formed paddy fields; the higher reaches of the hillocks were secondary forests used for grazing, fuel collection and which contained a variety of rich bio-resources and the lower hill slopes were under sable farmstead agriculture. Though the area receives more than three thousand millimeters of rain, water scarcity is experienced in the higher hillocks during the peak days of summer. This traditional agricultural area has a wide spectrum crops excepting a few plantation crop like tea and cardamom. The area had a large number of traditional Namboothiri houses called *illams* which owned extensive landholdings around their homesteads. These areas used to have exceptional bio-diversity of both the wild varieties as well as of the cultivars. Land reforms and the social and cultural changes which follows in this agrarian society have led to large-scale immigration of people from the southern districts of Kerala and to radical changes in landuse patterns. Karimpuzha area with more than 925 hectares under rubber the highest for any panchayat in the Ottappalam Taluk. The displacement of coconut, banana, tapioca, vegetables, cashew, and even arecanut by rubber has been quite extensive; (see Map 3, Appendix II, Table 2).

To the east of Sri Krishnapuram practically all the forests along the Ghat slopes have been destroyed drastically since 1971 causing changes in the volume of water flow along the stream at Thuppanad, Kanjirapuzha and Nellipuzha. The dam at Kanjirapuzha has reduced the flow further. Except in the case of Kunthi, all rivulets including Karimpuzha and the main Bharathappuzha are filled by slit and sediments, with the flow having been reduced to extremely poor levels. Although the main Kanjirapuzha canal passes through this area it has not significantly contributed to the water supply to cultivation in this area. Water scarcity is becoming a problem in most parts. The streams of Cherpuzha and Valiapuzha flow through Karimpuzha and Cherupuzha and Karimpuzha flow through Srikrishnapuram.

Educational Status

The SriKrishnapuram area had several old institutions, which played an important role in the propagation of knowledge and culture. The foremost among them were the *Ezhuthupallis* under the *Ezhuthachhans* who taught the simple lesions in all subjects. The Kalaris and the Vedic schools were places where a variety of knowledge systems was imparted to the community.

Under the initiative of the Madras and the Cochin Governments, several educational institutions of the modern type were started in this area. The Madras Local Bodies Act (1834) and the Elementary Education Act aided the establishment of new educational institutes. The social movements and reforms which came in association with the freedom movement saw the opening of educational facilities for all sections of the society. The Malabar district board under the presidentship of Sri. P T Bhaskara Panicker succeeded in raising the

educational status of the area. The contribution of Karimpuzha Ramakrishnan, Variyathodoi Raman Nair and Nalloor Gopala Menon to the education of the area are significant (Appendix II, Table 4).

Livelihood

The Karimpuzha panchayat is a self-sufficient, self-sustaining village in transition. A large number of small industrial units supply a variety products which have daily demand at the local level. The traditional crafts of the area such as handloom, mat-making and pottery had been brought and encouraged by the erstwhile rulers. The brass Karimpuzha Chellam and the Thottara knife which were once in great demand have however lost their market; yet bear testimony to the skills and craftsmanship of this area. The important traditional activities of the area, other than agriculture, are sketched out below.

Karimpuzha and Handloom

Karimpuzha Handloom is produced exclusively by weavers from Karnataka who had come to this area, two to three generation ago. There are two co-operative Societies functioning at Karimpuzha and Kottappuram which employ only 37 persons; but there are about a hundred families in the Karimpuzha *Kaithari theruvu* (handloom street) who are involved in the process.

Mat-making

The traditional mat-makers of Attassery utilize organic materials at all stages of the work. The reed-like sedge-grass growing on the banks of the river, the fibres of Pendanus and the dye made from Terminalia chebula seeds to into the production of these highly durable mats. The Attassery cooperative society established to revive mat-making in 1985 lies defunct. There are about ten families at Attassery who are skilled in this craft and produce mats, on order. The influx of plastic mats and mats of low quality imported from Tamil Nadu have displaced the Attassery mats even from the local market.

Khadi

The Khadi unit functioning at Kottappuram with the help of Kozhikode Sarvodaya Sangh is in a state of winding up. The Khadi distribution unit at Attassery employs only 15 persons; the Chandappura Khadi is also in a shambles. The lack of public demand and the failure of awareness creation is seen as major deterrents to the growth of this activity.

Pottery

There are only a few families in this area who are still involved in this occupation. There is a community of potters at Ambalappara, outside the study area, who are still active, but within the study area, only 20 persons have retained the skills. The influx of aluminum vessels and plastics has displaced mudpots from all the houses in the locality.

Fishing

The river Karimpuzha at its various locations is a source of a variety of fishes, which are used for household consumption. The traditional river fishers' families at Karuppamanna near Attassery also make their own fishing nets. But the unscrupulous practices of outsiders such as the use of explosives and poison for killing fishes are causing damage not only to the ecosystem but to the very resource base itself.

Relevance of the Work in Terms of Curriculum

An attempt was made at the outset itself to assess the actual role the outcome of this project would have in terms of the objectives of the curriculum. The national policy of education 1986 had attempted, in the context of evolving a new curriculum to introduce textbooks which are student-based, activity-oriented and related to the environment. Environmental conservation is considered one of the major values to be included in the child through the education system. The teachers are expected to evolve activities based on the local situation to help overcome shortfalls in the available facilities in the schools concerned. Most of such activities should involve location-specific exercises for the conduct of which basic knowledge about the area on the part of the teacher of the instructor. The question to be addressed at this juncture is the extent to which the teacher is able to cope with this demand and the types and the numbers of such exercises actually undertaken. During the course of this work, it was understood that the major deterrent to the carrying out of such exercises is lack of time, lack of initiative from the part of the teachers and lack of resource materials. Given the first two factors can be mitigated, with proper rescheduling and disciplining, there is an urgent need for supplying the required resource materials to the teachers to enable them to cope with the changing curricular requirements.

Attempts had been made in 1994-1995 by INTACH in association with a localized initiative called *Jaiva Gama* to evolve an environmental education module for children of the SriKrishnapuram area. A partial realization of an effective method of making teaching interesting and location-specific was initiated but it could not be continued. Other groups like *Haritha Nature Club* of VTB College, SriKrishnapuram, Daarsana College, Kottappuram, and Helen Keller School for the Blind, Thottara were all involved in this venture. The discussions and activities centered on evolving a sound environmentally sustainable and self-sustaining basis for the community; farmers, panchayat members, students, youth groups and women were part of this initiative. It was in continuation of this effort that the present exercise to evolve a environmental education component for a selected section of the community – teachers and students was thought of. The thought was triggered also by the fact that the remaining potential wealth of the area remains to be documented and no organized effort at protection was in place.

4. Evolving A Location-Specific Conservation-Education Programme

Preparatory Phase

During this phase (March-May 1998), a reconnaissance survey of the study area was done. The Upper Primary Schools in which the study would be conducted, were selected during this period. Consultation were held with the educational authorities concerned for initiating the process of interaction with the teachers. A detailed survey of the topography of the area with special emphasis on ecological peculiarities was conducted. An assessment of the availability of water and its importance as a limiting factor in the area was also done during the summer months of March to May. The laterisation of the introduction of monoculture of rubber on plantation scale, drying of wells, the growing menance of and quarrying on the river, the reclamation of paddy fields for other uses and the loss of bio-diversity etc were photo-documented. The rich cultural, social and architectural diversity of the area was also recorded. These slides would serve as immediate learning aids in the next phase where a detailed and specific analysis of the situation in the area will be done. In order to get a sample which would justify the objectives of the study, the survey was made as exhaustive as possible.

