

**ENVIRONMENTAL ORIENTATION**  
**TO**  
**SCHOOL EDUCATION**  
(TRAINING MATERIALS FOR DIETs)  
OF SOUTHERN REGION

**M.Z. SIDDIQUI**  
(Academic Coordinator)



**REGIONAL INSTITUTE OF EDUCATION**  
(NCERT)  
MYSORE-570 006

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## F O R E W O R D

The Department of Education, Ministry of Human Resource Development (MHRD), Government of India, had assigned a project to the National Council of Educational Research and Training (NCERT) to develop teacher training materials under the scheme "Environmental Orientation to School Education" in all regional languages of states/UTs for use in various inservice programmes conducted in District Institute of Education and Training (DIETs) for primary and pre-primary teachers to facilitate the development of Environment Education materials. The NCERT had constituted five resource groups - one in each of four Regional Institute of Education (RIEs), National Institute of Education (NIE), New Delhi. The training module was prepared at RIE, Mysore through the workshops involving educational functional functionaries from DIETs, environmental experts, DESM Delhi faculty, RIEM resource group with Dr. M.Z. Siddiqui as Academic Coordinator.

All the participants, RIE and NIE faculty worked to prepare draft, review and finalisation. Their contribution is acknowledged with heart-felt thanks.

The module has been prepared to best of the abilities of participants and reviewers. The suggestions for its improvement are most welcome.

**PROF. S.N. PRASAD**  
PRINCIPAL  
Regional Institute of Education  
Mysore-570 006

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**M.Z. SIDDIQUI**  
READER IN ZOOLOGY  
ACADEMIC COORDINATOR, EOSE  
RIE, MYSORE-570 006

## INTRODUCTION ABOUT THE MODULE/THEMES

The RIE, Mysore was entrusted the responsibility of the preparation of the training material for southern region states comprising Andhra Pradesh, Karnataka, Kerala, Tamil Nadu, Pondicherry and Lakshadweep. The academic leadership of Dr. M.Z. Siddiqui, Reader in Zoology, RIEM with other members of the family. Ten day workshop duration was conducted to analyse and identify the environmental components already mentioned in the text-books of classes I-VII. This was done with the help of subject teachers from the southern region. During the Second workshop conducted for seven days, teacher educators from DIETs of southern region were invited to prepare the module on the theme areas identified after the analysis done during the first workshop. The group prepared a draft material on the following themes/topics.

1. Population and Environment
2. Living (Biotic) Resources
3. Non-living (Abiotic) Resources
4. Human Health, Hygiene and Environmental Sanitation
5. Socio-economic and Political Development
6. Implications of Science Technology and Industry
7. Environmental Problems - Pollution
8. Conservation and Productivity
9. Quality of Living - Ethics - Values and Role of Children, Women, Community and Legislation

The draft was reviewed and edited by experts from Mysore and from CPR Environment Education Centre, Chennai.

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## INTRODUCTION

"We can set out to send man to the moon with reasonable assurance that we will succeed. Yet we are so ignorant about the functioning of society, that we cannot set out to eliminate poverty crime or pollution or to promote rapid undamaging technological development with a reasonable assurance of success".

- Fredrik L. Bates

## ENVIRONMENTAL EDUCATION - A HISTORICAL PERSPECTIVE

The year 1972 was a milestone in the development history of education. It was in this year that the U.N. convened an International Conference on Human Environment in Stockholm, Sweden and adopted the resolution to introduce environmental activities in education recognised international and carried on as 'Environmental Education'. This was prompted by increasing global concern over environmental degradation the world over. Developed and developing countries alike are confronted with the environmental problems of resources, pollution and other kinds of ecological disorders. Scientific and technological progress have set mankind on a collision course, with its environment. The conflict between growth ethics and natural limits is bound to occur before long and human values and institutions would be bent or be crushed by biological and physical realities. Unless a proper environmental consciousness is developed. Hence the imperative need to

develop environmental awareness in the people to forestall the impending disaster through well thought and planned environmental education.

India shares this global concern for environment. There is a growing concern in our country over the increasing degradation of the environment arising out of accelerated pace of economic development. Phenomenal growth of population, large scale industrialisation, greed to go rich and wrong policies in handling natural resources have contributed to the depletion of our precious, limited and life sustaining resources. Widespread water and atmospheric pollution is posing a grave threat to the very survival of our progeny. As rightly stated by Justice Krishna Iyer "Our self destructive over indulgence of commercial exploitation of nature we are blindly degrading the ecosystem and destabilising the flow of progress". Hence the urgent need to arrest this perinicious trend by developing in the children, the future citizens and policy makers, necessary understanding of persistent degradation of environment resulting in the depletion of resources. It is also necessary to develop in them an awareness of the danger of environmental degradation and the imperative need to prevent it by taking appropriate measures. Developing positive attitudes towards elements in the environment and skill to participate in their protection and preservation should also be the main objective of environmental

education. These objectives are now sought to be achieved through environmental education.

In India the awareness of the need to develop proper environmental consciousness through education had developed long before the Stockholm Conference. The Education Commission Report of 1964-66 stressed the need for linking teaching of science with immediate environment of the children. However, it was from 1975 onwards that environmental education was given formal and due recognition with the integration of environmental concepts in different subjects.

#### **ENVIRONMENTAL EDUCATION IN NATIONAL POLICY ON EDUCATION 1986**

With the implementation of National Policy on Education in 1986 environmental education programme has received renewed thrust. The policy envisages a national system of education based on a national curricular framework which contains a common core. One of the common cores listed in the policy document is the 'Protection of the Environment'. The document reiterates the "paramount need to create a consciousness of the environment". It must permeate all ages and sections of society beginning with the child, environmental consciousness should inform teaching in schools and colleges.

National Curriculum Framework also elaborates the need for developing environmental consciousness and



preparing children for environmental protection through education (National Curriculum for Elementary and Secondary Education - A Framework, 1988). The document expects the school curriculum to create a commitment on the part of pupils to protect the environment and conserve nature and its resources so that ecological balances especially and balance between man and nature is preserved.

The framework suggest several measure for the implementation of environmental education. These relate to (i) approach to curriculum construction and transaction, (ii) selection of relevant content, (iii) teaching learning strategies, (iv) preparation of instructional materials for teachers and teacher education, (v) curriculum orientation of teacher.

At the lower primary level an integrated approach is to be followed. In grades I and II, the child will be introduced to the environment as a whole without making any clear cut distinction between natural and social elements that go into its making. In grades III and IV while the environmental focus should continue, the physical and social aspects of the environments should be introduced into science and social studies as a broad and composite area of study. At upper primary and secondary stages, the environmental dimensions are to be introduced to the subjects discipline wherever appropriate. In otherwords

topics in biology, chemistry, geography and economics are to be dealt with from the environmental perspective. However, both the above approaches call for inter-disciplinary communication. Environmental Education should comprise of all aspects of the world emphasising the inter-relatedness between man and woman, and humanbeings and their environment. To conserve the holism, the curriculum has got to be interdisciplinary. This is what NCF seeks to achieve through the two kinds of approaches suggested above.

#### **STRATEGIES FOR ENVIRONMENTAL EDUCATION**

The question of adopting appropriate strategy for providing learning experiences and organising teacher pupil activities is a crucial aspect in teaching-learning process. The NCF has recommended a variety of activity for the learners and teachers, viz. observation, collection of material and information, demonstration, project assignment, survey educational excursions for study and use of physical, economic and socio-cultural environment found around the school.

For effective implementation of environmental education teachers need technical resource report. The NCERT has already prepared many instructional packages in the form of text books and teacher guides for the subject: Environmental Studies.

## TEACHER ORIENTATION IN ENVIRONMENTAL STUDIES (EVS)

A number of orientation cum training programmes for teachers and teacher educations have been conducted by the NCERT and its constituent units RIEs after the promulgation of National Education Policy 1986. The inservice teacher training package of the Programme of Orientation for School teachers (PMOST) includes a module on teaching of environmental studies for teachers and teacher trainees. SCERTs have also produced instructional package for teachers for teaching environmental studies.

### EOSE - OBJECTIVE AND STRATEGIES

With a view of effectively implementing environmental education in schools, the MHRD has recently launched a scheme called Environmental Orientation to School Education (EOSE). The orientation course of ten days for primary school teachers to be organised by the DIETs is one of the expectation of the scheme. An instructional package for use by the DIET personnel in the orientation course was envisaged as a requisite for training programme. The training module aims at imparting training to the primary school teachers so that they would be able to:

- make the children aware of their environment and their own place in it.
- arouse children's interest in the people and events around them and develop understanding of the environment both physical and social.

- develop skills in the learners for learning about their environment through observation, collection and classification and other processes of science.
- foster positive attitudes in the children towards environment.
- develop willingness in the children to work individually or in groups to maintain and conserve the environment.

This package containing nine themes has been developed after analysing the content in the text books of all subjects from I to VII classes. Topics with environmental components have been identified. Content in the module has been further enriched with suitable activities that would involve direct participation of the learners and for achieving the aforesaid objectives. Each theme in the package include objectives, a brief introduction as to content covered, the relevant elaboration of content, activities and evaluation items. The list of reference materials for the teacher educators and teachers has also been provided for all the themes.

Although the environmental topics/concepts are included in the textbooks, but they are generally being treated incidentally as a matter of fact by the teachers without the needed environmental dimension. The content components in the text are even inadequate. Therefore, this package attempts to provide additional content and

activities through which it is hoped that the teachers would be able to impart environmental oriented topics concepts in the right perspective. However, the content given in some areas are only suggestive and the teacher educators and teachers would do well to collect more information from the relevant sources as hinted in the activities. The activities and evaluation items are graded and meant for teacher educators, teachers and learners.

#### **ORGANISATION OF THE PACKAGE**

The package comprises of the following nine themes.

Module one on "Population and Environment" briefly deals with the population situation in India from 1901 to 1991 and the impact of explosive population growth on the quality of the environment. Describing the various environmental sources both biotic and abiotic themes two and three lament rapid depletion of these resources and warn of the impending disaster arising out of indiscriminate destruction of these precious resources. They stress the need to preserve the natural resources by judicious use.

Theme four is on the ways and means of preventing hazards to human hygiene and environmental sanitation.

The socio-economic and political developments vis-a-vis environment is discussed under theme five. It describes how certain social customs, traditions and values influence the quality of environment. It also highlights the conflict

between development and sustainability of the environment and the administrative and legislative measures undertaken to protect the environment.

The sixth theme is about the use of technology for harnessing the environmental resources for development. It stresses the need for the adoption of environment friendly technology to maintain environmental quality.

Pollution is the price that human kind has to pay for economic development. However this price can be reduced considerably through carefully planned human action. Theme seven deals with various types of pollution and the means of controlling them.

Next the theme eighth in sequence attempts to describe how in the context of rapidly depleting resources there is an imperative need to conserve them and at the same time increase their productivity by using environment friendly technology.

Theme nine deals with the erosion of certain accepted values and beliefs which are essential for building a healthy social environment and stresses the need to cultivate the right values among the young generation.

Owing to the inclusive nature of the content, overlapping in certain areas could not be completely avoided. However, keeping in view, the need to preserve the

unity of each of the theme contained in the package, overlapping is kept to the minimum with cross references.

It is hoped that this package would be useful to the DIETs in planning and help them to organise ten day orientation course for the teachers. But as stated earlier the teacher educators are advised to support the content given in the package by making use of the other reference materials suggested at the end of theme. Therefore it would be desirable if DIETs make necessary arrangements to procure these reference materials for their library.

#### **PLANNING THE ORIENTATION COURSE**

While preparing the schedule for the orientation course care should be taken to ensure it to make local specific to encourage use of locally available inputs like services of experts, urban agglomeration, polluted rivers, tanks, waste accumulation and other environmentally degraded sites. The schedule may include the following activities:

1. Lectures by DIET staff followed by discussion on each theme.
2. Guest lectures by specialists on the topics contained in each theme.
3. Identification of lessons in all school subjects from I to VII classes in which the themes of the package could be integrated.

4. Preparation of lesson plan.
5. Organising demonstration lesson.
6. Symposia by teacher educators on major themes related to environment.
7. Arranging debate on burning environmental problems and issues.
8. Field trips.
9. Film shows on environmental degradation and protection.

Environmental Education is an integrated and interdisciplinary approach to educate the children on environmental issues and problems to make them environment conscious. At the school stage environmental education is not a separate subject. Environmental content/concepts are integrated in the existing school subjects. The teachers may provide environmental dimension wherever appropriate and possible to achieve the overall aim of EOSE. In view of this, item nos. 3, 4 and 5 in the list of activities to be included in schedule for the orientation course play a critical role. While preparing the schedule due weightage should be given to these activities. There should be at least three demonstration lessons preceded by the preparation of lesson plans and their discussion. Other activities should also receive due weightage. Time allocation for each activity should be fixed depending on the local conditions and requirement.



MODULE I  
POPULATION AND ENVIRONMENT

INTRODUCTION

Throughout its history the human species has been predominantly concerned with the conquest of nature and the control of death. Human beings, from time immemorial have struggled to survive as individuals, families, tribes, communities, societies and nations. Procreation was an essential aspect of this survival. Unless there was an increasing supply of new human beings, food could not be grown, families could not be sustained, individuals could not be supported, and agriculture and industry could not be developed. Inevitably, a great deal of emphasis and value were placed on fertility. It was considered not only good but beneficial to have children; it catered both to the emotional and physical needs of individuals. It was considered good not only for the children themselves but also for the parents, society and the human species at large. Although extenuating circumstances did intervene to create temporary contra-indications to child-bearing, the high value attached to child-bearing remained intact. There remained a presumptive right of individual procreating, a right thought to sustain the high valuation assigned to the outcome, that of more human beings.

The high value attached to procreation has to be re-examined, shifted or even changed today, though it might initially create some confusion in a traditional society, which had always given a high premium to child bearing. The reason for such a change are the hazards of excessive population growth today. They pose critical changes to the future of the human species itself apart from the danger to the economic system, individual liberty and welfare, and the structure of social life. These hazards are serious enough to warrant a re-examination and revision of the traditional values attached to unrestricted procreation and subsequent increase in population size.

How does population growth endanger the environment ? A critical look at the effect of every person added to the population as an increment to the demands on the environment and the environmental impact of technologies involved in the production to meet the consumption, need of each additional person presents an alarming situation. Solving environment problem is more difficult and more expensive when populations grow very quickly. Thus, the steadily increasing burden of rapid population growth can eventually overload natural system and cause their collapse.

There is a need therefore to integrate population, environment and natural resource policies into national development strategies so as to ensure environmentally sound

sustainable development. The major emphasis of this approach is on meeting the basic needs of the people and improving their quality of life without adversely affecting the viability of the environment. There is a need to anticipate environmental problems and take necessary precautionary measures to avoid the resultant problems.

#### **OBJECTIVES**

To enable the children to

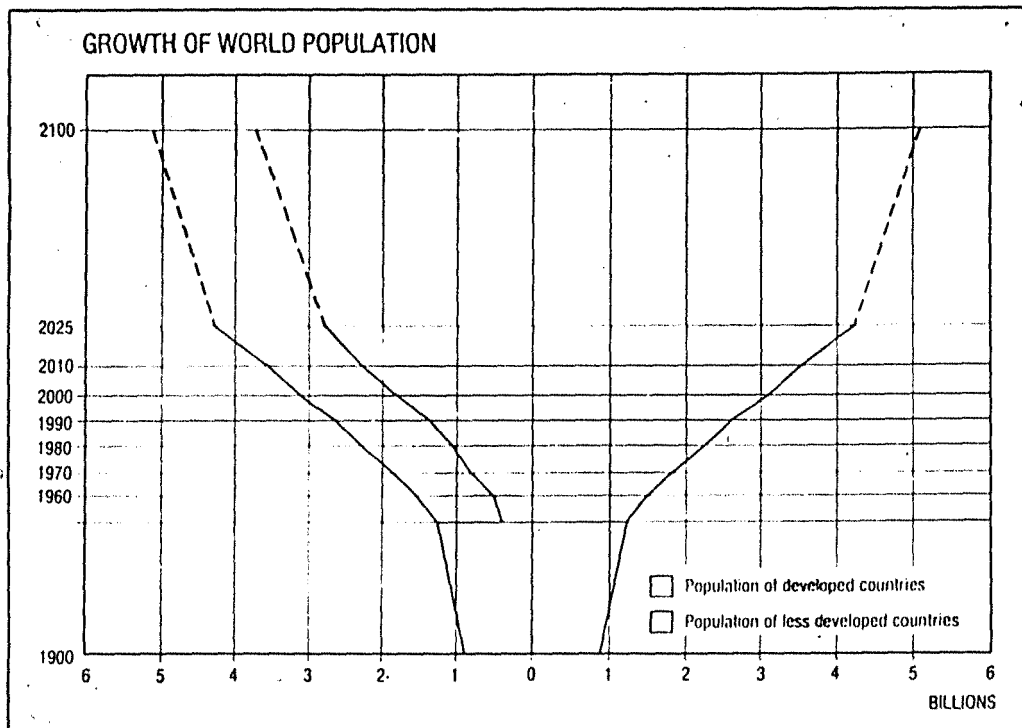
1. acquire knowledge of the population situation in the world in general and India in particular;
2. recognise the factors that contribute to the rapid increases in the population of a country;
3. understand the effect of rapid population growth on the quality of human life and the environment;
4. develop an awareness on the need to check population growth for improving the quality of human life and protecting the environment.
5. develop responsible behaviour towards improving the quality of human life and that of the environment.
6. enable them to prepare charts, diagrams, banners, slogans and illustrations, etc. relevant to population and environment.