Selection of Schools and Students

The schools were selected in such a way as to cover students coming from all areas of SriKrishnapuram. Four upper primary schools namely, SriKrishnapuram, Karimpuzha and Kulukiliyad and the U P section of SriKrishnapuram HS expressed willingness to participate in the programme. In the SriKrishnapuram UP school, the head of the institution emphasized the need to include all the students of class V, VI, VII in the programme since the strength of students in each class was quite small and manageable and a selection from among them would create problems. A total of 195 students (95 girls and 100 boys) have been involved till now. In Karimpuzha UP, a selection of 50 students (27 girls and 23 boys) was made with the help of the Head of the institution and the Science teacher. A formal science Club was started under the initiative of this study. In Kulukiliyad UP school, a selection of 75 students (40 girls and 35 boys) from the three classes was made with the support of the concerned Science teachers and other members of the teaching staff. This group has been functioning in the school as a Science Club. The UP section of the SriKrishapuram HS in which each class has more than three divisions, selection was difficult. Fifty students were selected from each class. In the two schools from which selection was made with the help of teachers, an evaluation of the students' aptitude to the environment was made using a set of informal questions (See Appendix IV). The answers received indicated a high degree of awareness and sensitivity to local environmental features among the students. In the other schools too, this method was tried out but it was not used as the sole criterion for the selection process.

Classes, field work and discussions about curriculum

The study began with detailed discussions with the heads and the teachers in the selected school and other knowledgeable members of the community about the need to link class

rooms to their immediate environment. Attempts were made with the help of the teachers especially science teachers, to link the basic concepts to be introduced during the first three months to the syllabus. The introductory class conducted in the month of June in all the four schools was attended by teachers also. The need to be aware of one's own surroundings and to develop a positive attitude to nature was stressed upon.

The concepts of interrelationships and interdependence on the basic percepts of ecological science, were related in the form of stories. This method evoked immediate positive response from the students; an exercise in composition was then tried out – the students wrote their own interpretations about the stories and the qualitative effect they had on them. The concept of environment was elaborated upon stressing on the commonly made mistakes.

The children gave their own analysis of environment; all the groups showed tendency to see human beings as distinctly different from the rest of the living world, not at all linked to the environment and other life forms. The subsequent classes started with a simple yet effective expansion of the term 'ECOLOGY'. Each letter was expanded to an appropriate term in the environmental science (for example, E for Earth, C for Clean, etc). Each of these concepts was then linked to the various topics in the syllabus of the three classes, V, VI and VII.

Routine classes for the groups in the four schools were conducted every month. The students were taken step-wise through the different concepts of ECOLOGY. Aids like books, posters and slides were used to substantiate the concepts introduced stories and songs relevant to the idea were collected and presented to the groups with suitable interpretations and analyses. Each class was also reinforced by reference to curricular links. The most satisfying experience during this period was the fact that the children were able to identify, relate to and link the abstract concepts to their immediate surroundings, on their own.

The last class held during the month of February, 1999 focused on winding up the evolution of the concepts of ECOLOGY emphasizing on You (Human Beings) and your role in the ecosystem. A qualitative analysis of the power of comprehension of the student groups was done through questions and writing exercises and pictures.

Curricular links

As work progressed, it became increasingly necessary to relate the broad concepts introduced to the immediate knowledge base of the child. An exhaustive analysis of the text books, especially those on Science and Social Studies was done. In standards V and VI, chapters on Kerala and India in the textbooks on Social Studies could be directly related to the immediate environment of the student. Issues of immediate relevance of Srikrishnapuram (Standard VI section in Social Studies textbook on soil) were highlighted and utilized to impart understanding about basic concepts. Similarly in standard VII (Science chapter on Agriculture) concepts represented in the text could be linked to crop diversity, agricultural practices and farming in the study area.

The concerned Science language teachers of each school attended the classes regularly and informal discussions with them about the need for a curricular link between the text and the

environment revealed that the teachers were aware of and willing to follow a method to establish such links if only the required guidelines were available. It was therefore decided that a manual should be prepared and that it should focus on the major topics in the science and the social studies syllabi, with emphasis on examples from SriKrishnapuram.

Field Work

The teachers, especially those dealing with Science and social studies, expressed their wish to carry on with the practical experiments in the field which would sustain the interest of the student. Therefore, four exercises were planned which would lead to development of skills, observation, recording, reporting, analyzing and relating among students. An expected outcome of this exercise was a detailed inventory of the floral and cultivar diversity of the area, a rough resource map and a qualitative list of agricultural patterns and land use changes.

Specific experiments were designed and monthly assignments were given for the groups. In deference to demands made by teachers to aid in understanding the nature of soils (Standard V, General Science), a simple exercise was conducted in association with selected students in a few areas. (Sacred Grove River Bank, Homestead Garden, Rubber Plantation and Waste Land) for gaining a qualitative understanding of different soils. The observations were recorded and the students themselves were involved in cultivar diversity were also done. The regular reports that the students submitted gave valuable insights into resources, awareness trends and sensitivity. The need to have detailed field trips was highlighted both from our part and from the part of the students. A short trip to the river with the students of Karimpuzha School proved highly productive. It was not possible to organize field trips in other schools due to lack of time. But after discussion with the teachers it was agreed that the annual excursion for Science Club members for the next academic year would be organized to the adjacent Silent Valley National Park with the help of our team. The relevance of having study tours to places of social and cultural significance such as the Karimpuzha Handloom village, the Attassery mat-making community and the Ambalappara Potters community was stressed upon.

Draft Inventory

Utilizing the data collected during preparatory phase and collating the information collected by students and our own observations, a listing of flora, fauna and cultivar diversity has been prepared. A rough assessment of resources and their uses has also been made. The draft inventory would be substantial by exhaustive reports on key issues of the study area. A study on traditional practices and ethnic crafts of the area (handloom, mat weaving, and pottery) would bring out the links that the local community has with the available resources and the ways in which the skills evolved over time are utilized.

The month of May 1999 was utilized to understand lacunae in our knowledge of the area. Exercises in mapping were tried out with the help of Geographers; a rough assessment of the understanding of various activities on the part of children was also made. A list of senior citizens of the area was prepared on the basis of which a dialogue with them about the historical and cultural significance of SriKrishnapuram was initiated. The land-use pattern

changes in the area were also assessed with the help of contacts made through students and the list of farmers, which had been prepared.

Networking

Contacts were made with elders of the community and discussions about education, agriculture and other traditional life styles were made. Panchayat members were informed about this research project on the need for location-specific inputs in the educational curriculum of the area. The parent-teacher associations of each school were contacted and their response to the work were positive.

Under the initiative of some members of the Science Club of Karimpuzha UP School, a group of children was organized in their own neighbourhood. This group met regularly and held discussions on various ideas for evolving a specific activity schedule. The local Balajana Sakhyam Unit kept on their monthly interactions with the project team since January 1999. In April, an anti-plastic campaign in their unit was conducted with the help of posters and the children initiated a programme based in their own homes. In May, the Balajana sakhyam group started a movement to save the indigenous plant saplings of the area. They also started a nursery of their own and exchanged saplings with other student groups.

Vacation Classes

The interest and enthusiasm of the students made the implementation of the programme worthwhile and rewarding. The first half of April was decided as the period for conducting classes in the schools, on ecology and environment. Two classes were conducted in each school. Since the teachers agreed to attend the classes an informal workshop for teachers in Environmental Education was included. Classes were conducted with the active participation of INTACH and Nature Club Council, local and specific issues on an inter-related basis. The last class for the groups included a question-answer session which served also as a evaluation of the programme. The responses of students gave an idea about their attitudes, priorities, knowledge and capacity to relate general concepts and information with their own milieu. Certificates were distributed at the end of the session with the headmasters of the school presiding.

5. Children's Attitude to Environment: An assessment

The general aptitude of the students and their intelligence and alertness were assessed by employing a set of methods. The assessment was done at four levels and step-wise. Since each class centered on a specific concept in ecology (eg: E for Earth or C for Clean etc), it was possible to start from the obvious and develop an abstract concept. The writing and the comprehension capacity of the students was evaluated after each class. This was done along with an assessment of their observation skills in the field exercises assigned to them.

Words and Concepts

The students showed willingness to absorb an abstract concept presented using a letter and a word. The best example in this study is the introduction of the word ecology. Since it was not possible to translate this word into Malayalam, it was presented as such to enable the expansion and succeeding analysis of concepts. Though the word was of the English language and unknown to the student group, it did not deter their eagerness and inhibit their capacity to internalize this idea. A worthwhile and enlightening exercise employed in this context given to the students was an opportunity to spell the word – in most cases except for using K instead of C, the spelling was correct. (Note that the derivation of the word ECOLOGY is from the Greek term OIKOS spelt with a K). Having given them the spelling, the next stage was to link each letter to a larger concept. At each stage, the process of introducing, familiarizing and then elaborating the idea was done. At the evaluation done at the end of the study (in April 1999) it was found that the students had imbibed the idea and did not require further reinforcing for them to remember and recapitulate the ideas and the concept.

Local Ecology

This exercise done at he outset (See Appendix IV, questionnaire) gave an idea of how and where to start the process of communication. Though the students expressed a high level of qualitative understanding about their immediate environment, there were lacunae in their understanding of measurements, distances and directions. The oral and informal analysis of awareness which was continuing during the study period also provided valuable insights into local ecology. The list of cultivars (rice diversity), birds and floral diversity of the locality was the direct result of this exercise. It was during these exercises that a clear difference in the capacity of children to respond to questions on their immediate surroundings was observed. A cursory attempt to understand the basis of such differences revealed that they arose from the household structure and the occupational status of the parents. This project period was too short to allow a detailed inquiry into these aspects.

Composition

After each class an exercise in writing about the topic dealt with was given. The compositions were centered mainly around the stories narrated to them to highlight a particular concept or idea. The students were required to interpret stories with an ecological message which had been narrated to them in the classes such as the 'Giving Tree', 'The Jumping Mouse', 'Hermit

and the Rose', 'Dinosaurs and other Rubbish'. Classic incidents or events which have both global and local consequences like 'Minnemata', 'Love Canal', 'Hiroshima', 'Bhopal', and 'Mavoor' were also included in the classes to convert particular messages. Issues which carry a positive message in spreading environmental awareness like the 'Chipko movement and the 'Silent Valley agitation were discussed.

Exercises

The students were given specific exercise during the course of the interaction. Such exercises were used to facilitate a four-fold understanding of the potential of the children. To begin with, information regarding a particular topic was given to the group, in detail. Examples from local and global scenarios were given in support. The interest of the students to the particular topic was sustained by referring back and relating to their own classes and immediate environment. It was only after creating a suitable atmosphere that exercises were given to them. The exercises were designed and handouts were prepared such a way as to awaken and sustain their interest and to make collection of information effortless. This process was made much easier by the fact that most of the General science and Social Studies text books had exercises for students at the end of each chapter. The skill of the child to carryout location-specific exercise was assessed at four levels – observation, identification, noting and analyzing. Since most of the assessment was done over a period of time (one to three months), the student became capable of monitoring his/her own environment and relate if effectively to a broader concept. For example, after the concept of clean was introduced, an exercise to look into one's own life from the start of a day, to make a list of articles being used and to classify them as artificial and organic, was given Exhaustive and elaborately classified lists were prepared by the students and submitted for evaluation at the end of the session.

Excerpts from the Exercises

During the interactions with the student groups (aged 10-13) made over a period of 8 months, the ways in which children perceive their visual and symbolic environment were deeply explored. Their understanding and analysis of their surroundings start much earlier than they join school; by the time some formal perception is imposed on them by teachers, they would had years of experience in intuitively assessing the place they live in and its relation to their own lives. From the study it became obvious that young children do not react to or imbibe their circumstances merely in a passive way. They bring intelligence and intuition into the interpretation of and communication with, what they perceive. Children also show tremendous potential to combine what they observed for themselves to what is presented to them by other as information. These responses from students and the general observations made by the research team, were checked and verified by posing different questions to the children.

As the term ecology was elaborated information regarding its derivation from the Greek word was explained and its meaning was given based on standard definitions on environment given in the school text books, it became increasingly necessary to relate abstract concepts as interrelatedness to the child's milieu. The question on what is environment was dealt with definitions on environment given in the school textbooks, it became increasingly necessary

to relate abstract concepts as interrelatedness to the child's milieu. The question on what is environment was dealt with by the students in a variety of ways – scientific, aesthetic or a combination of both. Each of these was linked to the subjective temperament of each child.

A quick appraisal of some of the response by children in their own words would reveal their thought processes more clearly. Those who defined environment in purely aesthetic terms conveyed a deeper sensitivity and ability to perceive concepts based on their own observations. Some of the definitions of the term environment given by the respondent children are given below.

'*An area which sparkles with pure air, water and the right amount of heat and cold is what I call my environment*', - a ten year old.

'*An area which is full of trees, rivers, streams, living things, small plants and flowers…*' – a twelve year old.

'*Lots of forests with lots of trees*
Lots of trees with lots of birds
The murmur of a river
And the fruits of the season – jack and mango
For us children' – a ten year old.

In sharp contrast to the above, highly scientific definition expressed in the form of a unique combination of three distinct concepts was given by a twelve-year old child.

"*Environment is the ecosystem with the 'nature' where life survives*.'

A ten-year old child defined it thus: '*the Environment is a space than an organism requires to survive combining living and non-living elements'*.

Here we find and effective blending of the aesthetic and the scientific.

The following definitions were also given by children:

'*The magnificent area which is created all around by the living and non-living elements'* (a ten year old).

'*Environment is that in which a variety of living and non-living factors combine and live in peace and harmony'* (a twelve year old).

A few of students have attempted to define environment linking it to the concept of GAIA.

According to a twelve-year-old child, '*Environment is the originator of life*.'

The key concept in defining environment and the most crucial element which determines the formation of a clear image is that of interrelatedness and interdependence. This is often left

out in the definitions supplied by children and the school textbook definitions invariably ignore this idea. However, a few of the students had taken note of it whom they defined environment as '*an effective mingling, an interrelation between living and non-living*'. This particular definition was a child of ten years of age.

"*The relationship that exists between a living thing and its surroundings'* was the definition given by a thirteen year old.

According to a twelve-year-old child, environment implied '*The bonding of living and non-living to form a community*'.

An attempt was made to assess these differences in perceptions within the same group and the recurrence of this unintentional exclusion of the concept of interrelatedness from the definitions. It could be understood that in SriKrishnapuram where primary relationship between people and the environment still exist, children find it incongruous to state the obvious. A similar kind of exercise done in an urban milieu revealed that children stress on this concept more so because of the lack of such lively inter-relationship. The children of SriKrishnapuram seemed reluctant to talk or express their view about their deep and subtle feeling for nature which was so much a part of them. Table 5.1 indicates the children perceptions classified according to their quality.

Table 5.1. Types of Definitions of Environment Given by School Children

Quality of the Definition	**Percent Responses**
Aesthetic	28
Scientific	44
Aesthetic and Scientific	23
Mentioned interrelationship	5

The definitions given in the text book often determine the thought process of the child. It becomes very difficult for an educator trying to work within the system to make children think for themselves. In this particular case it tool more than the expected time for the group to come out of the constraint and start voicing opinions and observations of their own.

To the question pm "Why should we conserve nature' there were obvious and clear-cut distinctions in attitudes reflected in their responses. There were children who felt that nature should be conserved for the benefit of all mankind.

'*Human beings are dependent on nature. So we should not destroy it'* was the response of a ten year old child.

'*Destruction of nature will result in our destruction*.' A twelve year olds child equipped.

According to a child of thirteen years of age, '*Nature which gives us food, water and life has to be protected*.'