## **The Population Problem**

### **Global**

World Population stands at about 5.6 billion in 1995 and is expected to reach 6 billion before the turn of the century. Most of the current annual increase, nearly 90 million people per year is occurring in developing countries (Fig. 1).

The rate of world population growth increased from two per cent per thousand years in the pre-historic past to about two per cent a year by the mid 1950s. Approximately, one billion people are being added every twelve years. Every minute, the global population grows by 150; everyday by 220,000 and every year by over 80 million. The annual increase in numbers will continue to grow until the 1990s, when it will be about 90 million. By the turn of the century, the world is expected to have 6.1 billion people. Although the growth rates are now slowing down, the momentum of population growth ensures that at least three billion people would have been added to the planet between 1985 and 2025. Growth will not stop altogether for perhaps another century, when the world population may be over 10 billion, twice its present level. A majority of these people will be born in developing countries. The developed world grew from 0.8 billion in 1950 to 1.2 billion by 1985, while the



population of the third world countries increased from 1.7 billion to 3.7 billion.

Part of this dramatic rise in numbers is the result of widespread improvements in basic health care, which have contributed to lower infant mortality and brought about longer life spans. But the very success of these interventions now threaten the future of mankind. A country's people should be a resource not a liability. Problems arise when population growth outstrips a society's capacity to adopt to their needs and equip them so that they can make their contribution to the development of society.

#### **Implications of Population Growth**

This rapid increase in population makes it difficult for a nation to improve the living standards of the people and their quality of life. Whatever economic gains are achieved they are nullified by the rapidly growing population who have to be provided increasingly with essential services. This leaves little for capital formation and investment. There are some projections which indicate that at the present rate of population increase and consumption, many vital resources will be exhausted by the end of the century.

The problem, however, is limited not only to a rapid increase in population as it impinges on the economic and

social developmental efforts. There is also the problem of rapid urbanisation due to industrialisation and rural migration to urban areas. This is primarily due to an increase in numbers as opposed to a decrease in farm lands. Rapid urbanisation consequently has contributed to the growth of slums, over-crowding, unemployment and inadequacy of water, electricity, sewerage, transport and other vital social services.

#### **Activity (Teacher Educators)**

Collect statistical information regarding the population of world in the following format (Source: Population Education a National Source Book, NCERT).

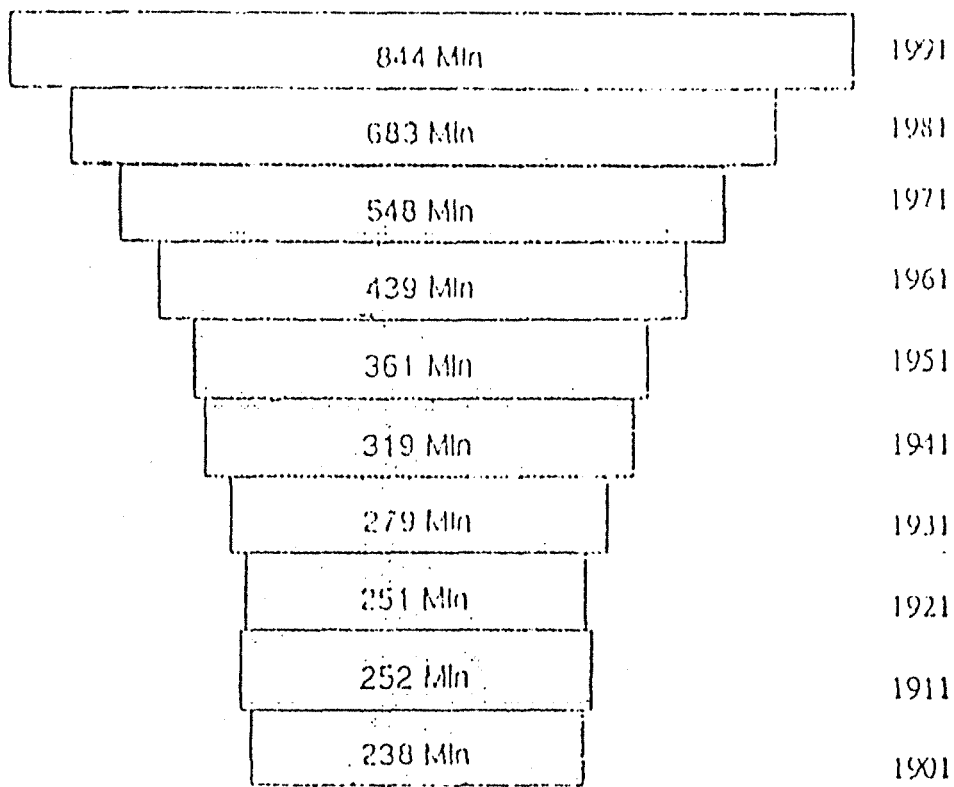
Year	World population (in million)	Annual Growth Rate (%)	Population doubling time (years)
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Write a brief note making a critical analysis with regard to 1. annual growth rate, 2. population doubling time, 3. reasons for the higher rate of population growth in modern times than in the past.

#### **Population Situation: India**

With a population of 843.932 million in India (it was 683.81 million in 1981 with an annual growth rate of 2.21 per cent) and increasing at about 2.11 per cent annually, it is not surprising that many are under-

### Mounting Burden of Population on Nation's Resources



Source: INDIA 1993-94  
(An INDIAN EXPRESS - VANS Publication,  
Bombay)



nourished, malnourished, ill clothed, ill sheltered, unemployed, underemployed and illiterate. In sheer numbers, India rank second in the world, its total population size being second to China with only 2.42 per cent of the world's land area. India has to support about 15 per cent of the world population. In comparison to the United States, India is about two-fifths in area but has about two and a half times its population. Moreover, 40-45 per cent of India's population comprises children under 15 years of age. In the next few decades, their attitude towards family size and their reproductive behaviour will determine the pace of population growth and its impact on quality of life both at the macro and micro levels.

Traditionally, the large numbers would not be a matter for concern if food supply, employment opportunities, housing, educational and health facilities, energy and other essential resources were growing at a rate faster or even at a rate commensurate to the growth of population. But this in fact is not the case. Unplanned population growth places severe restrictions on the basic and essential requirements of man.

During the four decades of planned development since 1951 our population has increased 2.33 times. Mounting burden of population, growing at a high rate, is at the root

of our general level of poverty. Development resources have been found inadequate for providing the minimum basic necessities and social welfare of the masses. In short, this has negated the gains of economic growth even at the improved levels during the 1980s (Fig. 2).

### **Population Situation in the Southern Region of India**

The southern region of India, includes the states of Karnataka, Kerala, Tamilnadu and Kerala plus the union territories of Pondicherry and Lakshadweep. The demographic indicators available from 1991 census are presented in the enclosed table.

The main cause for this phenomenal increase is the decrease in the death rate. While the death rate has been going down steadily, the birth rate has remained more or less static or registering only a marginal decline. In 1921 the death rate was 48/1000 and birth 49.2/1000 leading only to a small increase in population. The death rate in 1981 had come down to 14.8/1000 and birth rate to 36/1000 giving a growth of 2.10% per annum. In 1991 the death and birth rates were 9.6/1000 and 29.9/1000 giving a growth rate of 2.36% per annum. The life expectancy at birth has increased from 46 years in 1971 to 60 in 1991 while the sex ratio has steadily declined. There are now only 929 women for every 1000 men (Fig. 3).

The density of population or the number of persons per square km in the country in 1991 was 267. It was 77 in 1901, 103 in 1941, 117 in 1951, 142 in 1961, 177 in 1971 and 221 in 1981. When compared to developed countries like USA (25), USSR (11), Australia (2), Canada (2), this figure is alarmingly high. Among the states, West Bengal has the highest density of 766 followed by Kerala 747. Arunachal Pradesh has the lowest density followed by Mizorams (33). Among the union territories, Delhi has the highest density of 6319 and Andaman Nicobar as lowest (34).

A special feature of Indian population is the dependency ratio. It means that there are a large number of people who are dependent on others for their livelihood. In other words, the population can be divided into productive and unproductive consumers or working and non-working people. Unproductive consumers comprise people who are not engaged in gainful employment, eg. children, aged, incapacitated people. In 1961 the working population was 42.7% and the non-working population was 57.3%. In 1971, it was 32.9% and 67.1% respectively. According to 1991 census the percentage of working population is 37.6%; children below 15 years of age constitute about 45% of our population.

4. (Students) Collect density figures of all the states in the country. Classify the states into two categories (1) those which have density above the national figure, (2) those which have density below the national figure.
5. (Teachers) Arrange an essay competition on the population situation in the country/your state.

#### Activity 6

Make the following table after getting the 1991 census information from the census.

Age group	No. of females	No. of males	Total
0-5			
6-10			
11-14			
15-18			
18+			
Total			

#### Activity 7

Find out the number of persons literate, illiterate by sex in your location and prepare the following table.

Age	No. of males	No. of females
7 years +		

It is significant that nearly 74.3% of India's population are residing in rural areas with the remaining 25.7% in the urban sector.

#### Activity

1. (Students) Prepare a bar graph showing the growth of population in India from 1901 to 1991.
2. (Students) Collect from your local panchayat/municipal office, statistical information regarding the number of births and deaths in your village/town from the past five years.
3. (Teachers) Collected information from the District Statistical Officer or Census Book (Government of India) 1991 regarding the population situation of your state from 1981 to 1991.

The information should include

- a. Population figures from 1981 to 1991
- b. Annual birth rate
- c. Annual death rate
- d. Annual growth rate
- e. Male/female ratio
- f. Density of population
- g. Number of children below 15 years

Show the above details in an appropriate tabular form.

## DETERMINANTS OF POPULATION GROWTH

Let us now discuss some of the determinants of population growth in the country.

1. **Gap between the birth and death rates:** Due to improved medical facilities and public health and sanitation, there has been a sharp decline in the death rate without a corresponding decline in the birth rate. Therefore, the rate of population growth increased.

2. **Marriage:** In India, marriage is a compulsory social phenomena. It is believed traditionally that every male and female must marry and beget at least one son in order to attain salvation. In the United Kingdom 1/3 of the population aged 35 years and above remain unmarried whereas in India nearly 76% of the women of reproductive age are married. The percentage of unmarried women aged 25 and above is very low. Moreover, people in India marry quite early in life. A girl is generally married in rural areas by the age of 15 although the legislation has fixed the marriage age of girls at 18. This is a significant factor leading to increase in birth rate, as it provides a wide fertility period (15-45) of 30 years for women to beget more children. In Western countries since the women marry after the age of 25, the child bearing period (fertility period) is reduced to 20 years. Therefore, if an Indian women on an average

gives birth to 4 to 6 children, the women in the west deliver only 2-3 children.

**3. High rate of infant mortality:** High rate of infant mortality, i.e. death of children before they attain the age of one constitutes yet another major factor influencing rapid population growth. The infant mortality rate in 1991 was 80/1000. As compared to 215/1000 in 1901, the mortality rate has significantly dropped. Still it is very high when compared to 18/1000 of U.K. and 13/1000 of Belgium. Since parents are not certain about the survival of their young children they have a larger number of children in order to ensure that at least one or two survive.

**4. Low literacy rate:** Low literacy rate is yet another contributory factor for rapid population growth. Though there is an upward trend in literacy rate from 5.35% in 1901 to 43% in 1991; illiteracy among women continues to be a major factor influencing the total literacy rate. Among the illiterates, nearly 75% are women, with an increase in illiteracy, birth rate tends to be high due to superstition and blind beliefs. Further, couples are either averse to or are ignorant of modern birth control devices. According to the National Sample Survey, it is found that the average number of children for women who are illiterate or who are having only primary education is 6.6; whereas it is 4.6 for

those with education upto the secondary level and; two with university education. This indicates that the level of education has a positive influence on reducing the birth rate. Educated women are also more likely to protect their children's health. Studies suggest that for every year of mother's education, child mortality is reduced by 7-9%.

**5. Poverty:** Persistent poverty is another factor which contributes to population growth. It leads the poor to believe that larger the number of children, the greater is the income for the family.

**6. Socio-cultural values:** Population change is both a biological and socio-cultural phenomenon. Though the birth of a child is a biological phenomenon, the decisions behind the birth are mostly governed by socio-cultural values. Early marriage specially of girls is a social value which is a product of historical circumstances. In a patriarchal society, male children are preferred over female infants for socio-cultural factors like performing the last rites of parents. Scriptures sanction this when they say "aputhrasya gathirnasthe". At the time of marriage, the family priest repeatedly recites "dharma praja sampatyam" meaning the purpose of marriage is to beget a 'praja' or a citizen who upholds dharma or the rule of law for the society. Brides are always blessed by the elders with the wishes



"sumangalyam dergamayuhu" and "asta puthravathe bhave". There is a social stigma attached to unmarried and/or barren women.

**7. Migration:** Migration is also one of the contributing factor in increasing the size of population. Migrants are pulled towards the city with the hope of better access to education, health services and jobs, but they are also pushed off the land by rural poverty. In just three countries - India, Bangladesh and Pakistan - there are over 30 million landless rural households; over 30 million landless rural households; families who neither own nor lease land. Assuming an average of only six people per household, the sub-continent's landless rural population is nearly as large as the total population of the United States. They are dependent on seasonal agricultural employment. Landlessness in itself is often enough to push people into urban areas.

Many of the migrants, who are living in illegal squatter settlements or on the street are caught in an economic trap from which escape is difficult. A high proportion of those officially classified as unemployed are infact working 10-15 hours in factories, households construction sites, etc. They are all underpaid and they will never be able to extract themselves from these slums.

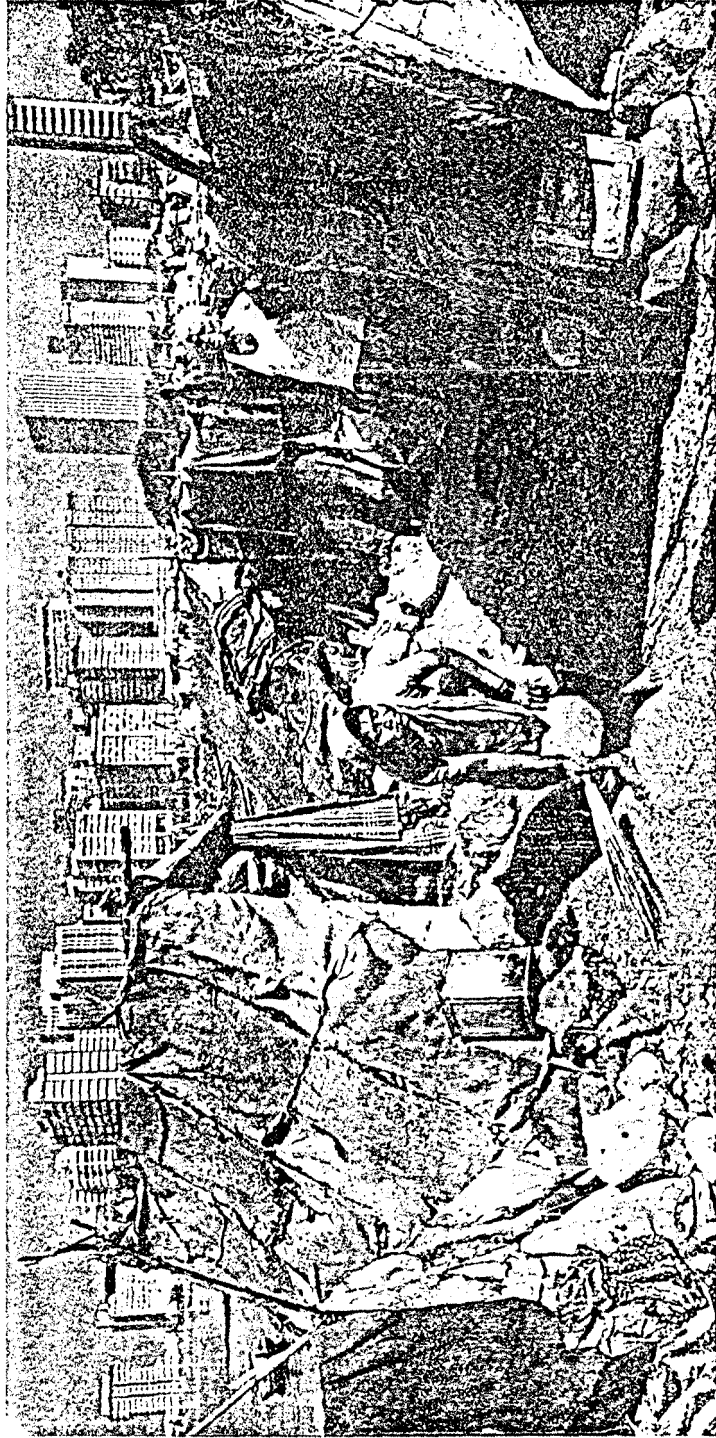
A critical factor in migration is the movement from densely populated rural areas to less populated rural areas, as an escape from environmental and resource degradation, landlessness is severely limited (Figs. 3 and 4).