The fact that it is the responsibility of the human beings as an intelligent inhabitant to protect nature was stated emphatically only by one student. The majority of the students felt that nature should be conserved for all living things. For many, nature implied forests and rivers. It is the pristine quality of all these that the children prioritized as most important to preserve.

'*It is nature which has made life possible. It is not only the human beings who have a place on earth.*' was the sagacious observation of a thirteen-year old child.

Some children added emphatically an ethical dimension to the whole idea of conservation.

'*We have no right to destroy nature.*'
'*We are only a part of the innumerable inhabitants on earth.*'
'*We should learn to take only what is necessary.*' These remarks came from ten-year old children.

The concept of preserving nature for all the benefits that it gives not only to us but to all of life was also expressed.

'*Nature is home to a lot of creatures. It gives water, air and food for all'* was the shrewd remark of an eleven year old child.

'Nature gives pure air and water for all life forms.' – a 12-year-old observed.

Table 5.2 given below illustrate the responses of the students.

Table 5.2 Types of Definitions of the Role of Nature Given by Schoolchildren

Quality/content	**Percentage of students**
For us Human beings	34
For life on earth	50
For benefits – water, air and food	16

Children also demonstrated repeatedly their capacity to judge and take a stance on a wide variety of topics. Their understanding of the relationship between people and the environmental conditions in which they live and their perceptions of the contrasts between different situations are tremendous. The exercise in which they were asked about choosing a particular lifestyles given a choice showed how they interpreted environment in its relation to their own future.

The contrasting situations concepts discussed under the topic YOU and in relation the question as to how to foresee the future of human beings, brought out many important dimensions. Three lifestyles, ways of life were put before them – *adivasi*, villager and urbanite – without showing bias towards or against any of them, but explaining to them about ecological consequences of each.

The majority of children chose the *adivasi* life as the best, giving an array of reasons for the choice.

'*I live the adivasi life because it allows me to love nature and live in peace*.' Was the views expressed by a twelve year old child.

'*The adivasi life is natural and therefore healthier*.' An eleven-year-old child observed.

'*The love that human beings develop towards earth is necessary for our survival. The adivasi way alone allows this.*' Was the wisecrack of another twelve-year old child.

Those students who chose the life of a villager did not romanticize nature as idyllic but stressed upon several positive aspects.

'*Since the modern trend towards destruction cannot continue indefinitely, the only space in which human beings can live doing the least harm to nature is villages'*, a eleven year old child observed.

Another child, a thirteen-year-old, thought that '*The village along gives you the chance to be a part of nature, depending on it, yet keeping distant from it.*'

'*I want to wake up each morning hearing bird songs. I want the cooling presence of the natural world around me. I know money and wealth will bring more disquiet*.' This was the remark made by another child of fourteen years.

The child of SriKrishnapuram and Karimpuzha villages who enjoyed all the benefits of a secure, self-sufficient village were witness to the influx of urban influences and rapidly undermining the age-old value systems. The inevitability of this transition was evident in many of their remarks and writings but they admitted that, given a choice, they would not opt for an urban life. The major deterrent is the inherent tension, speed and self-centredness they identified as hallmarks of urban life.

'People who live in cities do so for 'style.' there is no love there.' – a ten year old child presaged.

'What fun is there in bathing in a tiled bathroom? Most often you fall and break your bones. I would never give up bathing in the river swimming with my friends every morning for a life of comfort.' A twelve-year old child declared.

Children were also aware of the craving acquisition of wealth and selfishness and private interests that go with it, that are the characteristic of the modern times; and they are vary of the insecurity and danger that ensure. Though they admitted that cities are glamorous places and that they contain a lot of interesting things, they lacked space; the children were frightened of the jostle and the din and bustle of city life. In fact, none of the children in the group chose the urban way. There were also few among them who felt that a way of the life had to be

evolved which would be in harmony with nature; but they could not spell out what that should be.

Table 5.3 Distribution of Children by the Way of Life Preferred

Life Style	Percentage of Children
Adivasi	56
Village	33
In harmony with nature	12
Urban	0

Another important analysis of attitudes was made possible by a question posed to them in which they were asked to state their opinion about a wrong thing which they witnessed being done by everyone, to the environment.

The major threat to environment that the children perceive is plastics. The accumulation of huge quantities of plastic wastes in school campuses, roadsides and paddy fields in the area must have triggered their concern. The destruction of vegetation and the harm done to life forms (butterflies, birds, flowers and elephants) were also considered major social evils. The urban way of wasting resources – water, paper and electricity – was also pointed out by the children. Throwing waste into the river was seen by some of them as wrong, a practice which had to be corrected immediately.

Table 5.4 Major Threats to Environment as Perceived by Students

Issue	Percentage of Students
Destruction of plant	22
Use of Plastics	34
Destruction of life forms	22
Wastage of resources	16
Polluting the river	6

In the next session, children were asked to note down activities which considered right to protect the environment. Two ideas came up, but each in sharp contrast to the other. The major way in which they felt they could contribute to conservation was reportedly by planting trees. The next step in the solution was to acquire knowledge and start concentization of their families, community and village about the importance of protecting environment. The local Balajanasakhyam in the group activities may be seen as the outcome of this view.

In sharp contrast was the result of the questions posed to the students for which they had to answers in the form of handouts. On observing a tree and listing the amount of waste it generated, the child took time to observe, think, analyse and respond. In the first exercise ‘CAN YOU MAKE A TREE YOUR FRIEND?,” detailed descriptions of each tree or plant with systematic observations in a sequence were submitted by the children. The children were given the freedom to choose their own plants. Though the question was to make a tree a friend, many of them did not choose huge trees but only small shrubs eg: Hibiscus, Bauhinia) or even a herb (eg: Rose, Thulasi). The maximum number of choices were of the coconut

tree. This was followed closely by the mango tree – the variety of mango trees found in the area, whether planted along the road side by the *Adhikari* (Village Officer) a 100 years ago or those remaining in the homesteads not yet converted to rubber. The next in the lost were the Jack, the Neem and the Lime trees, in that order. Some of the observations were supported by detailed descriptions about the feelings that made them friends with the plants and trees such as the ones given below:

> '*Naming this plant on my own as the bush, I watched the dew-drops filling in its tender leaves and marvelled at the beauty. There are so many flowers in it now*.' (an eleven years old child)

The twelve-year-old child who had watched t he Balsam gave a chronological chart of the plant growth which showed details of branches, leaves, flowers and seeds.

'The leaves of the lime tree that I have been observing have wilted. There are so many fruits in it which we watch with great anticipation. As soon as they ripened my mother made pickle which we are still relishing. Another child of the same age observed thus: 'The Parijata tree with its white flowers spreads a light fragrance all around which comes inside my house too. Scores of varieties of butterflies visit the plant every day; there is a crow's nest atop the tree too, the presence of which scares me away from climbing the tree!

An eleven year-old girl gave a beautiful description of the sprouting of a bean seed. According to her '*the soil bulged up and the first buds appeared, the leaves have come and I have put a bamboo pole for it to spread*.'

This exercise was highly useful for classes V and VI in which both the science and the social studies text books have references to watching of trees.

The exercise on ARE YOUR SURROUNDINGS CLEAN? evoked good response from all the schools selected for the study. The concept of CLEAN which was introduced in a thorough way and the fact that wastes of all kinds lay strewn all around could have been the reason for this ready response. The listing was extremely comprehensive and exhaustive. The lost of non-bio-degradable material included subtle references to the 'Sticker Bindi" and apparently harmful products such as plastic covers and used up batteries. Some of the lists also threw light on health-related items like cosmetics which the children sensed as potential threats. References to obscure items such as asbestos and rubber latex as non-biodegradable revealed the capacity of children to find out the peculiarities of each item.

The evidence presented by the children through these interactions is undoubtedly elaborate and complex. Children are not only aware of the environment but they are also influenced by it. For children, environment is not just an issue. They perceive and address their surroundings in their own ways and relate themselves to the environment and attempt to find solutions in their own ways. Unfortunately, the capabilities of the child are left ununderstood or appreciated. Nor are they addressed either at home or in school. They are constantly being pushed into a small world in which they are not allowed choices of their own. The present experiment at communication with children reveled that it will be of immense value if the inputs from children went in to formation of the curriculum for teaching and learning.

6. Evaluation of Benefits of the Programme

The evaluation was done at many levels in and around the study are. The exercises related to land, farms and river. During interactions with student, groups attempts were made to prepare maps and slides and conduct exhibitions.

Exercises on Specific Topics

After the initial eight month long interaction, we gave a gap of about three months before starting on the formal exercises. This time attempts were made to make more detailed observations, recording and analysis. The results gave further proof of the depth of understanding that children had about their surroundings.

The first exercise / questionnaire titled 'Know Your Land" (the Malayalam term Bhoomi was used which meant your own land in a narrow sense or Earth in a larger sense). This exercise was connected to the E-Earth of Ecology. The ten questions related broadly to topography, lifestyle and culture and attitudes. It also helped to identify key issues and to locate key persons from among the students who could give us deep insights into area. The answers from students gave an opportunity to collate information on the actual vestigial nature of the area. The details collected formed the basis for the teaching manual on environment.

The second questionnaire on 'Know Your Farmland" was designed to provide information on the actual land use patterns, the crops cultivated, the external inputs and the economics of farming. Since the two panchayats represent the typical agrarian Kerala village which is in transition from self-sufficiency to market-dependent land use, the data collected by the children proved valuable. They indicate the extend and the depth of the change. A rough idea of the actual productivity of the land was also traceable from the answers of the students.

The third questionnaire on 'Know Your Own River' was based mostly on the fishing communities in area like Attasseri and Karuppamanana. The population in the area depended on other means of livelihood such as cultivation and mat-weaving beside fishing. The wealth of knowledge of the students about the river, its sedimentation patterns, the riparian vegetation was profound and extensive.

The questionnaires used for these three exercises are given below:

Know Your Own Land

1. Where do you come from? How long have you been residing there?
2. What are the obvious peculiarities of the land around your home?
3. Where do you obtain drinking water from?
4. Is there a well in your house? If there is, what is its depth? Does it dry up in summer?
5. Is there a river, tank or stream near your house?

6. Do you depend on these water sources? If you do, how?
7. What is the nature of soil in the area? What is the colour? Does the soil retain moisture or is it dry?
8. What are the plants in your compound? On which all do you rely for food, medicine, fodder, etc?
9. Are there people around your house engaged in traditional artisanal occupation? What are the occupations? How many families are there? Please give details?
10. Are there festivities associate with religious events in your area? If so mention details.

Know Your Farm Land

1. Does your household cultivate land?
2. If yes, what is the type of land – wet land or dry land?
3. What is the nature of soil in the farmland?
4. What are the different crops being cultivated in your land? What are the varieties?
5. Do you use new seed varieties for cultivation? If yes, since when?
6. Is the farmland irrigated? If yes, what is the source of water?
7. Is there a canal near your house? When and for how long in the year, does water flow through these canals?
8. How many times do you irrigate the land?
9. How is the fertility of soil maintained in the farmland – by using organic manure or by applying artificial fertilizers?
10. Do you use pesticides? If so, for which crops? What are the names of the pesticides used?
11. What is the cost involved in farming – wages and irrigation costs? Give details
12. Do you sell the crop outputs? Give details of outputs and sales.
13. Are cash crops cultivated in your land besides food crops?
14. Are there festivities, rituals and events in your area connected to cultivation and harvest? If yes, what are they and when do they take place?
15. Are their people near your house who have knowledge of traditional farming practices?

Know your River

1. Name of the river
2. Is it tributary?
3. How long have you been staying here?
4. Do you catch fish from the river?
5. For how long have you been doing this?
6. How many types of nets are there?
7. Do you weave your own nets?
8. Do you use nylon nets? What was the material used for nets before the coming of nylon nets?
9. Do you use hook and line for fishing?
10. How frequently do you catch fish?
11. For what all purposes do you use the fish?

1. for home consumption?
2. For distribution among neighbours?
3. For marketing?

12. How much fish do you obtain per week?
13. What are the different kinds of fish available? Give their names and sizes
14. Are these available always?
15. Are there species which were available easier but have disappeared by now?
16. Is there sandmining taking place in the river?
17. Is there the practice of using poison / explosives in the river to catch fish?
18. What are the different plant species growing in and around the river bank?
19. Does the river bank undergo erosion?
20. Do you think that bank erosion has contributed to reduction in vegetative cover of the bank?

Interactions with Student Group

Monthly interactions with student groups were continued throughout the academic year 1999-2000. A poster exhibition by INTACH was held for a day each in all the 4 schools. The exhibition was open for all the students of the schools and it elicited very good response. The teachers involved especially in handling science and social studies evinced keen interest. The exhibition which focussed on the message of conservation also had special foci like Extinction of Species Endangered Species, Ecosystems and the Dilemmas of Human Development. This programme was later extended to Kalladi high School, Mundur High School, V T B College and Mannurkad Co-operative College. The L P Schools in Cherplacherry area gave us the opportunity to interact with children of the age group 5-9 which enabled us to apply the same methodology at a lower level without diluting the message. Of course, more interactive methods like songs and plays, were tried out at the lower primary level.

Innovative Venture by Pattambi Block

The Pattambi Block situated about 50 kms away from the study area started an innovative attempt under the 'Education – Culture' slot of the People's Planning Campaign. The voluntary group Abhayam based at Koppam initiated the formation of Environment Clubs in 10 U P schools and High Schools of Pattambi Block. They held classes conducted exercises and gave assignments for the members. A major focus of the programme was the river Bharathapuzha and its various features. The death of the river, especially by sand-mining and pollution, was topic of discussion.

At the request of the Pattambi Block, a 2-day interaction session was held with 40 selected teachers and 100 children at Pattambi. The experiment and experience of SreeKrishnapuram was discussed in detail. The children were given specific exercises (Know your land, Farm land and River). The responses elicited display of commodity of understanding and perception. The thrust of the interaction with teachers was on giving an Environmental Orientation to the school syllabus. The teachers expressed willingness to adopt the model and the method

evolved at Sreekrishnapuram in their schools during the ensuing academic year. Similar interactions were held also at Koppan, Kodumunda and Vaikathur, all places adjacent to the Pattambi area.

Preparation of Poster Exhibition on SreeKrishnapuram

A set of 20-25 posters highlighting the main features of the area were made for display in the study area. The topographic, historic, cultural, sociological and ecological characteristics of the area together with the impacts of human interferences were covered. The validity of this educational interaction as exemplified by the responses of children was also highlighted. The help of an artist was sought for the completion of this work. The photographs taken during the study period were utilized for this purpose.

Preparation of a Set of Slides on Sreekrishnapuram

The initial part of the study which included a pilot survey and visual recording of the area, was depicted in the form of a package of slides, highlighting the various aspects of the area and was used for dissemination.

Preparation of Resource Map of Karimpuzha Panchayat

As part of the People's Planning Programme, initiative was taken by the researchers and GAIA – Infosystem (Thiruvananthapuram) to prepare a detailed resource map of the area using GIS technology. On the basis of discussions with the panchayat president, ward members and other local leaders, a training programme (2-day) was organised for volunteers selected from all the wards. A detailed questionnaire was prepared and the booklet on Resource Mapping (prepared by State Planning Board) was distributed. A total of 68 volunteers including 28 women participated in the survey. The 15-day long survey was co-ordinated by the GAIA team members and teachers.

The maps prepared on Administrative details, Land form, Relief, Water resources, Land use and Assets have served as a ready reckoner for the planning process in the area. The data collected in detail were processed and formed the foundation for the Environment Education Manual prepared for the area. A map in AO size was prepared for display at the Karimpuzha Panchayat Office.