The foregoing discussions reveal that the solution to the problem of population growth lies in taking the following measures:

1. Reducing the gap between birth and death rates to achieve the goal of zero growth rate.
2. Adopting a small family norm.
3. Preventing early marriage and encouraging late marriage for women to reduce the fertility period.
4. (Teachers) Arrange a debate on the topic "population increase results in increase in human resources which is essential for economic growth".
5. (Students) Arrange an essay competition on the causes of rapid population growth in India.

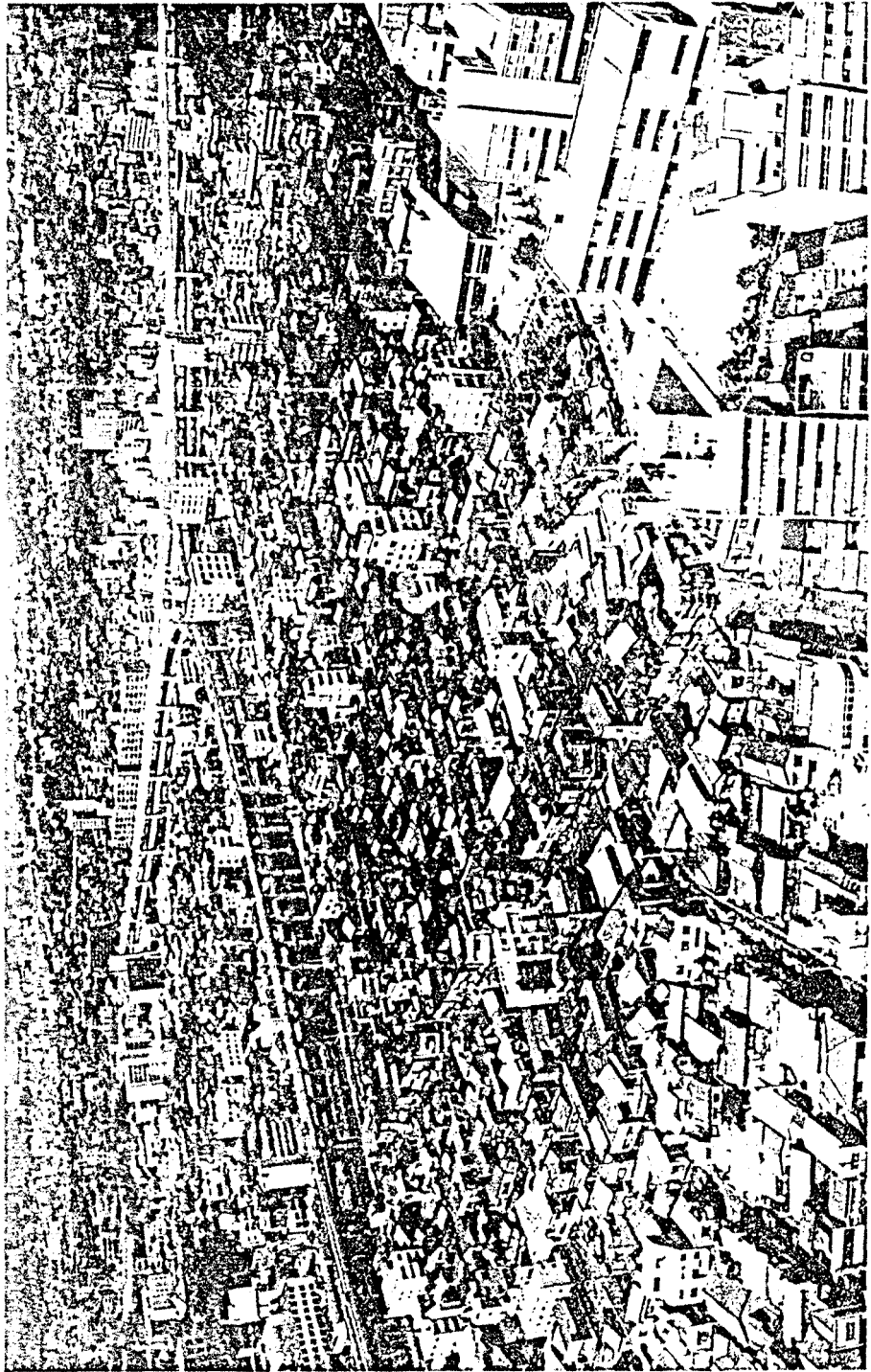
#### **EFFECTS OF POPULATION GROWTH ON ENVIRONMENT**

Increasing human demands are damaging the natural resource base - land, water and air upon which all development ultimately depends. Industrialized areas contribute to environmental degradation by their insatiable demands for resources, their production of wastes and their cumulative effects on mankind.



*Many migrants living in illegal squatter settlements find themselves caught in an economic trap from which escape is almost impossible. Yet without them many developing cities would grind to a halt.*

*By the year 2000 half the world's population will live in urban areas. Of these over 600 million will live in "mega-cities" with a population of 4 million or more.*



High fertility and rapid population growth are a major contributing factor to this process. Slower growth and more even distribution of population would relieve the pressure off agricultural land, energy sources, watersheds and forest lands. In India, rapidly growing population has inundated approximately 1.5 million hectares of agricultural land during the past 30-40 years. In addition, 1.3 million hectares of forest was lost each year during 1975-82. The shortage of housing is an ever growing phenomenon. In major cities of India, nearly 30-40% of the population resides in slums. An important factor is that the size of the earth is fixed and its resources are strictly finite. Demands upon natural resources expand rapidly while their per capita availability decreases progressively, damaging the natural resource base.

The consequences of environmental degradation and resource scarcity hit the poor most severely. To stay alive these people destroy the very resources they will need tomorrow. The resultant damage to the environment only deepens their poverty. The vicious circle of poverty and environmental destruction is at work. The 'scissors effect' of poverty and increasing population slices away their ability to sustain human life. The victims of poverty destroy forests for fuel-wood, food, water and fodder and

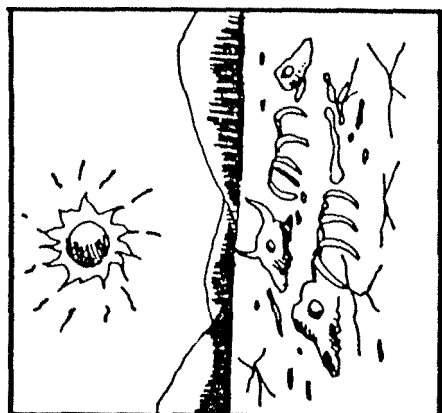
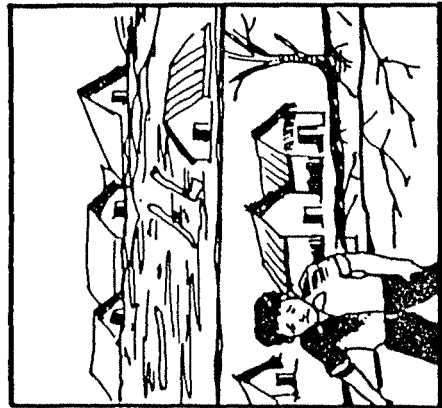
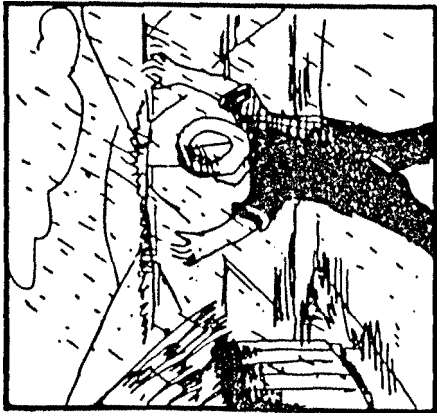
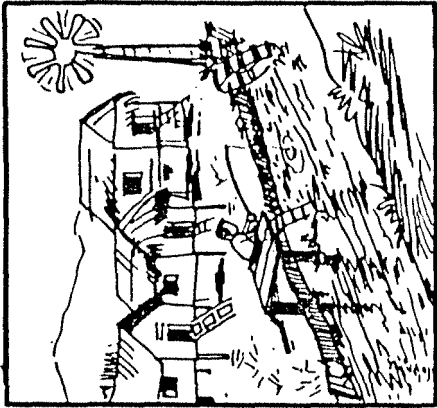
the growing population forces them to farm marginal land at non-sustainable levels. The excessive resource exploitation combined with a poor understanding of the interrelationships between man and environment has thus led to ecological crisis. Soil erosion and land degradation, deforestation, the fuel wood shortage, problems of water management, excessive population pressure on land and other environment-degradation trends inhibit the pace of economic development.

The mounting problems of pollution consequent upon unimaginative interference of human beings with nature have been adversely affecting the quality of life. Pollutants may be regarded as resources at the wrong place, but as such they represent a continuous drain on resources, apart from their disruptive or degrading impact on air, soil and water. However, the harsh reality of the environmental crisis - shrinking of forests, increasing desertification, degradation of critical resources, loss of agricultural land, salinisation, alkalinisation and waterlogging, acidification of the environment and release of hazardous waste - has created environmental awareness among planners and policy makers. Building environmental concerns into development is now regarded as making efforts for sustained life and for avoiding the imminent death trap.

**1. Land:** A direct and immediate effect of population growth is on land and its use. Land is the most important element

of the environment, since it provides life sustaining resource inputs like space for agriculture, homes, shops, offices, hospitals, schools, factories, airports, highways, rail roads, parking lots, water, energy, mineral resources, etc. Today in India the per capita availability of land is just 0.48 hectares. The mainland ratio is only 0.27 hectares in relation to arable land. All the land that is not for meeting the above demands are covered by the natural ecosystems which control soil erosion, assimilate pollutants, preserve the quantity and quality of water resources, protect animal life and perform other valuable functions. As population grows, more cities grow around agriculture regions leading to large scale urbanisation. Increased demand for land for housing, agriculture and industrial production leads to the encroachment and use of new lands covered by varied eco systems like arid and forest land. New land brought under cultivation need water diversion projects and drainage. These changes eventually lead to an imbalance in the eco system. Further, more new land under cultivation requires more chemical fertilisers and pesticides for a higher yield eventually renders the soil infertile (Fig. 5).

Acceleration of economic activities through large scale industrialisation and increasing modes of transport



WHAT HAPPENS IF MAN  
DISTURBS THE ENVIRONMENT



have led to increased energy producing plants like nuclear, thermal and hydro-electric dams and reservoirs. To meet the space requirements for new power projects, forests are destroyed. Thus we find that explosive population growth leads to a chain reaction in the following manner:

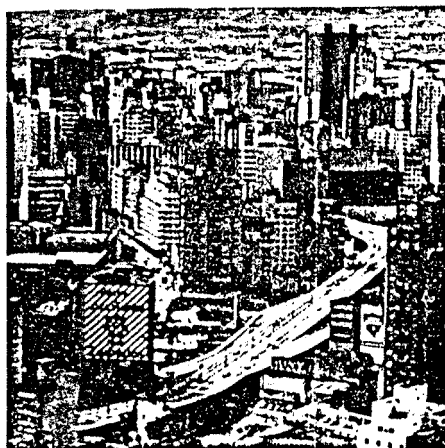
Population growth leads to urbanisation with the use of arid and forest lands, necessitating deforestation leading to soil erosion ultimately in the deterioration of the quality of the environment.

Thus, checking the growth of population together with an efficient land policy alone can save humankind from the impending disaster.

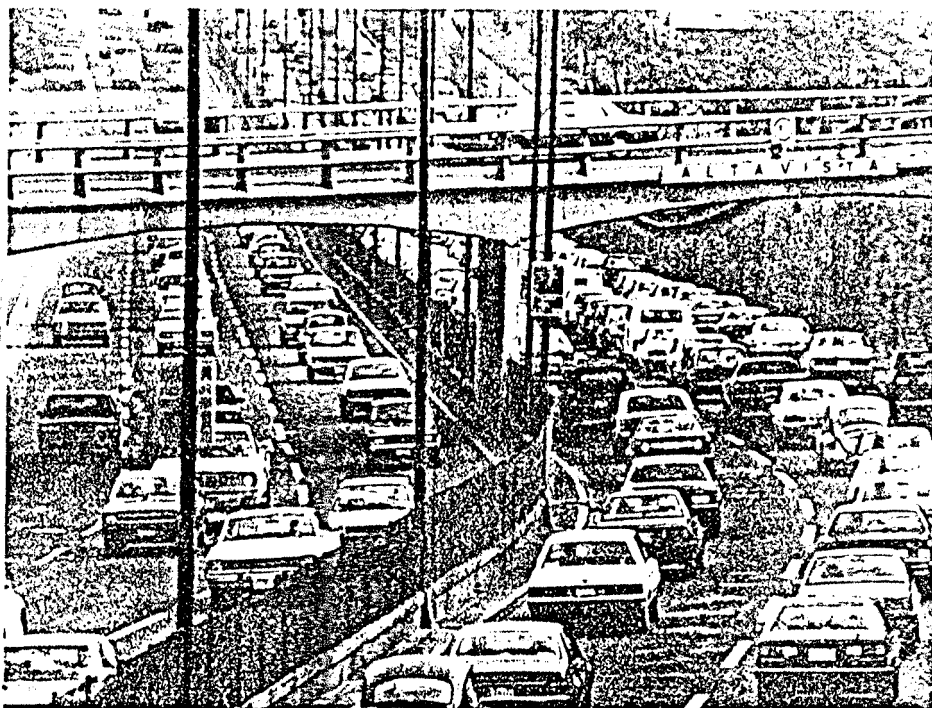
#### **URBANISATION**

As stated above, urbanisation is the direct result of population growth. The natural increase in the number of people in cities accompanied by large scale movement of people from rural areas to cities in search of gainful employment and better amenities of life results in urbanisation. The urban population of India in 1901 was 25.6 million (11% of total population). It increased to 230 million (27.5%) in 1991 and is expected to reach 326 million (33%) by the end of the century (Figs. 6, 7 and 8).