7. Syllabus and Its Linkages

A detailed analysis of the syllabus at the U P school level was also undertaken as part of the project in order to examine possible linkages and their application to the local environment. Since the U P level in the education system of Kerala lacks a definite curriculum only the textbooks in General Science and Social Studies in which direct topic-wise linkages were possible, were evaluated. Attempts were made to identify area in which improvements and corrections were called for.

At the level of standard V, the textbooks underwent a major changes in presentation and content since 1997. This is in conjunction with District Primary Education Programme (DPEP) implemented upto Standard IV by the Department of Education. The textbooks, which at the first glance were appealing and attractive, suggested experiments for conveying ideas to students using local level material and examples. It's in this connection that the outcome of this project, namely a localized education manual, was found relevant and topical application. The teachers dealing with both these subjects have to be innovative, informed and interested in matters concerning their immediate environment so that they would be able to teach broad concepts and principles using local examples. For example, in the first chapter of standard V Social Studies textbook, an important exercise given was for students to visit a lake / water body near the school, to evaluate how it is getting polluted and to initiate a discussion in the class room about possible solutions to the problem. For this exercise to yield good results, the teachers had to know the location of the water body, it's quality, its polluted nature, the magnitude of the problem in relation to the pollutants and the health of the surroundings before he/she coordinated such an activity. Similar examples are found in chapter 11 and chapter 15, to mention a few. Such linkages could also be worked out in detail at standard VI and standard VII levels.

Linkages to Local Environment and the Text

During the course of interactions with students and teachers it became obvious that linkages have to be worked out at two levels. This is to enable and initiate an attempt at (a) introducing a definite general environmental education programme at UP level and relating it to the syllabus. (b) linking the texts to local environmental factors, situations and resources.

Syllabus and Generalized Environmental Education Programme

This was done based on the method (explained in consolidation of monthly reports) employed in the four schools in which the concept of ecology was developed step-wise during the interactions with student groups. The ways in which each of these concepts could be linked to the UP syllabus. They are explained in this section. Table 7.1 shows how each chapter in Social Studies and General Science textbooks can be linked to ecological concepts. This information would serve as a guideline for groups / teachers / individuals who organise children and attempt to build a knowledge system combining global and local scenarios.

Table 7.1 Chapters in Social Studies and General Science Text Books which Could be Linked to Ecological Concepts

Topics		Chapters in Standard V	Chapters in Standard VI	Chapters in Standard VII
Earth	Social Studies	1,11,12	7a, 7b, 9	5,6
	General Science	6	6,8,9,11,12	14
Clean	Social Studies	1	11a,11b,12	
	General Science	6,7,10,11,12,14	11,12	8,15
Ocean	Social Studies	9		
	General Science	7	1	9,10,11
Life	Social Studies	11	11a,11b,11c	6,9a,9b,9c,10
	General Science	1,2,3,6,8	1,7,11	1,2,3
Oxygen	Social Studies		11a,11b,11c	6,7a,7b,9a,9b, 9c,10
	General Science	1	10	8,10,11,12
Green	Social Studies		10,11a,11b,11c	7b,9a,9b,9c,10
	General Science	1,6,8	1,2,11	2,3,15
You	Social Studies	15,16	1,2,3,4,5,6,11a,11b,11c, 12,13,14	1,2,3,4,5,7b,9a, 9b,9c,10
	General Science	6,7,10,12,14	11,12	4,13,15,16

In this Table, it is shown that each concepts under Ecology – namely Earth, clean, ocean, green, you – is liked to the related chapters in the text books. For example, while introducing the concept of Earth (E for Earth), s short description of the origin of the earth, formation of oceans, origin of life and other related aspects are touched upon. As per this sequence, this class on Earth can be made more appealing – to the student group by referring to standard V Chapters 1, 11 and 12 of their social studies text book or chapter 6 of their general Science text book. The same process could be applied to standard VI and VII as is worked out in the Table. This type of exercise was done very effectively in the case of other concepts also.

Syllabus and local environment

During the course of the study, it became obvious that the environmental features of both SriKrishnapuram and Karimpuzha can be used as examples for making the teaching and learning process in school more lively and interesting. From this experiment, it also became clear that the usage of such examples enhances the cognitive and retentive capacity of the child. It also enables the child to relate the global phenomena and concepts to his immediate environment. Table 7.2 lists the chapters and their subsections in the proposed manual. Since the manual would contain all the relevant and available information on SriKrishnapuram and Karimpuzha *pancahayts*, it will serve as ready reckoner enabling the educator / teacher to utilise it at the local level.

Table 7.2

Topics in the Manual	Sub-sections
1. Location of	General Geography of the area: topography, ecology, demography, the study area, etc
2. River	Details: physical, origin, ecological role
3. Resources	Water: Drinking water sources, wells, ponds – status, use, and availability of each sourceSoil: Types of soil, status of soil – fertility, organic, content, health of soil Living Resources: 1. Flora – diversity and distribution 2. Fauna – diversity and distribution
4. History	1. Pre-freedom movement period 2. Freedom movement period 3. Social movements
5. Culture	1. Social significance – Valluvanad culture 2. Literature, Arts 3. Ethnicity 4.Communal Harmony
6. Agriculture	1. Agriculture in relation to ecology 2. Cropping patterns – traditional practices, indigenous varieties of crops 3. Changes in Landuse – influx of cash crops, modern practices
7. Livelihoods	1. Local-resource-based traditional occupations – handloom, mat-weaving, khadi, poetry, metallurgy, etc.
	2. Modern occupations and employment; changing social attitudes
8. Interventions	1. Landform – laterite mining and quarrying 2. River – pollution, sand burrowing, use of explosives and poison for fishing, bank erosion 3. Water – bore-wells, canals, degradation of land 4. Soil – mono-cropping, pesticides, desertification, laterisation 5. Health – menance of wastes and garbage (non-degradable wastes), consumption goods, food habit changes
9. Conclusions and suggestions	

The manual includes the different aspects necessary to initiate and sustain a locally relevant environmental education work. The success of its application can be assessed only after trying out with the same student groups for at least a full academic year. Teachers who have been part of this programme have undergone an orientation workshop to use the manual.

Table 7.3 Topics in the Manual and the Related Links in the Different Chapters of the Textbooks

Class	Subject	Location	River	Resource	History	Culture	Agriculture	Livelihoods	Intervention	Conclusions
Std V	Social studies	Chapter 1,10,13	Chapter 1	Chapter 5,10	Chapter 2,3,4,6,7,8			Chapter 15	Chapter 1,15	
	General Science	Chapter 4	Chapter 7,8,9	Chapter 1,2,3,6,7,8			Chapter 14	Chapter 1	Chapter 6,7,11,12	
Std VI	Social studies	Chapter 7b,8,9,10	Chapter 8,10,14	Chapter 9,10,14	Chapter 1,14	Chapter 13,14			Chapter 10	Chapter 10,12,13,14
	General Science	Chapter 6,9,10	Chapter 7,11	Chapter 1,2,8,10, 11,12			Chapter 11		Chapter 11,12	Chapter 10
Std VII	Social Studies	Chapter 3,5,6,7b,8,10		Chapter 6	Chapter 3	Chapter 2				Chapter 11,12,13,14
	General Science	Chapter 14		Chapter 1,9,15			Chapter 15		Chapter 1,13	

8. Conclusions and Recommendations

The relevance of conservation education for helping people to become well aware of the value of natural resources and the ecological process that maintains them, the threats that environment is being subjected to, and the contribution they can make to the improvement of the health of the environmental are being discussed all over the world. These objectives distinguish conservation education from other types of instruction. It is a practical tool to achieve observable results, identify attitude change and initiative appropriate action. Attempts were made in the present project towards the fulfilment of these objectives.

From the experience gained during the one year period of project implementation, the standard V students of the sample upper primary schools were exposed to basic percepts of environmental knowledge which served to develop an ethical base to their attitudes and thought processes. At the school level the teaching community was initiated into incorporating the key concepts of local ecology into their teaching. The degree of involvement of an agency from outside is necessary upto a certain point the sustainability of the interest generated even after the withdrawal of this outside agency would depend on local initiatives evolved during the course of interaction and their efficacy.

Recommendations

The continuation of the type of work in the study area on the lines of this project is recommended for two purposes: one for realising the aims and objectives of the syllabus and two for local level development.

Relevance of the study in the context of the school

At the school level the following dimensions need to be added:

a. Formalised in-depth study of the curriculum including analysis of incorporated location-specific environmental inputs;
b. Regular teachers training programme to sustain interest among teachers in topics in environment and promote field-oriented workshops to aid formal education;
c. Formation of working groups in each area consisting of scientists, experts, concerned teachers and local panchayat officials – this would help incorporate environmental concepts, promote environmental values, enhance location-specific knowledge and local skills for use in teaching and learning.

Relevance of this study in the context of local level plan

An understanding of the environmental dimension to the development plan of both the panchayats in SriKrishnapuram block was done to enable the long-term impacts of the various projects envisaged. The introductory chapter of SriKrishnapuram panchayat plan outlines clearly the ecological consequences and disasters the area faces desertification, loss of soil fertility, reclamation of paddy fields, influx of mono crops, quarrying, growth of brick kilns

and so on. But the sections on each aspects of development explains the implementation of programmes in total disregard to the concerns raised in this introductory chapter and betraying ignorance of the basic teats of ecology and sustainability. It is in this context that the manual carries a definite and clear-cut section on human interference in the ecosystem with specific case studies and location-specific solutions.

The process of conversion of paddy fields either for rubber cultivation or for cultivation of other non-food crops is rampant. The development plan of the panchayat proposes opening up of a pesticide manufacturing unit in the area and raising subsidies for fertilizers and cash crops. It also suggests starting of and agriculture training centre which would train farmers in modern agriculture practices and use of high-yielding varieties. The plan does not make, however, any mention about the need for conserving the species diversity of food crops, the traditional time-tested agriculture practices and the rotation of crops which ensured self-sufficiency in food in the area till recently, An active discussion has to be initiated both at the level of policy makers and of farmers in order to promote a sustainable, locally relevant land use pattern with no irreversible consequences.

The section on industry, while focussing on traditional cottage industry, suggests production of plastic goods including plastic baskets as a solution to the problem of unemployment. It also recommends introduction of granite quarrying, a diesel plant and rubber factories. All these proposals have to be thoroughly discussed in terms of their long term consequences both on the environmental health and human well being, before any final decision is taken on them.

The section on Education classifies the proliferation of English-medium schools and erosion of the standard of teaching as major problems. Improvement of the standard of teaching, by providing adequate resource material is suggested as a solution. The need to have workshops in which the teachers would be exposed to a variety of ideas, methods and resource material to trigger their initiative and interest was obvious, but not spelt out in the plan.

The section on water is seen to put great emphasis on mega schemes centering around the Kanjirapuzha Canal, with a view to reaching water to all the panchayats in the district. Paradoxically, no mention is made about the possibility or the need for recharging the ground water resources by through measures for increasing the water retentivity of the soil or the growth of green cover. The social forestry scheme under the Jawahar Rosgarh Yojana (JRY) project recommends planting of eilnthus, casuarina and similar other trees as the best choice. There are several indigenous trees which are better-suited for the purpose. A list of such trees has to be prepared explaining their uses and their growth characteristics. It is also necessary to develop nurseries of the saplings of such trees. The twenty-one Youth of Arts groups in Karimpuzha themselves could be involved in the generation of saplings from the area itself. Children in the various schools of the area may also be organised to raise sapling nurseries of their own.

The manual is expected to be used as ready resource material for bringing to light all these various aspects. The audio-visual material prepared for the classes could be utilized for the concentization programmes to be initiated at the Grama Sabha level. Resource mapping and analysis of the development potential of the area need to be urgently taken up.

Appendix List of Birds in the Study Area

1. Little Cormorant	Phalacrocorax niger
2. Indian Pond Heron	Ardeolagra grayii grayii
3. Cattle Egret	Bubulcus ibis coromandus
4. Eastern Large Egret	Ardea alba modesta
5. Little Egret	Mesophoyx intermedia
6. Black-Winged Kite	Elanus caeruleus vociferus
7. Brahminy Kite	Haliastur indus indus
8. Ceylon Shikra	Accipiter badius badius
9. Crested Hawk Eagle (?)	Spizaetus carrhatus carrhatus
10. Crested Serpent Eagle	Spilornis cheela melanotis
11. Southern Grey Partridge	Francolinus pondicerianus pondicerianus
12. Grey Jungle Fowl	Gallus sonneratii
13. Common Pea Fowl	Pavo cristatus
14. White Breasted Waterhen	Amaurornis phoeincurus
15. Purple Moorhen	Prophyrio porphyrio
16. Red Wattled Lapwing	Vanellus indicus
17. Grey-fronted Green Pigeon	Thenon pompadora affinis
18. Indian Spotted Dove	Streptopelia chinensis suratensis
19. Indian Emerald Dove (?)	Chalcophas indica indica
20. Blue-winged Parakeet	Psittacula columboides
21. Rose-winged Paraket	Psittacula cyanocephala cyanocephala
22. Common Hawk Cuckoo	Cuculus varius varius
23. Indian cuckoo	Cuculus micropterus micropterus
24. Indian Koel	Eudynamis scolopace scolopacea
25. Southern Crow Pheasant	Centropus sinensis parroti
26. Collard Scops Owl	Otus scops rufipennis
27. Brown Fish Owl	Ketupa zeylonensis
28. Malabar Jungle Owlet	Glaucidium radiatum malabaricum
29. Southern Spotted Owlet	Athene Brama brama
30. Palm swift	Cypsiurus balasiensis
31. Travancore Pied Kingfisher	Ceryle rudis travancoreensis
32. Indian white breasted Kingfisher	Halcyon smyrnensis fusca
33. Brown-headed storkbilled kingfisher	Pelargopsis capensis capensis
34. Small Green Beeater	Merops orientalis orientalis
35. Malabar Grey Hornbill	Ocyceros griseus
36. Crimson-breasted Barbet	Megalaima haemacephala indica
37. Small Green Barbet	Megalaima viridis
38. Malabar Golden-backed Woodpecker	Chrsocolaptes lucidus

39. Indian Pitta	Pitta brachyura brachyura
40. Swallow	
41. Swift	
42. Indian Oriole	Oriolus oriolus kundoo
43. Black-headed Oriole	Oriolus xanthornus xanthornus
44. Large Racket-tailed Drongo	
45. Ashy Swallow shrike (?)	Artamus fuscus
46. Common Myna	Acridotheres tristis tristis
47. Southern Jungle Myna	Acridotheres fuscus mahrattensis
48. Tree-pie	Dendrocitta vagabunda parvula
49. House Crow	Corvus splendens
50. Malabar small Minivet	Pericrocotus cinnmomeus malabaricus
51. Ceylon Iora	Aegithina tiphia multicolor
52. Chloropsis	Chloropsis sp.
53. Southern Red-whiskered Bulbul	Pycnonotus melanicterus gularis
54. South Indian Red-whiskered Bulbul	Pycnonotus cafer cafer
55. Malabar Jungle Babbler	Turdoides striatus malabaricus
56. Brown Flycatcher	
57. Paradise Flycatcher	Terpsiphone paradisi
58. Tailor Bird	
59. Southern Magpie Robin	Copsychus saularis ceylonensis
60. White throated Ground Thrush	Zoothera citrina cyanotus
61. Large Pied Wagtail	Motacilla madespatensis
62. Indian Purple Sunbird	Nectarina asiatica asiatica