An adverse impact of urbanisation on eco-balance is reflected mainly through deforestation leading to other

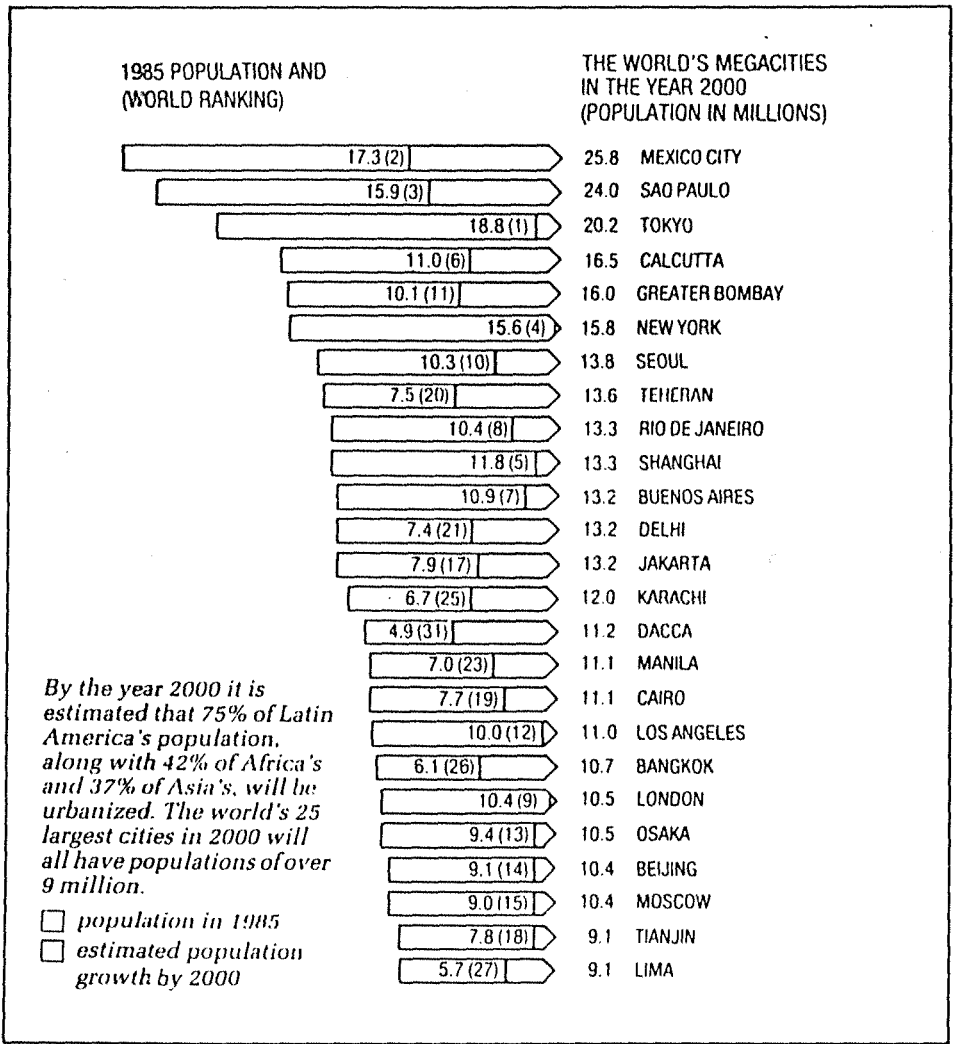


*Urbanization places heavy demands on the supply of basic necessities like food, energy, potable water and shelter.*



*(Above) One of the major contributors to deforestation is the wholesale conversion of wood to charcoal for sale to people living in towns and cities.*

*(Below) Based on a "global average" a city of 9 million inhabitants consumes every day 5.6 million metric tons of water, 18,000 metric tons of food, 85,500 metric tons of fuel, and generates 4.5 million metric tons of waste water, 18,000 metric tons of solid wastes and 8,550 metric tons of air pollutants.*



ecological problems. Urbanisation depletes renewable and non-renewable resources faster to meet the growing energy and other requirements of modern life. It also creates an acute shortage of housing facilities resulting in the proliferation of slums. In our country the slum dwellers account for 15% of the 156 million urbanites in 1981 and this is expected to go upto 25% by the turn of the century. These slum dwellers live in the most degraded environment without proper drinking water, sewage connection and health services.

The most dangerous impact of urbanisation on the quality of environment is pollution (for details in this regard, please refer to module no. 7 on Environment and Pollution).

Urbanisation is a blessing in disguise notwithstanding its adverse impact on ecosystem. It is an indispensable aspect of economic growth. It generates employment opportunities for the growing rural population, relieves rural misery and directs the flow of money from cities to rural areas. The argument, however is for a clean city, of a just and suitable balance in rural and urban population and economic activity. The realisation of this goal is possible only through: (Fig. 9)



*Every year hundreds of millions of tons of hazardous waste are produced creating widespread disposal and health problems.*

- a. proper planning of the cities;
- b. government investment programmes on housing, urban services including pollution control systems;
- c. preventing the setting up of more industries by encouraging rural and small scale industries to check large scale movement of people from rural areas to the cities;
- d. use of technology in production which is environmental friendly;
- e. an effective land policy designed to make lands available at affordable prices and fixing a ceiling on land holding in cities by individuals and;
- f. enacting pollution control laws and ensuring their strict enforcement.

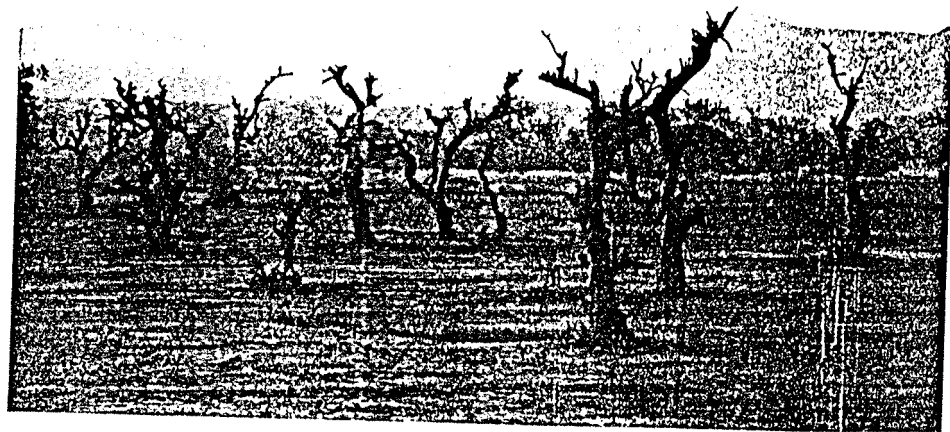
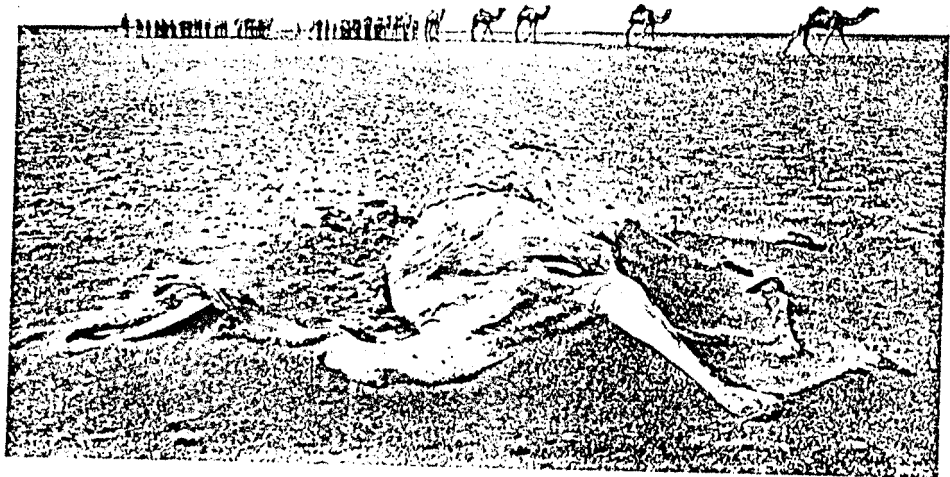
#### **DEFORESTATION**

Burgeoning population consequent to urbanisation have placed heavy demands on forest resources resulting in deforestation. Trees are felled for cultivation, timber and grazing. Deforestation which is a prize that has to be paid for development has produced serious effects on the quality of the environment. The climate, rainfall, relative humidity, wind and soil are all influenced by forests. Therefore, indiscriminate destruction of forest leads to the

deterioration of not only the environment but also the quality of life.

Due to large scale deforestation nearly 50% of the total geographical areas of the country suffers from soil erosion, land degradation, water logging, salinity, alkalinity and other hazards. The 'two key ecological zones - the Himalayas and the Western Ghats are witnessing a fast denudation of the country's prime level forests. The impact is now also being felt in the changes in the climatic condition, delayed monsoon, flood and draught situation regularly visiting the country. In the interest of promoting quality of life and environment, serious efforts needs be undertaken to arrest this ecological crisis (for more details on deforestation, please refer to Module No. ) (Figs. 10 and 11).

**Depletion of Mineral Resources:** Population growth has increased the consumption of mineral resources leading to their depletion and eventually to the total exhaustion of non-renewable ones. While the impact of this depletion and exhaustion on the quality and nature of the ecosystem is yet to be assessed, the quality of human life is sure to be affected adversely as these sources form the backbone of or industry. (For more details on resources and the impact of their indiscriminate exploitation on environment, please refer to Module No. ).



*Desertification currently threatens one third of the world's land surface, affecting the livelihoods of at least 850 million people.*





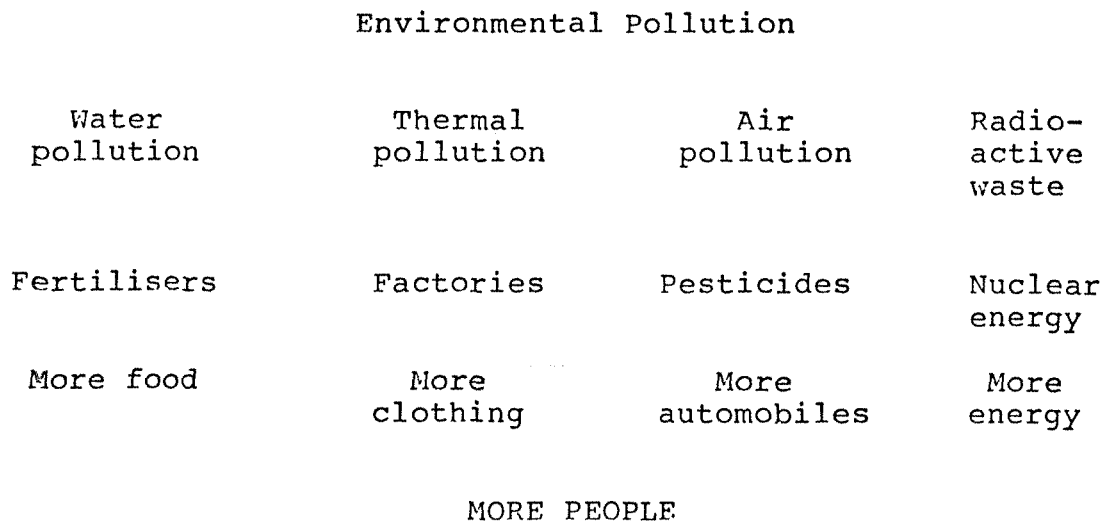
*When vegetation cover of upland watersheds is destroyed, soil erosion is just one of the serious environmental consequences.*

## POLLUTION

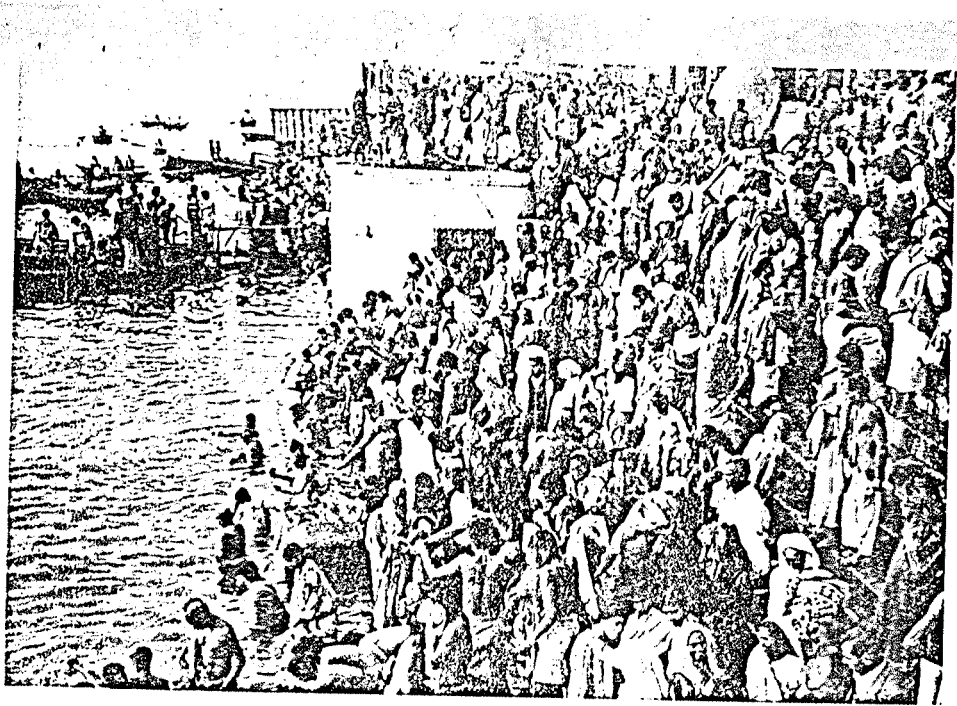
In order to meet the growing needs arising out of their growing numbers, human beings resort to increasing exploitation of their environment and its precious resources causing unfavourable changes in their surroundings, leading to depletion of resources. Therefore, environmental pollution may be defined as an unfavourable alteration of human surroundings as a byproduct of human action leading to direct or indirect effects of changes in energy patterns, radiation levels, chemical or physical constitution and abundance of organisms. Pollution may be of different type: air, water, atmosphere, noise and solid waste and pollution produced by various energy sources (for details on pollution, please refer to module no. ) (Figs. 12 and 13).

The following diagram represents the relationship between population growth and environmental pollution.

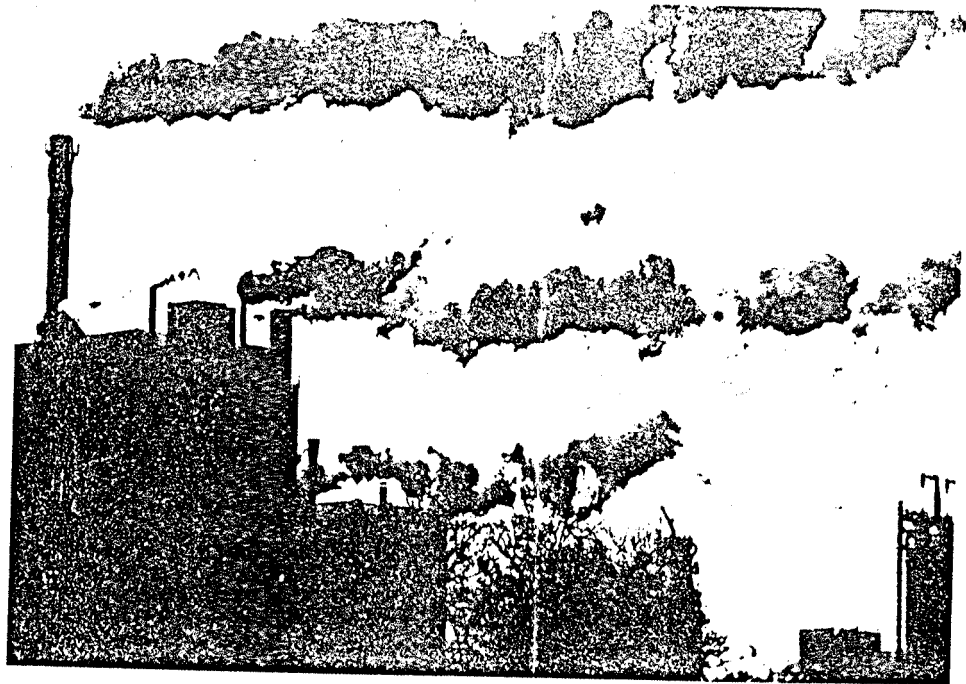
Chart 1



Source: R.C. Sharma, Population Trends, Resources and Environment, Hand Book on Population Education, p. 249.



*The River Ganges is sacred to millions of Hindus. But it is now badly polluted by industrial and agricultural waste.*



*Industrialization seemed to offer developing nations solutions to hunger, poverty and, eventually, to population growth. But industrialization brings the problems of air pollution and hazardous wastes.*

## POPULATION AND SOCIAL ENVIRONMENT

Population growth not only leads to the degradation of the physical environment, but also adversely affects the social environment. One of the most important features of a healthy social environment is that the people should have equal opportunities and access to the basic needs and comforts of life. When these are denied, social dissatisfaction,, unrest and tension arises. With the rapid growth of population, the demand for goods and services outstrips the supply, making it almost impossible to fulfill the growing needs of the people. In India for instance, we add every year nearly 1/2 crore of people to our population. To meet the needs of this increasing number, we have to have every year an additional 120,000 schools; 372,000 teachers; 250,700 houses; 12,545,000 quintals of food grains and 4,000,000 jobs. Given the present state of economy, it is extremely difficult, if not impossible to meet these additional demands. The end result is poverty and increasing misery of the people creating a wide gulf between the haves and have nots. Poverty may drive the deprived people to anti-social and criminal acts like murder, theft, cheating, etc., which vitiate healthy social environment.

Economic growth propelled by burgeoning population has brought about changes in our accepted social and

economic values. The values of co-operation, mutual assistance, constructive competition, concern for the weaker sections, willingness to subordinate self interest to the larger interest of the community, all of which are essential for a healthy social environment, are gradually being eroded. People are becoming more and more materialistic, self centered with minimum concern for the well-being of their fellow beings and the society. Tendency to acquire wealth through easy, quick and unfair means has again led to anti-social activities like hoarding, smuggling, profiteering, black marketing, bribery, dowry, etc. all of which are leading to the pollution of the social environment.

It is, therefore, necessary to check the growth of factors that create disturbance and imbalance in the social environment. Increased production to meet growing needs is inevitable. But care should be taken to see that what is produced is equitably distributed. Our productive and distributive arrangements should be based on the aim of ensuring social justice for all. Today, the call for social justice given by almost all political parties is intended to usher in desirable changes in our social, economic and political system.

**ACTIVITY**

1. (Teacher Educators) Arrange a symposium by experts on the following themes.
  - a. Population growth and land use
  - b. Population growth and urbanisation
  - c. Population growth and deforestation
  - d. Population growth and pollution
  
2. (Students) Collect from your local panchayat or municipal office particulars regarding the acreage of arable lands in your village or around your city in 1991 and in 1995. Do you find any difference ? Give reasons.
  
3. (Teachers) Arrange a lecture by the Administrator of the Municipality of your city on the problems faced by the Municipal Administration relating to the provision of basic civic amenities including keeping the city clean.
  
4. (Teachers) Arrange a group discussion on population growth and its impact on the society.
  
5. (Students) Develop a picture album to depict
  - a. population growth
  - b. urbanisation
  - c. deforestation
  - d. sources of energy
  - e. pollution

**EVALUATION**

1. Why is the rate of increase in the national income in India higher than that of the per capita income ?
2. What is meant by density of population ? How does it affect quality of life ?
3. What is zero growth rate ? Is it good or bad for the country ? Give reasons.
4. Why should early marriage be discouraged ?
5. What is meant by unproductive population ? How does it affect economic growth ?
6. How do you say that high infant mortality rate leads to population growth ?
7. How does population growth lead to changing patterns in land use ?
8. How does urbanisation create pollution ?
9. How do forests help in preventing soil erosion ? What are the harmful effects of soil erosion ?
10. Point out the relationship between population growth and deforestation.
11. How does population growth lead to increased crimes in society ?

12. "Our progress would be like writing on sand with the waves of population growth washing away all that we have written". Comment on this statement.

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5. Sharma, R.C., "Population, Trends, Resources and Environments", Hand Book on Population Education, Delhi, Dhanpat Rai and Sons, 1975.



MODULE II  
LIVING (BIOTIC) RESOURCES

INTRODUCTION

Environment is the sum total of all external conditions and influences affecting the organisms. Environment may be divided into abiotic (non-living) and biotic (living) components. Biotic components consist of plants, animals and micro-organisms. All the biotic components are adapted to survive within the framework of their habitats. The biotic resources are dynamic, interrelated macrosystems - a mosaic of eco-systems. It includes the study of biological environment of organisms and human impact on the organisms.

Biotic resources are important in satisfying the needs of man. Every child must know about the biotic resources and need of these resources in maintaining the ecological equilibrium. It is our duty to conserve the resources for prosperity. These resources should be consumed judiciously without exploitation. Therefore, there is an urgent need to create an awareness among the children about the biotic resources.

This module attempts to create an awareness about biotic resources through various planned activities related to the concepts identified to achieve the given objectives.

Assessment exercises have also been added to test the achievement of the children in terms of awareness.

#### **OBJECTIVES**

The pupils will be able to

- acquire knowledge about different types of organisms and their surroundings.
- recognise the diversity in nature through simple observations.
- develop skills of collecting and classifying information about biotic resources and drawing simple inferences from it.
- understand and interpret the interactive relationship between humans and their environment, and also amongst various organisms.
- list the beneficial and harmful effects of various organisms on human beings.
- appreciate the need for the conservation and management of biotic resources.

#### **Identification of plants, animals and micro organisms in nature**

No organism in this world can live alone. Successful survival of a biological community depends upon its inter-relation and interaction between the physical environment and among the living organisms themselves. The physical environment constitutes the abiotic component whereas the living one constitutes the biotic component.

Biotic resources influence the abiotic resources and vice-versa.

Human beings by their intelligence have controlled the environment and thereby influenced the biosphere. Their activities have affected their environment on which their very existence depends. Earlier the maxim was "Conquer Nature". Presently it is "Live in Harmony with Nature". Hence, to achieve this, he must observe and understand our environment, especially the biotic one. This will enable us to manage, conserve and preserve the natural environment in a more effective way. It will also ensure that the links and balances of biosphere are disturbed to the minimum. Thus, to achieve this, we must try to understand the biotic resources around us.

## BIOTIC RESOURCES

### ACTIVITY 1

List the biotic resources available in your surroundings in a given tabular form.

Sl. No.	Name of the plant	Name of the animal
1	Tulsi	Earthworm
2	Neem	Centipede
3		
4		

List the diversity of organisms in each category as shown in the example given above.

#### **ACTIVITY 2**

Measure height and breadth of ten selected trees in your surroundings. Compare the data and find out the average height and average breadth.

#### **ACTIVITY 3**

Collect information on cattle census and tabulate. Contact the local animal husbandry department/agriculture department for collecting information.

#### **ACTIVITY 4**

There may be a variety of plants and animals in your locality. You may not know many of these plants and animals. Try to list them with the help of your teacher/elders/an expert.

### **DIVERSITY OF LIFE IN NATURE AND THEIR ADAPTATIONS TO THE ENVIRONMENT**

We notice a variety of living beings - plants, animals and micro-organisms in our surroundings. They vary in their size, shape, structure and habitats. All these organisms are interdependent on each other and each contributes in its own way to the environment. Thus, each and every organism is essential for the maintenance of the ecological balance.

#### **ACTIVITY 1**

Observe different types of insects.

Collect different types of grasses and prepare a herbarium.

Discuss the different kinds of animals found in different ecosystems.

List the plants and animals living in forests.

List the broad leaved plants.

List the thorny plants.

List the organisms found in a drop of pond water with the help of microscope and draw them.

## **ACTIVITY 2**

Collect some leaves and dry them between folds of old newspapers.

Find out the following in the dried leaf.

- a. Geometrical shape of the leaf.
- b. Geometrical angle of the apex of the leaf.
- c. Leaf area by using graph paper.

Note: You may also use fresh leaves for the above activity.

Discuss the results of the above activity.

You have learnt that plants and animals cannot survive without air and water. Organisms are adapted to live in the diverse habitats found in the environment. For this, organisms have developed suitable, structural and functional features during the course of evolution. This ensures their survival in a particular environment and enables them to give rise to suitable offsprings thereby enabling the continuity of the generation. Thus, adaptation has got an evolutionary significance.

Adaptation leads to the formation of divergent groups of organisms arising from a common stock. As a result of adaptations, organisms of same stock may evolve along different lines in various habitats. Most of the organisms modify their morphological or physiological aspects to suit the environment in which they live. These adaptations which may be short term or long term help the organisms to tide over the adverse environmental conditions.

**ACTIVITY 3**

Visit a pond and observe flora and fauna of the pond. List different types of organisms observed.

**ACTIVITY 4**

Observe a fish in its natural habitat as also an aquatic plant and write down the observable adaptations.

**ACTIVITY 5**

Collect the pictures of animals living in various habitats - water, mountains, desert and forests.

**ACTIVITY 6**

List out the various plant modifications and mention their uses in a tabular form.

---

Sl. No.	Name of the plant	Modified part	Use of the modified part
1	Opuntia	Leaf into spines	Protects against grazing animals
2			
3			

---

Perform a similar activity for animals. Present your data in a tabular format.

---

Sl. No.	Name of the animal	Modified part	Use of the modified part
1	Tapeworm	Head	Suckers on head help in attachment to host
2			
3			
4			

---

**CLASSIFICATION OF BIOTIC RESOURCES BASED ON THEIR UTILITY TO MANKIND**

Organisms show diversity in shape, size, structure, function, habitat, and various other characters. On the basis of their diversity, they can be classified into various groups. Living organisms can be broadly classified into plants, animals and microbes. Some of these organisms are beneficial to us and some are harmful. Here you are going to classify the biotic resources based on their utility to mankind.

**ACTIVITY 1**

Make a list of various organisms. Identify them based on their utility. Classify them as beneficial or as harmful ones. Present your observations in a tabular form as follows.

**LIST OF BENEFICIAL ORGANISMS**

---

Sl. No.	Name of the organism	Benefit obtained
1		
2		
3		
4		

---

**LIST OF HARMFUL ORGANISMS**

---

Sl. No.	Name of the organism	Harm caused
1		
2		
3		
4		

---

**MICRO-ORGANISMS**

Bacteria are unicellular organisms. Some bacteria are beneficial and some are harmful to us. Some bacteria are harmful as they are responsible for causing diseases in man. Most bacteria are beneficial to us because they help in manure decay, fixation of nitrogen, fermentation, production of vitamin B complex, etc. According to their role in environment, they can thus be divided into useful and harmful bacteria.



**ACTIVITY 1**

Take some cow dung in a polythene cover. Observe the small organisms that settle in it, note down the changes day by day caused in the cow dung. Enter your observations in the table given here. Also note the colour, smell, moisture content, initially, and finally.

---

Cow dung	Changes				
	----- 1st day	----- 2nd day	----- 3rd day	----- 4th day	----- 5th day

---

**ACTIVITY 2**

List out the useful, harmful bacteria with the help of a teacher/health worker or a doctor. Discuss preventive measures in case of bacteria that cause diseases. Viruses are also micro organisms. They fall in the borderline of living as well as non-living. They cause diseases in man, domestic animals and plants.

**ACTIVITY 3**

Visit the nearby health centre and collect information on bacteria and viruses that cause diseases, and their effects on biological environment.

Fungi are also micro-organisms like bacteria and viruses. However, many fungi can be seen with the naked

eye like mushrooms and bracket fungi. Fungi lack chlorophyll, hence live saprophytically, i.e. on dead organic matter. Fungi are both useful and harmful to mankind.

#### ACTIVITY 4

Make a list of fungi with the help of your teacher. Classify them into useful and harmful fungi.

##### LIST OF USEFUL FUNGI

---

Sl. No.	Name of the fungus	Reason for usefulness
1	Penicillium	Antibiotic-drug
2		
3		

---

##### LIST OF HARMFUL FUNGI

---

Sl. No.	Name of the fungus	Reason for harmfulness disease caused
1	Phytophthora infectans	Late blight of potato
2		
3		

---

#### ACTIVITY 5

Take two equal sized bread pieces. Keep one piece each in a polythene cover. Now close one of the polythene

covers tightly. Keep the other one open. Observe them after some intervals with a magnifying glass. Enter the observations in the table given here.

---

Day	Bread piece in			
	Polythene cover (closed)		Polythene cover (open)	
	Thread-like structure (hyphae)	Rough counting of spores	Thread-like structure (hyphae)	Rough counting of spores
First				
Second				
Third				
Fourth				

---

What do you infer from the above data ?

Plants around us may be flowering or non-flowering. Both types are useful to us as they give food and shelter to animals. We use various parts of these plants such as seeds, fruits, flowers, secretions as well as excretions of plants to fulfill our needs.

#### ACTIVITY 6

List out the plants in your locality and classify them as cereals, vegetables, fibre-yielding plants, condiments and medicinal plants.

Animals also constitute an important biotic resource. They are abundant in fresh water and marine water. Aquatic resources yield a high percentage of animal food.

**ACTIVITY 7**

Visit a nearby pond or seashore and observe the animal resources. Make a list of these animals. Mention their uses.

**ACTIVITY 8**

Collect data in a tabular form and infer economic importance of various animals from it.

---

Type of cattle	Water consumption per day	Food consumption per day	Other food materials per day	Milk yield	
				No. of liters per day	In Rupees

---

---

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**ACTIVITY 9**

Collect information from your village/town for the last five years pertaining to the population of your area.

---

Year	No. of acres cultivated	Average yield per acre	No. of births	No. of deaths	Total population
------	-------------------------	------------------------	---------------	---------------	------------------

---

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Most natural or man made ecosystems constantly undergo changes. These may be caused by

Reproduction of the plants and animals is to enhance the required biotic resources and to ensure survival.

Every plant or animal undergoes growth, development, ageing and death culminating in decay. Reproduction is nature's way of ensuring that the living organisms do not get wiped out completely. Thus, multiplication of the organisms occurs generally in the healthiest phase of their life-cycle, i.e. usually immediately after the completion of sexual development. Animals and plants adopt various methods of reproduction. Reproduction is the only means for the renewal of the biotic resources.

#### ACTIVITY 1

Here is a checklist of various methods of reproduction adopted by various organisms. You can collect some of the samples and observe them to know about the way they reproduce.

NOTE: Seek the help of your teacher or any science practical book for procedure.

- Budding in Bryophyllum
- Propagation of a runner - jasmine plant
- Budding of yeast cells
- Growing Pencillium on the bread
- Observation of dispersal of seeds - list out dispersal of different kinds of seeds that you have observed.
- Vivipary in mangroves
- Collection of pictures of animals and their offsprings.

**ACTIVITY 2**

Make a list of the plants that can be propagated through their vegetative parts. Mention the plant parts used for their propagation. Plant potato 'eyes' in the soil and observe their development. Keep watering it from time to time. Write your observations in a notebook.

**ACTIVITY 3**

Make a list of animals which show parental care. Collect their pictures and paste in your album.

**ACTIVITY 4**

Sow some bean/pea seeds in school garden or at home and also plant eyes of potato/bud of ginger/bulb of onion. Compare rates of production of plants propagated from seeds with vegetatively propagated plants.

**ACTIVITY 5**

Visit a research station nearby to find out about grafting techniques. You may also contact the horticulturist and floriculturist to know about various methods of grafting.

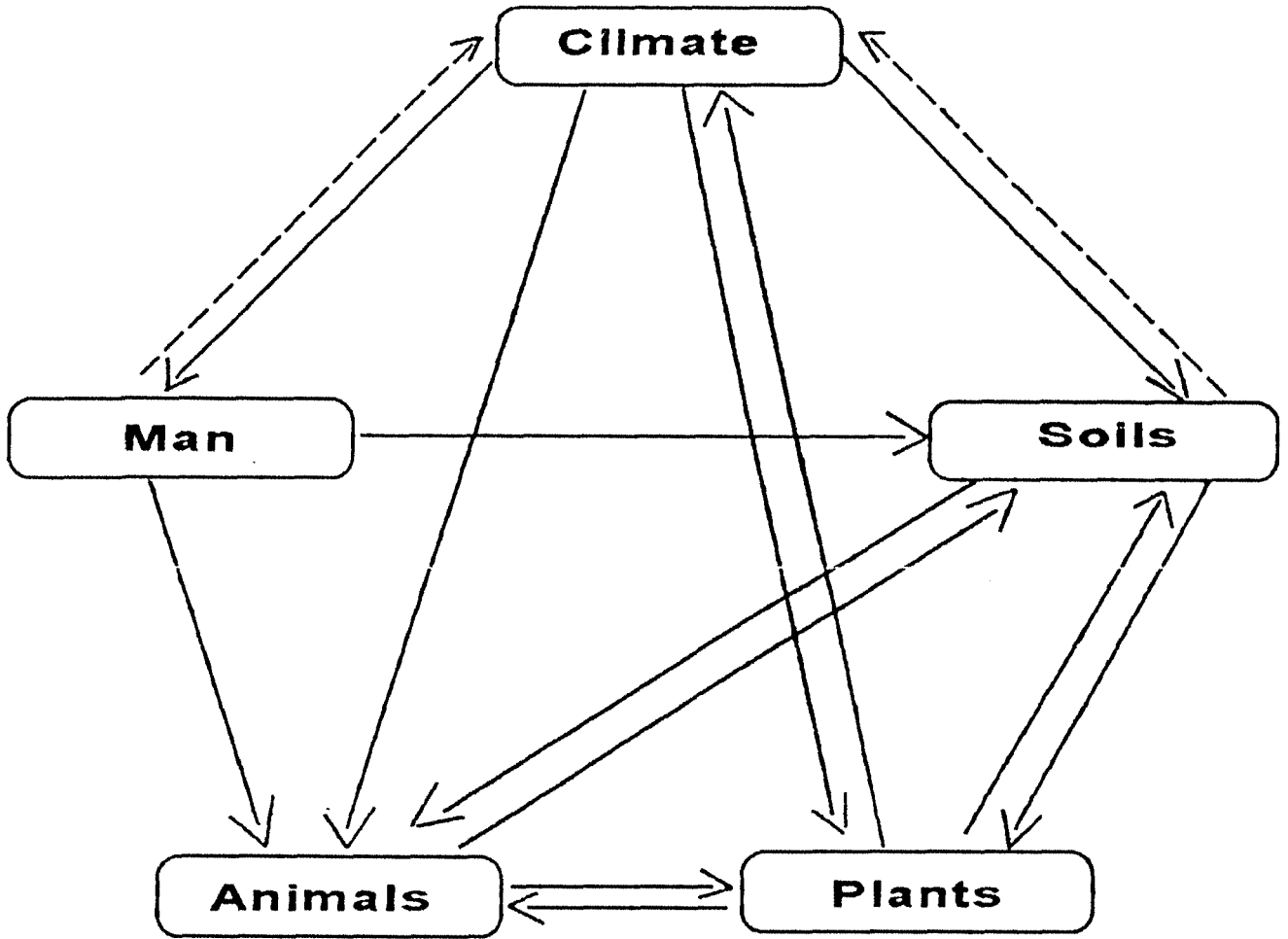
**ACTIVITY 6**

Make a list of animals around you. Note number of offsprings produced in one delivery.