Appendix B

Table B (i) Population in the Study Area

Panchayat	Area (Sq.km)	Men	Women	Total	No. of Wards
SriKrishnapuram	29.56	8153	9323	7,476	9
Karimpuzha	47.39	12,504	13,600	26,104	11

Table B (ii) Landuse in the Study Area

Panchayat	Dryland (sq.km)	Wetland (sq. km)	Total Area	Net Area under cultiv.	Net Area under Agri. Use	Area not cultivated
SriKrishnapuram	27.83	6.73	29.56	20.26	2.91	6.38
Karimpuzha	38.36	9.03	47.39	32.69	3.40	11.3

Table B (iii) Main Workers and Agricultural Labourers in the Study Area

Panchayat	Main Workers	Agricultural Labourers
SriKrishnapuram	764	2013
Karimpuzha	239	3464

Table B (iv) Schools and Enrolment in the Study Area

Panchayat	LP School				UP School				High School			
	Govt.	Pupil	Pvt.	Pupil	Govt.	Pupil	Pvt.	Pupil	Govt.	Pupil	Pvt.	Pupil
SKPuram	-	-	8	1338	-	-	1	837	-	-	1	1015
Kpuzha	4	1208	5	530	-	-	4	2410	-	-	1	763

Table B (v) Sources of Drinking Water in the Study Area

Panchayat	Common wells	Common Ponds	Bore wells	Common Taps
SriKrishnapuram	32	3	28	28
Karimpuzha	41	1	8	20

Appendix C

Exercise format: 1 CAN YOU MAKE A TREE YOUR FRIEND

Is there a tree growing outside your home? You must have been seeing it for many years. If today on going back home from school you find that the tree is no longer there, how would you feel? Would you feel like you have lost a friend? But to feel so the tree has to be your friend. Hasn't it to be? You should have spent a lot of time with the tree, heard what it has to tell you and understood its language. The tree expresses herself in a number of ways – leaves, flowers and a lot of other things. Lots of friends who understand the language of the tree come to see her everyday. Do you know who they are?

Why don't you make an attempt to select a tree and become friends with it. You should try to spend some time everyday watching the tree. While watching, you should note down the changes that come to the tree – the shedding of leaves, the colour and shapes of leaves, the appearance of flowers and fruits. If you draw a picture of the tree, it would be really good. While you sit and watch the tree you would see the variety of living things that find shelter in her. After a month of observation, you will find in your notebook, so much about this tree that makes you its intimate friend.

Exercise format 3: KNOWING YOUR SOIL (specially designed for standard V science students)

In the course of our session on C for CLEAN, you would have noticed that our surroundings are not as clean as they should be. You would have realized how each one of us is contributing to making the earth an unclean place to live in. We also know that the cleanness of the things we use and throw away is directly related to the capacity of NATURE to turn them back into matter which would be used by other organisms for their growth. But how many of the things that we use today belong to the category NATURAL. How many of them are NON-NATURAL. Let's start from our own life. Please try and observe yourselves from the beginning of the day. List out all the things that you use till the end of the day. Then try to classify them as natural and non-natural. This list will tell you how clean our lives are.

Exercise format 3: KNOWING YOUR SOIL (specially designed for standard V science students)

The chapter on soil in your Science textbook tells you to observe your soil. Do you think that soil is a living thing. If not, why not? If yes, what do you think gives soil life? You can start knowing the soil in your area by observing the plants that grow around you. There are definite differences among the plants you find in a paddy field in a rubber plantation in a sacred grove and in your backyard. Go to each of these area and find out what the differences in the respective soils are. You should not hesitate to take the soil in your hands, feel it, smell it and understand its texture. Note all this down in your notebook. You may also try and dig a little bit in each of these area – you will come across a lot of life forms. Make a lost of them. At the end of the exercise, you will know more about the soil than you would have ever thought possible.

Appendix D

I SAMPLE STANDARD QUSTINS ON LOCAL ENVIRONMENTAL AWRENESS OF STUDENTS

1. Trees that you see on the way to school
2. Five plants in your garden
3. Local names of five birds
4. Have you watched butterflies – Can you remember the colours of a few of them?
5. Name of river in your area. Do you know where it flows to?
6. Name of the mountain chain seen from the area
7. The most abundant food crop in the area
8. Are there tanks / ponds near your house?
9. Are there paddy fields near your house?
10. Most abundant cash crop in your area

II SAMPLE OF STANDARD QUESTIONS POSED TO STUDENTS FOR EVALUATION

1. What is environment?
2. Which of the concepts contained in the word ECOLOGY did you understand / like the most?
3. Which image in the film screened appeal to you the most? Give reasons for your choice
4. Which image in the film screened appeal to you the most? Give reasons for your choice
5. (i) Mention a wrong that everybody does to the environment. How would you correct it?
   (ii) Identify a right thing to do for the environment
6. Since we have seen three ways in which human beings live, (*adivasi* life, village life, urban life), which, according to you, is the best way? Give reasons for your answer.
7. Why should we conserve nature?

End Notes

[1] Robottom T, (1993): The role of Ecology in Education – An Australian perspective in 'Ecology in Education' Ed. B y Monica Hale, Cambridge University Press, 1993, pp. 1-9

[2] Robottom T, (1990): Reconstructing the curriculum for environmental responsibility, New Education XII (i), pp. 61-71

[3] Hale M & Hardie J, (1993): Ecology and Environmental Education in Schools in Britain in "Ecology in Education' Ed M Hale, Cambridge University Press, 1993, pp. 10-23

[4] Acar C (1993): Environmental Education in the primary school science curriculum in Uganda in "Ecology in Education" Ed M Hale, Cambridge University Press, 1993, pp.10-23.

[5] Berkowitz A R, (1993): New Opportunity for Ecological Education in the United States, in 'Ecology in Education ' Ed. M Hale, Cambridge University Press, 1993, pp. 45-59.

[6] Soerjani M (1993): Ecological concepts as a basis for Environmental Education in Indonesia, in 'Ecology in Education" Ed. M. Hale, Cambridge University Pres, 1993, pp. 145-160.

[7] Yoshids M (1993): The present status of Environmental Education in Japan, in "Ecology in Education" Ed. M Hale, Cambridge University Press, 1993, pp. 161-166.

[8] NCERT (1981): Environmental Education at school level – a lead paper, presented at the International conference on EE, New Delhi, Dec. 1981.

[9] MHRD (1992): National Policy on Education 1986, with modification in 1992, Scheme of Environmental Orientation to School Education, Dept. of Education, MHRD, New Delhi and GOI (1988).

[10] Warrier M & Kothari A (1992): Status of Environmental Education in India, IIPA, New Delhi

[11] Bhushan S et al (1990): Environmental Education Handbook for Educational Planners, NIEPA-UNESCO-UNEP, New Delhi.

[12] MoEF (1991): Environment – The Indian Perspective, ENVIS-MoEF, Govt. of India.

[13] CEE (1990): Essential Learning's in Environmental Education, CEE, Ahmedabad and CEE (1991), Training programme in EE (TEE – 90 Report), CEE, Ahmedabad.

[13] CPR EEC (1994): Understanding the Nilgiris, CPR, EEC, Chennai

[14] Warrier M & Kothari A (1992), Status of EE in India, IIPA, New Delhi

[16] Rao S (1996): 'Treasured Islands – An Environmental Handbook for Teachers of A & N Islands, MHRD and Kalpavriksh, New Delhi

[17] Rao S and Anitha. S (1996): 'Nammude Sweep: Lakshadweep', - An Environmental Handbook for High School Teachers for Lakshadweep Islands, MHRD and Kalpavriksh, New Delhi

[18] Warrier M & Kothari A (1992): Status of Environmental Education in India, IIPA, New Delhi.

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