---

Name of the animal	No. of offsprings	No. of dead offsprings	No. of offsprings that reached adult stage

---



The Ecosystem as an integrated complex unit (Van Dyne, 1966)

Some species of insects reproduce more quickly and in greater number than most of the organisms. Many insects are important agents of pollination and seed dispersal. Even other animals help in pollination.

#### **ACTIVITY 7**

Observe how various seeds are dispersed. List the various mechanisms of seed dispersal. Note the names of animals which help in seed dispersal. Make a list of animals that help in the dispersal of a given seed. Present your data in a tabular column.

#### **Interdependency of plants and animals**

Producers, consumers and decomposers live inter-dependently in a community. The ecosystem as an integrated complex unit is shown in the diagram here.

Plants synthesize their own food material by the process of photosynthesis. Photosynthesis was a significant event in the evolution of biosphere. Previously there was no free oxygen in the atmosphere. The release of oxygen through photosynthesis permitted the evolution of higher life forms.

Symbiosis is an association of two or more than two heterogenic species. This association may be mutualism, commensalism and parasitism. In mutualism both the partners are benefitted, e.g. nodules or roots of leguminous plants in which bacteria which fix atmospheric nitrogen live.

#### **ACTIVITY 1**

Select two equal square feet of fertile land in your school garden. Plant equal number of both leguminous (such



as bean) and non-leguminous plants (such as mustard) together in one square and an equal number of non-leguminous plants in another square. They supply nearly 3/4th of the total oxygen requirement of life on earth. They are also a possible future source of human food.

Every organism has a role in maintaining the balance of nature. For example, some birds may be important in controlling population of snakes and rodents - while others are important for seed dispersal. Snakes play an important role in the control of rodents.

Food chains consist of producers or autotrophs which make their own food and consumers or heterotrophs. Consumers can be herbivorous (plant eaters), carnivorous (animal eaters), omnivorous (both and plant and animal eaters) and decomposers (dead organism eaters). Decomposers are bacteria, fungi, nematodes, mites and certain insects or organisms that feed by degrading organic matter. They are essential components of all nutrient cycles and food chains. If the decomposers were removed from the biosphere, the earth would become a vast dump of dead organisms. Life would probably stop as the nutrients needed for life would be tied up in the dead organisms in the absence of recycling.

There are two major types of food chains. The first starts from a base of green plants and goes onto herbivorous and carnivorous. The other one starts from a base of dead

organic matter proceeding to a variety of other organisms including scavengers, insects and micro-organisms. The two chains are linked to each other and help in the recycling of materials which in turn provided nutrients vital to the green plants. A trophic level consists of those organisms in a food chain that are the same number of steps away from the original source of energy. Many food chains occur in nature. An organism feeds on a variety of foods in nature. Many food chains interlock to form a food web.

#### **A SIMPLE FOOD CHAIN**

Vegetation --> Man

Vegetation --> Goat --> Man

Vegetation --> Insects --> Hen --> Man

Vegetation --> Grasshopper --> Frog --> Snake --> Eagle

#### **ACTIVITY 2**

Plan a discussion on food habits of animals found in your locality. Arrange this data in the form of food chain. Are these food chains interlocked with each other ? Find out. Represent this data diagrammatically as shown in the simple food chain above.

#### **ACTIVITY 3**

Identify a food chain from the aquatic environment. Make a diagrammatic representation of the same.

#### **ACTIVITY 4**

Observe some of the trees in your surroundings. Make a list of the birds, other animals and insects that live on them as per the table given here.

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Sl. No.	Name of the tree	Name of the animals that creep and live on that tree	Name of the birds which inhabit that tree	Name of the insects which live on that tree
1				
2				
3				
4				

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#### AGRICULTURE AND FORESTRY

Modern agriculture, of course, differs completely from primitive, slash and burn agriculture. The science of plant breeding has produced a vast diversity of crops that are adapted to various growing conditions, high yielding varieties resistant to diseases, and so forth. Agriculture must remain spread over the face of the earth because the energy of sunlight can only be utilised in photosynthesis at its point of arrival. Humans have domesticated many species of food plants. In addition, they have improved most of them by selective breeding and hybridization. Rice is probably the most important of all. It is the staple food of billions of people on this earth. It is estimated that 27% of farmers in India grow it. International Rice Research Institute (IRRI), Philippines have developed new strains of rice that produce very high yields per acre. On proper cultivation, these give a very high crop yield. The area under wheat and

maize cultivation in India is 5% and 25% respectively. Rice, wheat and corn together account for somewhat more than 3/4 billion metric tonnes of grain annually. The other crops that are grown worldwide are barley, rye and sorghum. The protein content of modern high yield grains tends to be about 5 to 13% only. Two legumes -soya beans and pea nuts account for about half of the world legume production.

Chicken, duck, geese and turkey account for virtually 100% of the world's production of protein from domesticated animals.

Beef and pork together in roughly equal amounts account for some 90%. Cows produce more than 90% of the milk consumed.

Forests are one of the largest and most complex ecosystems. Forests help to prevent soil erosion and are important in soil formation. They enrich the soil with their organic debris and increase its porosity and water storage capacity. Forests help control extremes of heat and cold making the climate more equable. They produce large quantities of oxygen and remove CO<sub>2</sub> from the air. Transpiration from forests affects the relative humidity and sometimes local precipitation. Forests also help reduce wind velocity.

The diversity of forest communities is determined by climate, soil, geology and biotic activity.

The six major types of forests in India (according to widely accepted classification) are mostly tropical, dry tropical, montane, sub-tropical montane, wet temperate, subalpine and alpine shrub.

Grasslands are characterised by plains with dense grasses, sparsely distributed trees and sometimes an abundance of herbs.

In India, specially the southern region does not have climax grasslands like the prairies, steppes, savannas and pampas of North America, Australia and Africa.

Grasslands are an ideal habitat for a large variety of herbivorous and their predators.

#### **ACTIVITY 1**

Visit an agriculture farm and collect information on mixed crops and rotation of crops. List the names of the crops grown in your area.

#### **ACTIVITY 2**

Make a list of the plants available in the nearby forest and classify them as medicinal, wood-yielding, based on their utility in our day-to-day life.

#### **ACTIVITY 3**

Adopt a piece of waste land in your village and grow useful plants for firewood and shade, etc. as it is done in social forestry.

**ACTIVITY 4**

List the types of paddy cultivated in your locality. Gather the information and write it in the following table. Mention which is more economical to the farmer on the basis of this data.

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Type of paddy	Water consumption/acre	Labour charges/acre	Fertiliser consumption/acre	Other miscellaneous expenditure	Yield/acre in kg	Duration of crop period from sowing to harvest
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**ACTIVITY 5**

Collect data on the role of precipitation from the nearby meteorological department. Analyse the causes for failure of monsoon/excess rains. Mention reasons for that in view of ecological conditions and observe the impact on agricultural fields and forests.

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Sl. No.	Year	Rainfall	Agriculture area developed	Forest area developed
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## CONSERVATION OF NATURAL RESOURCES

Humans depend on the environment for his basic needs. Needs increase as there is an increase in population. To compensate this, natural resources like forests are destroyed and are converted into cultivable lands. As a result, ecological balance gets upset and it has long term adverse effects, so environment should be protected.

We have been using various natural resources to fulfil our needs. Now there is a shortage of certain resources due to population increase and unlimited use of these resources.

Natural resources are of three types - inexhaustible, and exhaustible. Exhaustible ones may be renewable and non-renewable.

Inexhaustible: Not likely to be exhausted by man's consumption

eg. sand, air and clay.

Renewable : Naturally replenished after man's consumption  
e.g. water, wind and solar energy.

Non-renewable: Cannot be replaced after use

e.g. minerals, coal and oils.

### ACTIVITY 1

Take a small census with the help of your friends.

1. How many motor cycles, scooters and cars are there in your town ?
2. What was the number of scooters and cars last year ?

3. How many places are connected to your town by bus ?
4. What was their number last ?
5. If you are living in a city, make note of numbers in the number plates of vehicles coming to your city. From your record, find out the highest number of vehicles coming from a particular place. Do this counting continuously for two months ?

#### ACTIVITY 2

1. By which monsoon is the southern part of the country benefitted ?
2. For the past couple of years, why are big cities like Chennai, Hyderabad, or Bangalore experiencing water scarcity
3. Do we regularly get monsoon rains every year ? Specify only for southern India.
4. During the period of water scarcity is there an increase in diseases like jaundice, diarrhoea.

Answers to these questions may reveal to us that monsoons may fail, but the need for water would continue. So we should approach this problem in three ways.

1. Store water during rainy season
2. Avoid wastage of water by minimising its use
3. Keep the water bodies clean by minimising their pollution.

#### ACTIVITY 3

**Soil erosion:** Much is spoken about soil erosion now than in previous years. We hear about landslides in summer resorts like Kodaikanal, Ooty and the roads getting blocked.



The fertile top soil is removed by water and wind. When the fertile soil is washed away, plants are damaged. Do you think that only now there is lots of rain and wind? If the answer is no, why do we have this problem only now?

A correct answer to this is that when the trees and shrubs are removed, there are no roots which could bind the soil together. As a result, soil erosion occurs due to heavy rains and wind.

In dry regions, wind causes soil erosion whereas in hilly regions, rains cause it. Erosion through water is of two types - sheet erosion and gully erosion. Soil erosion occurs when top soil is washed away because of removal of vegetation. Major causes of soil erosion are overgrazing, deforestation, forest fire, tree cutting and wrong methods of ploughing.

Proper irrigation, drainage, planting fast growing plants, ploughing at right angles to slopes, dividing the hill slopes into small fills as ridges and terraces, construction of dams and check dams and controlling grazing are some of the methods to preserve soil. Further, soil fertility should be maintained in the rain fed grazing lands.

**Role of plants:** Plants form a protective canopy that reduces the impact of drops of rain pounding against the

soil, thus reducing soil erosion. The layer of dead litter prevents run off and allows water to percolate into the ground. Roots form a matrix, holding the soil in place. Dead parts of plants decompose to form humus which holds water like a sponge.

There are over 1,600,000 species of animals and 400,000 species of plants in the world today. Many of these are being destroyed by the human activities. One in five of all living beings may become extinct by 2000 AD.

Effective conservation programmes should involve the communities dependent on the resources or are affected by conservation of that resource.

Effective ways to conserve both renewable and non-renewable resources include reducing wasteful consumptions and recycling, whenever possible. Sometimes, it is possible to substitute one resource by another. Substitution of resources does not necessarily result in their conservation. True conservation of biotic resources requires their judicious use.

#### **ACTIVITY 4**

1. Vanamahotsava is celebrated in schools every year. What is its importance ? Discuss.

2. Collect information about the Appico and Chipko movement.

3. Gather information from the forest officers as to how effectively several forest schemes are implemented in your area and their importance.

As a consequence of increasing, tampering of nature by us, natural resources are fast dwindling. The M.A.B. programme (Man and Biosphere) has been greatly concerned with problems of nature conservation both in relation to habitats and to wildlife. The M.A.B. programme is to equalise and intensively study the basic process in ecosystem with a view to understanding their function normally and under stress. It is an interdisciplinary programme of research and emphasizes an ecological approach to study the inter-relationships between humans and the environment.

As the forests in which wild animals live have been destroyed, they are being protected in sanctuaries set up in various parts of the country. Some wild animals which were in large numbers once upon a time have become reduced in their number considerably. Some have even become extinct. A good example in Cheetah.

In November 1952, Indian Board for Wildlife was established. Every year since July 1955 onwards, wildlife week is celebrated in July. This is celebrated to impress the importance of preserving wild life.

In Mudumalai sanctuary in the Nilgiris in Tamil Nadu and Nagarhole in Karnataka., wild animals like the elephants, bisons and lion-tailed monkeys are protected.

Ranganathittu in Karnataka, Vedanthanagal in Tamil Nadu are bird sanctuaries established by the respective Governments to protect and preserve birds. National parks e.g. Corbett National Park (UP), Hazaribagh National Park (Bihar) are preserved and protected by Central Government.

Zoological gardens are provided in bigger cities to enable the people to see wild animals and birds. In recent times, the zoo gardens (Mysore Zoo Garden) have been developed in such a way that natural surroundings are created for the animals living there. Animals are thus able to move out of their cages and enjoy similar surroundings in the zoo. This helps in the perpetuation of animals also, especially the ones which need protection. Indira Zoological Park, Vishakapatnam, Andhra Pradesh; Anna Zoological Park in Vandalur near Chennai, Tamil Nadu are also quite famous.

#### **ACTIVITIES**

1. Gather information about the various sanctuaries in your State. Name the wild animals that are protected in it.

2. Collect the list of names of sanctuaries in India and types of wild animals protected therein.

3. Gather information about the Zoological Parks in your State and list out the names of the animals with the guidance of the teacher.

4. Ask and discuss with your teacher about bird sanctuaries and zoological parks in your state.

**EVALUATION**

1. State the biotic resources present in your surroundings.
2. Make a list of useful plants and animals.
3. Classify the plants based on their sizes, habitat, life span.
4. List the domesticated animals of your locality.
5. Name some of the plants found in your school garden.
6. List the plants which grow in water.
7. List the plants which grow on land.
8. Name the plants which grow in the desert.
9. Name the animals which live in water.
10. Name the animals which live on land.
11. Name the animals which are found in the desert.
12. Write the names of the plants which store food in roots.
13. List out some of the useful fungi to human beings.
14. State names and parts of plants which are useful for making shelters in the given proforma.

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Sl. No.	Name of the plant	Part of the plant used	Purpose for which it was used
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15. Write the names of the plants that are useful for medicines.
16. Name some of the bio-pesticides.
17. Enlist the different kinds of legume plants.
18. Describe various methods of reproduction in plants.
19. Write some hybrid varieties of cereals and pulses.

20. Mention the names of animals which show parental care.
21. What is the role of reproduction in renewal of the biotic resources ?
22. Discuss, using a suitable example, interdependency of plants.
23. Give some examples of scavenger birds. List the various types of symbiosis.
24. Mention the names of animals which help in seed dispersal.
25. What are the latest techniques in the field of agriculture ? Discuss.
26. Name some of the varieties of crops which are high-yielding and disease-resistant.
27. Discuss the various types of forests.
28. What is social forestry ?
29. List the different products of the forests.
30. "Deforestation is an unavoidable evil". What measures can be taken to overcome this problem ?
31. Explain the need of conservation of natural resources.
32. Write an essay on "Vanamahotsava".
33. Write ways and means of conservation of soil.
34. Write the importance of conservation of wild life.
35. List the animals in the zoological park visited by you.
36. Write a brief account of your visit to a sanctuary.
37. List the names of plants and animals which are extinct.

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MODULE III  
NON-LIVING (ABIOTIC) RESOURCES

INTRODUCTION

Man on earth does not live in vacuum and his existence needs an environment in which the two components such as physical non-living elements (abiotic) and biological living elements (biotic) are the integral parts for his survival. Nature has abundant resources, both living and non-living. These are resources, man and society growth with and depend on for his livelihood and his socio-economic development. The non-living resources are as important as the living resources in satisfying the needs of man. Many of these resources are of limited availability and non-renewable.

The change in nature is a basic phenomenon and the interaction of biological and physical resources may cause degradation or become non-renewable, such as fossil fuels (petroleum, coal and natural gas), minerals and metals.

Failure of man to make judicious use of the abiotic resources will deplete him. Excessive mining of gold from Kolar gold mines and iron ores from Khudremukh in Karnataka and pumping out petroleum at Krishna basin in Andhra Pradesh have considerably depleted which has become a great concern for future.



While keeping the exploitation of the resources to the minimum, he has to search for alternatives for them. Therefore there is an urgent need to create in the future citizens an awareness of the existence of the abiotic resources, their limited availability, the need to avoid excessive exploitation by men and to conserve and find out alternatives.

This module attempts to identify the abiotic environmental areas found in the textbooks has been discussed as natural resources under different headings such as land, soil, atmosphere, water, energy and minerals. It also suggests activities to highlight the factors discussed above. A provision is also made for evaluation.

#### **OBJECTIVES**

To make the children -

- acquire knowledge of the presence of natural resources around them; appreciate that the natural resources provide them with food, air, shelter and other life sustaining materials; become aware of the limited existence of the natural resources; realise the need to prolong their availability and develop an attitude to judiciously utilise the resources.
  
- acquire the knowledge of universe and its abiotic and biotic resources.

- acquire the knowledge of celestial bodies and their influence for the change in nature.
- understand that the land is vital for life on earth and that indiscriminate exploitation of land through agriculture, mining, industrial growth leads to its degradation that affects man's sustainable development.
- understand the distinction between soil, nutrient, rock and minerals.
- develop an understanding that the rocks and soil contain fossil fuels and minerals; acquire knowledge of the importance of preserving the fertility of the soil and of how soil erosion robs the soil of its fertility and soil pollution reduces considerably the agricultural produce.
- understand that there exists a relationship between economic development of a country and natural resources including the employment of human resources.
- understand that the atmosphere is one of the indispensable resources and that it is the source of oxygen and carbon dioxide required for the existence of life become aware of air pollution and feel the necessity to contain the pollution.
- understand that water being one of the most important requirements of life. Recognise its sources; and become

aware that just 1% of the available water is fit for human consumption and that water resource is renewable.

- understand that the sun is the source of energy used by living organisms, acquire knowledge of the fossil fuels, and their importance in industrial growth; become aware of their limited availability and realise the need for finding out alternatives (wind and solar energy) of them.
- develop an understanding of the use of electricity in man's life, its sources and make them realise that the use of non-renewable source of electricity is to be reduced.
- understand that the existence of minerals and how man depends on minerals for his economic development; aware of the disruption caused by mining to the ecosystem and their reckless consumption and also their limited existence and hence their planned utilisation.

The teacher trainee applies the knowledge and the understanding for various methods to

- preserve the abiotic and biotic resources of nature.
- extrapolate the cyclic flow of nutrients in nature.
- obtain energy and its judicious uses.

#### **NATURAL RESOURCES**

Man needs food, air, shelter clothing recreation, etc. for a better living. He depends on natural resources

for his need and wants. These natural resources may be living or non-living. Man makes things needed for him from the natural resources through processes (eg. cutting of trees, mining) skilled and unskilled workers are involved in producing the materials needed for man.

The various important abiotic natural resources are soil, water, air, minerals and fossil fuels and natural gases. The lithospheric components of inorganic and organic materials are most essential for the living animals and plants.

The topography and geographic climate of southern India is such that except desert all type of land is available. A vast area is sea coast, mountains, forest and wetland. Human life is very much dependent on the nature of land and available soil. The top most layer of soil is very important for cultivation and for forest growth. Deforestation and removal of natural vegetation by man overgrazing by animals leads to soil erosion and due to running water on the hilly slope it may cause flood and havoc on plane land. Therefore the conservation of soil should be a top priority in the use of natural resources.

#### **ACTIVITY 1**

1. Make a list of non-living things found in the surroundings.

2. Find out the natural resources from which these things are made; tables, paper, shaving blade, knife.

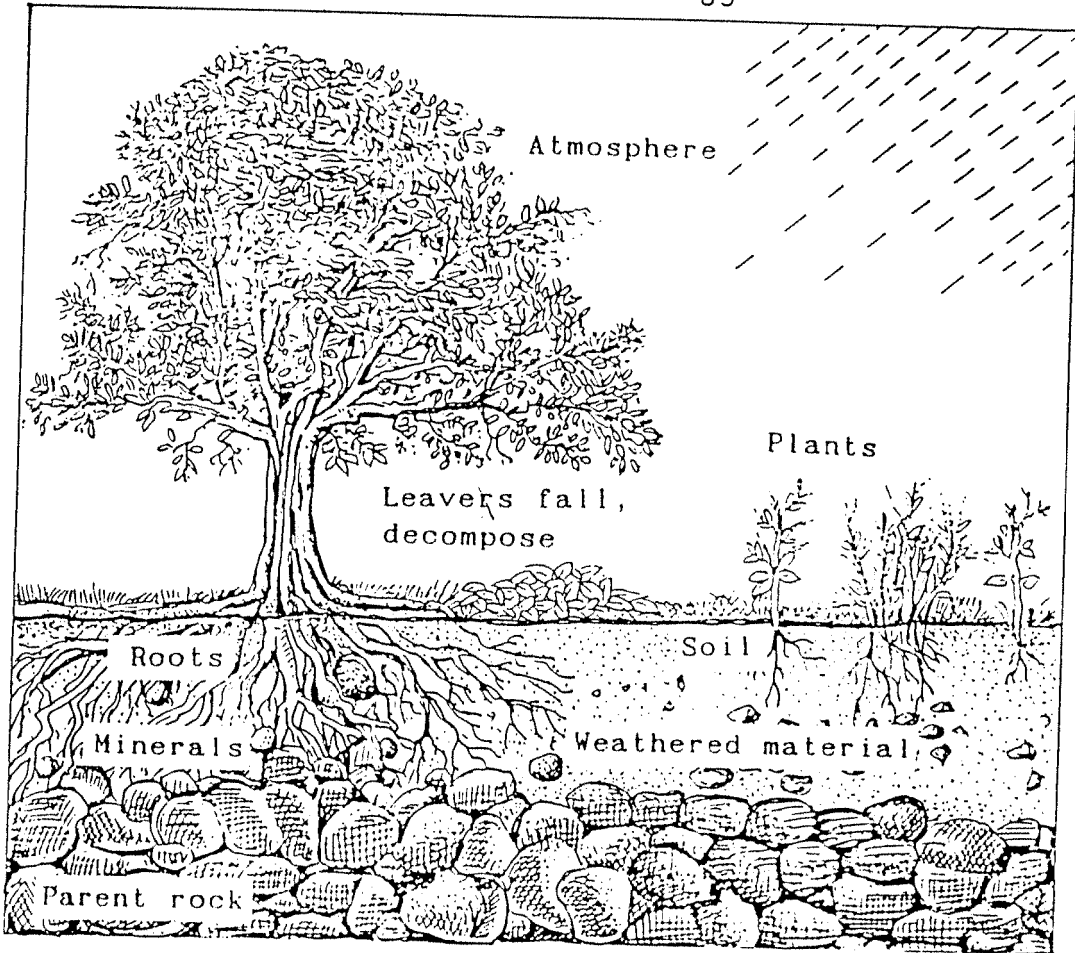
3. Learn how iron is extracted from its ore.

The natural resources have become indispensable to human life because of the variety of their uses. Man wholly depends on them for his economic development. The natural resources exist in limited quantities. For example the total coal reserves in India is about 39,700 million tonnes. The present rate of consumption is about 110 million tonnes a year, at this rate of utilisation, the reserves cannot last long. Out of the total petroleum reserves of about 400 million tonnes in India, we are extracting about 15 million tonnes every year and it is estimated that at this rate of consumption the petroleum reserves will not last for more than 20 years. Indiscriminate use of the resources will result in their depletion. Some natural resources are renewable (eg. trees) others are non-renewable (eg. minerals). If we could utilise our resources judiciously to prolong their availability sources as well, our future generations would not have to suffer on this account.

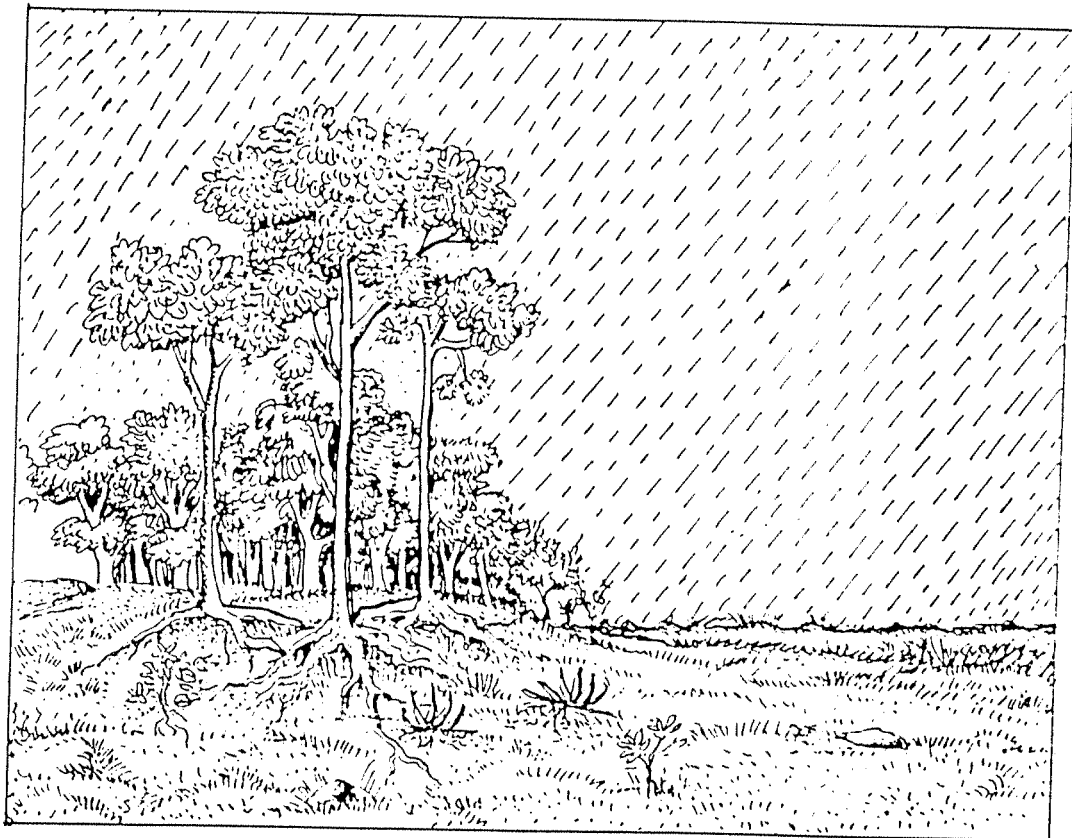
**ACTIVITY 2**

1. Planting of trees in school, house and neighbourhood.

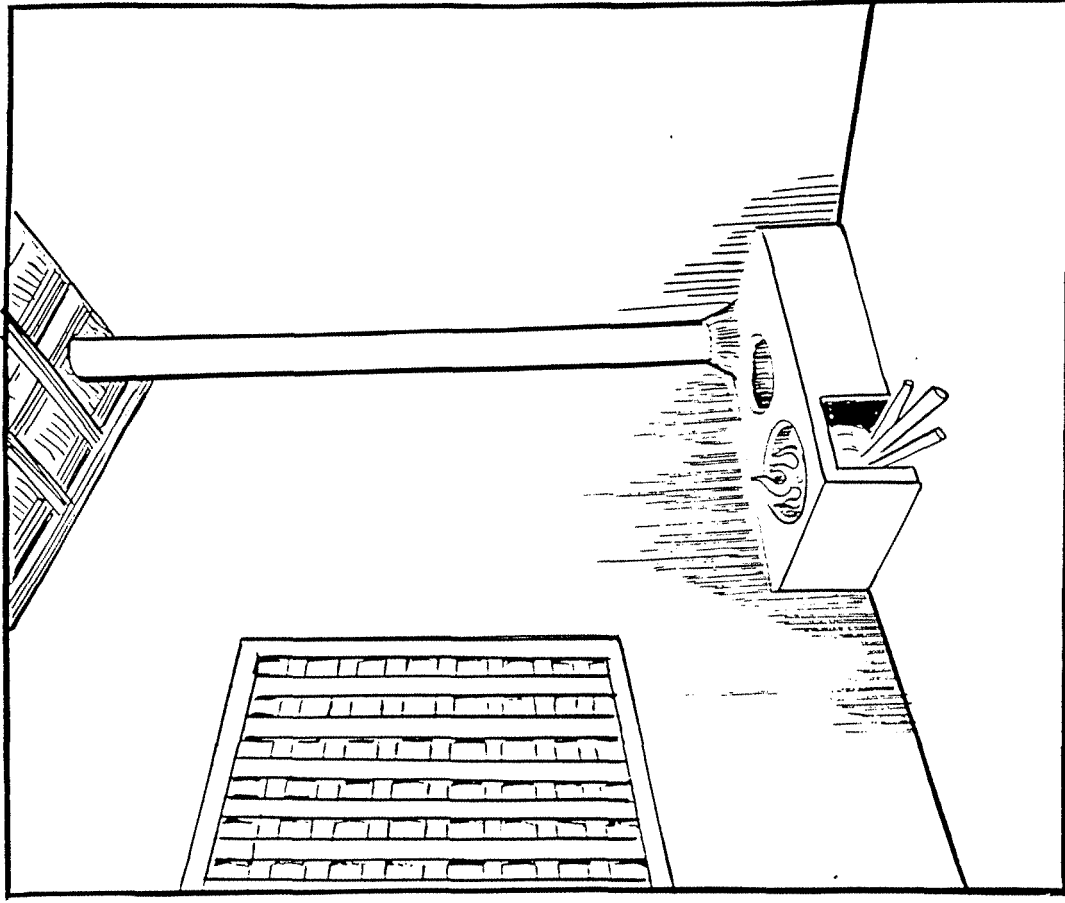
2. Students forming a pressure group for educating the parents and neighbours on the need of conservation of natural resources like water.



Formation of 2.5 cm of top soil can take anything from 100 to 2,500 years.



Preventing soil erosion.

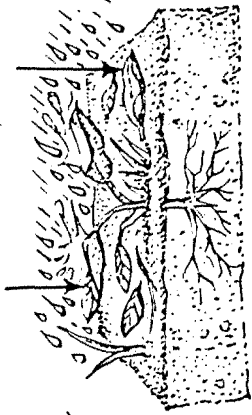


Smokeless chulhas

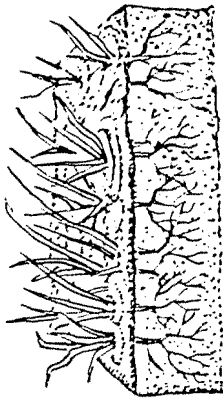
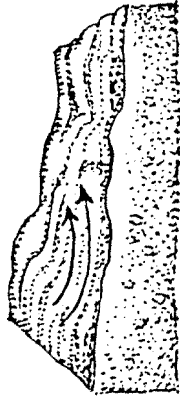
Unprotected soil

Vegetation

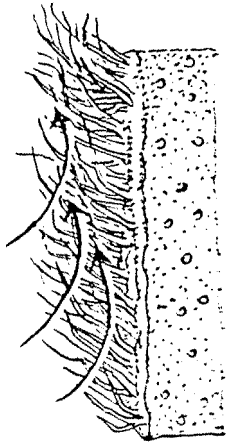
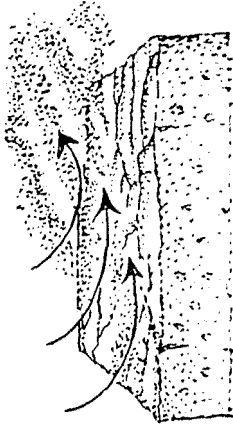
Dead leaves  
on surface



Splash



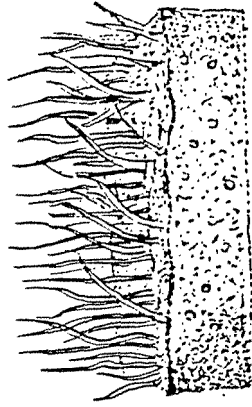
Runoff



Wind



Result



Sandy, rocky soil

Good soil maintained

Forces of erosion



3. Collection of waste paper, scrap iron, etc. and sending them for recycling; knowing the process and uses of recycling of non-organic wastes.

### ACTIVITY 3

1. Collect data about the availability of minerals in India and the south as well.

2. Collect information from newspapers and magazines about the steps taken by developed countries to conserve the natural resources.

3. In rural areas, man mostly makes use of the materials available in the neighbourhood for building his house. Compares the house building materials used in one area with those of another area. Discuss about the building materials used by tribals.

4. It is claimed that man indulges in non-judicious use of natural resources. Discuss and find out such uses of natural resources in your region.

5. Prepare a status report on the environment of your region.

6. Discuss and find out how the stone quarry like Kadappa stone and granite stone influence the region.

### LAND AND SOIL

Land is an essential component of environment. It consists of rock, soil, water and life forms. The land

features present today are the results of processes like glaciation, volcanic eruption, erosion, formation of mountains and oceans, appearance of forms of life, over millions of year. Both nature and man are responsible for the physical changes to the landscape. Man has altered the face of earth to a great extent in recent times. This has led to the degradation of the soil and loss of natural resources.

#### ACTIVITY 1

1. Identify the various types of soil found in the locality.

2. Collect samples of soil from different places, observing how they are different from one another.

3. Observe what happens to soils in times of rain and wind.

4. Arrange a meeting of children with farmers and know the types of plants that help to increase the fertility of soil.

5. Collect informations about the type of soil and climatic condition needed for the tea, coffee and cotton which are the special crop of southern India.

6. Group discussion for the reasons, that why paddy, cotton and coconut is grown more in southern India rather than the wheat.

Rocks contain minerals. Soil, which is formed from rocks through a very slow process, is a mixture of organic (biotic) and mineral materials (abiotic). The type of soil present in an area is largely dependent on the available minerals. It takes 500 to 2500 years through natural process for the formation of 2.5 cm of fertile top soil. Lack of an effective soil management like prevention of erosion results in the loss of top soil leaving the land barren.

#### **ACTIVITY 2**

1. Collect information about the extent of agricultural land and barren land in your area.

2. Arrange field trip to a forest area, where children could observe and study how the soil gets fertility through natural processes.

3. Study of efforts taking place in the locality to prevent soil erosion by planting of trees and raising bunds.

4. Observe the water retention capacity of different types of soil through simple experiments.

5. Start a vermiculture unit in the school.

Soil is a non-renewable source because the formation of soil takes thousands of years, and hence to be conserved. Soil conservation is vital for food production. Maintenance of soil productivity is essential to the welfare of all nations and future generations. Soil productivity can be maintained by preventing erosion, returning plant and

animal residues to the soil reducing the loss of nutrients from the soil.

Soil gets polluted and loses its fertility in the long run by the use of chemical fertilizers that kill the living organisms present in the soil and increases the salt content of the soil. The industrial effluents and failure to return the nutrients to the soil also cause soil pollution and soil degradation. A survey conducted in India in 1982 shows that when compared to 18 million tonnes of nutrients we obtained from the land through the foodgrains in a year, we returned to the land the next year only 11 million tonnes of nutrients in the form of fertilizers and manures. Thus, in our country, the food producing land is losing 7 million tonnes of nutrients every year.

#### ACTIVITY 1

1. Visit an organic farm and observe how the nutrients are returned to the soil in the form of organic resources.

2. Know from your teacher or a farmer how 'crop rotation' helps in reducing the loss of nutrients from the soil.

3. Identify the soil pollutants like polythene covers, plastic materials found in the garbage used as a manure by the farmer.

4. Visit industries located in agriculture areas and observe how the crop production around the industries is affected.

Use of land for quarrying is profitable in the short term, but is not the best use in terms of health and ecology in the long run. Immense damage to the land is caused by mining and quarrying. It is possible to reclaim such land through afforestation and replacement of top soil.

#### **ACTIVITY 2**

1. Visit the areas, where brick kilns are located and observe how the top (fertile) soil is removed.

2. Make a study of the effects of stone quarrying and mining on the environment.

Landlessness is an important cause of poverty. The number of rural landless in India is expected to reach 4.4 crores by the end of the century. Multiple land use will minimize the pressures on land surface, eg. paddy fields used as fish ponds, etc.

#### **ACTIVITY 3**

1. Prepare a chart of land use and calculate the percentages of land used for various purposes.

2. Meet the town and country planning officer and find out the availability of any master plan demarcating residential, agricultural and industrial zones.

3. Discuss and find out the types of houses to be built in a land starved area.

#### **ACTIVITY 4**

1. Collect information from the soil test laboratory about the potentiality of various types of soil available in your locality.

2. Agricultural produce is decreasing year by year. Collect data to substantiate this statement.

3. Obtain data from the Pollution Control Board of your area regarding the industries causing soil pollution and the extent of land affected.

4. Demarcate an area in your neighbourhood and find out the extend of agricultural land consumed by industrial activities.

#### **ATMOSPHERE**

Atmosphere is one of our vital abiotic resource. It is the direct source of carbon dioxide and oxygen required for plant and animal life on earth. It is composed of 78% of nitrogen, 21% of oxygen, 9% of organ, 0.03% of carbon dioxide and small amounts of water vapour and inert gases.

The earth is surrounded by gaseous envelope of various composition as an atmosphere. The transparent gaseous layer of atmosphere has varying characteristics of

temperature and their combinations. The different climatic condition in India such as summer, winter and rain is due to change in the atmospheric temperature, pressure, humidity and other gaseous condition of air at different places at different period. A sudden low atmospheric pressure causes storm and cyclone which is a common feature of coastal southern India.

#### **ACTIVITY 1**

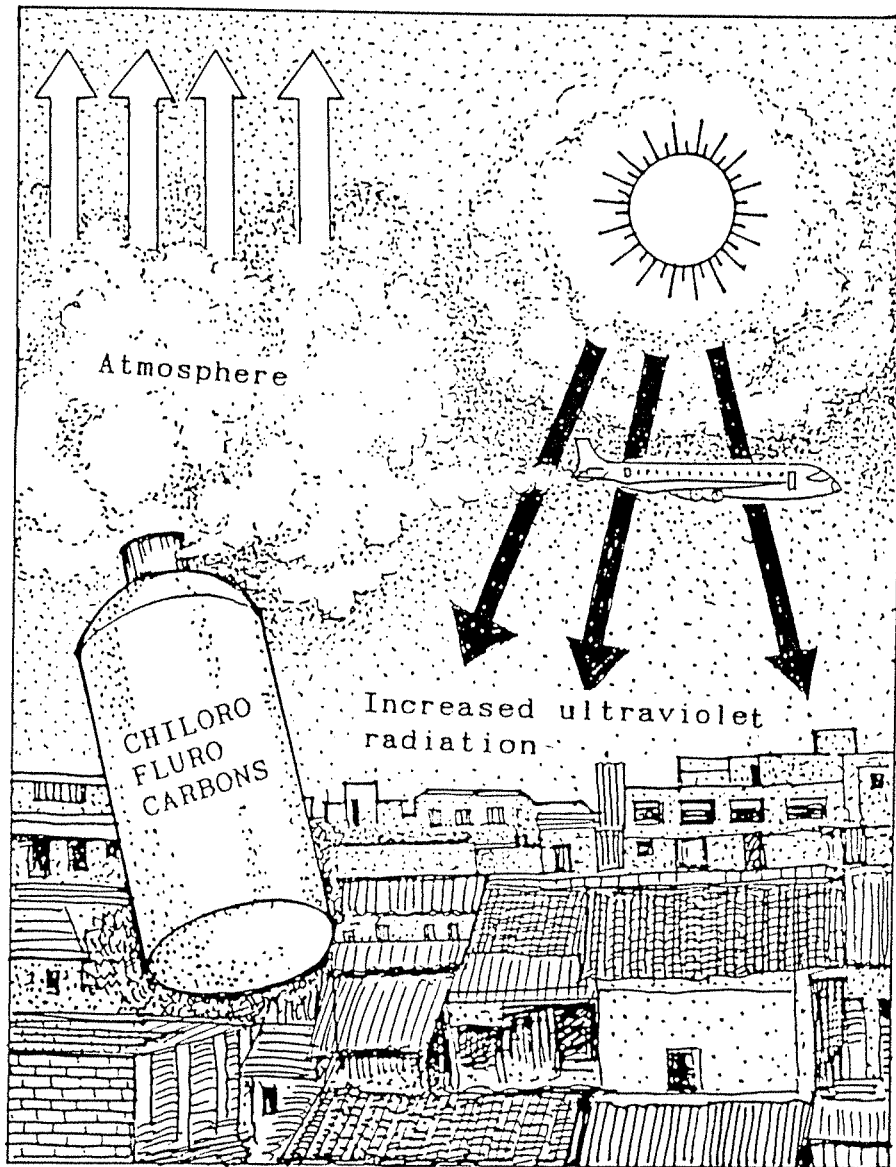
1. Keep a glass of ice water on a table for some time. You will find drops of water on the water surface of the glass. Find out where from has this water come.

The upper layer of the atmosphere contains ozone. It is the ozone that protects life on earth from the harmful ultraviolet radiation of the sun. Without the ozone, life on earth could not have been as it is now. The chemicals produced by man released into the atmosphere damage the ozone layer. We should realise that the depletion of the ozone layer will result in considerable damage to life on earth and so take steps to avoid it.

1. Collect newspaper clippings about ozone hole and discuss its effects on life on earth.

2. Discuss various ways of preventing ozone depletion.

Smoke and fumes, emitted from factories, automobiles, electricity generating plants, petroleum refineries, etc.



Human activities are leading to the depletion of the ozone layer.



release enormous quantities of pollutants into the air. People living in the polluted towns are prone to diseases like bronchitis, asthma, lung cancer, etc. Burning of fossil fuels release large amounts of oxides of sulphur and nitrogen into the air.

The particulates (dust, soot, etc.) released both from natural processes (eg. volcanic eruption) and man made processes (eg. burning of coal) cause respiratory problems in man. They also affect the process of photosynthesis in plants. To protect women from the smoke and particulates smokeless chulas have been developed for use in the kitchens.

#### ACTIVITY 1

1. Visit a house, where the smokeless chula is installed and observe how it functions.

2. You might have known that the leakage of a poisonous gas at Bhopal resulted in the death of many people and loss of vision to hundreds of people. Discuss how such a leak will immediately/immensely affect man and materials.

3. People in rural and slum areas make use of open air toilets. This results in environmental pollution apart from becoming sources of man diseases. Discuss how this can be avoided.

4. Discuss the differences of urban and rural atmospheric air and its effect on human health.

5. Discuss the air pollution vehicular emission test for big cities.

6. Draw the five layered atmosphere of ascending order for (i) Troposphere, (ii) Stratosphere, (iii) Mesosphere, (iv) Ionosphere and (v) Exosphere.

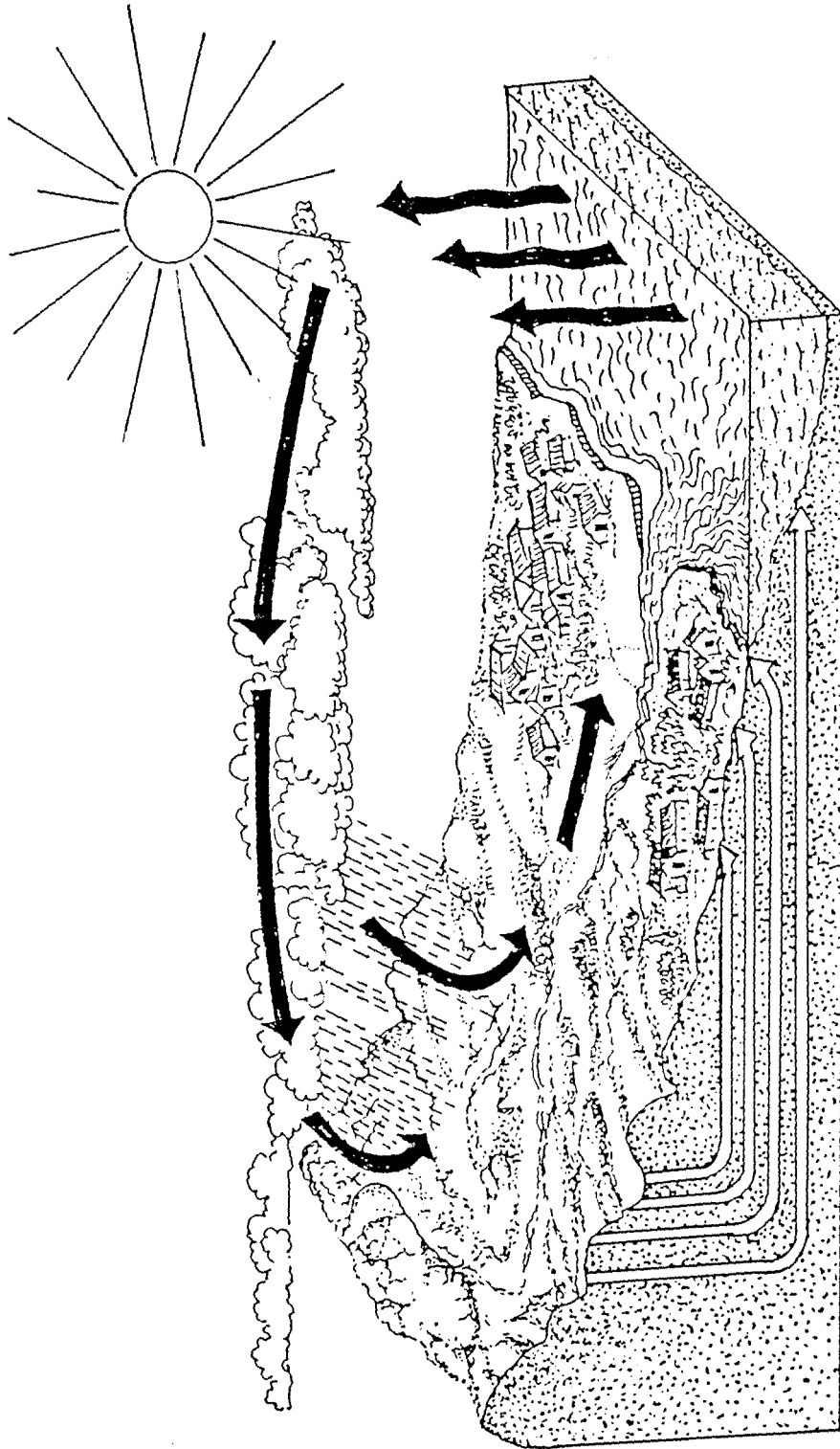
7. Draw the chart for nitrogen and carbon dioxide cycles.

8. Discuss the application values of atmospheric pressure in aviation and telecommunication system.

9. Arrange a field trip to show the atmospheric pollution due to industrial exhausts.

#### **WATER**

Water is one of the most important requirements for life. Only 1% of earth's water supports all kinds of life on land. Water covers about 70% of earth surface and about 1.4 billion cubic kilometers as its volume in the hydrosphere of which 97% is found in oceans. The principal form of water on land is found in rivers, lakes, ponds, streams, glaciers and underground water. It is true that all form of fresh water sooner or later reach to sea and become salt water. Growing population, agriculture and industry are increasing our demand for water. The maximum use of fresh water is needed for irrigation of land and industries whereas the most available sea water is not used hence a judicious use is needed.



The water cycle is powered by the sun.

Indiscriminate use of water has resulted in its shortage. The sewage and the industrial effluents are the major causes of water pollution. Nature helps man in retaining land water through the process of water cycle. Water pollution is also removed to some extent by natural processes.

#### ACTIVITY 1

1. Make a survey of various water resources available in the locality.

2. Collect pictures/news items depicting scarcity of water.

3. Find out the source of water to your house and discuss on the water charges and ways to reduce them.

4. List the names of the important rivers in South India.

5. Discuss the use and misuse of water ways as a means of transport.

Ground water is the main source of water for drinking, industry and irrigation. Water table in an area is mainly affected by withdrawing excessive amounts of water resulting in shortage. This also results in salt water intrusion in the coastal areas, leading to shortage of drinking water. Water management practices such as collection and proper storage of rain water (recharging of ground water), afforestation of catchment areas (to

prevent loss of water due to evaporation) could help prevent such shortage.

#### ACTIVITY 2

1. Observe of water retention capacity of different soils.

2. Find out whether your local body or government has any law restraining digging of borewells on the coastal areas. Discuss what can be achieved by such laws.

3. Dig a soak pit in your school and observe its effectiveness in recharging of ground water.

Water pollution occurs when chemicals or nutrients enter water faster than they can be removed by natural processes. These include sewage, oil, silts, industrial effluents, pesticides and fertilizers. Stagnant waters are more prone to be polluted easily than running waters. Inadequate wastewater treatment and lack of drainage facilities cause water borne diseases like malaria. This emphasises the need for wastewater treatment (removal of pathogens, soluble and insoluble materials) before releasing into the environment, apart from taking steps to contain sewage and industrial effluents.

#### ACTIVITY 3

1. Visit the industrial areas and observe the effluents discharged and discuss how the effluents pollute the water bodies.

2. Observation of water treatment plants.

3. Observe the places around public water taps/ drinking water wells how these places are misused; how the stagnant water is a breeding ground for mosquitoes. Discuss how the people will be educated in this regard, activities to drain the stagnant water by channels to naturally drained area, planting of trees, filling up the cavities, etc.

Water conservation may also be affected in other ways also. Water bodies like rivers, lakes and tanks are to be taken good care of by desilting, afforestation on the banks, clearing of the wild plant growth in canals and water bodies.

#### **ACTIVITY 4**

1. Learn from the parents/teachers the number of water bodies present in the locality ten years ago; whether all those exist now, if not, what happened to them.

2. Group discussion on the protection of rivers, ponds and lakes.

3. Collect information from water testing laboratory about the quality of the water available in various places in your neighbourhood.

4. Collect data on consumption of water by various types of industries, find out the type of industry that consumes more water.

5. Collect information about the quantity of water used by various types of food crops, cultivated in your area; find out the crop that consumes the largest amount of water and the crop that consumes the least amount of water.

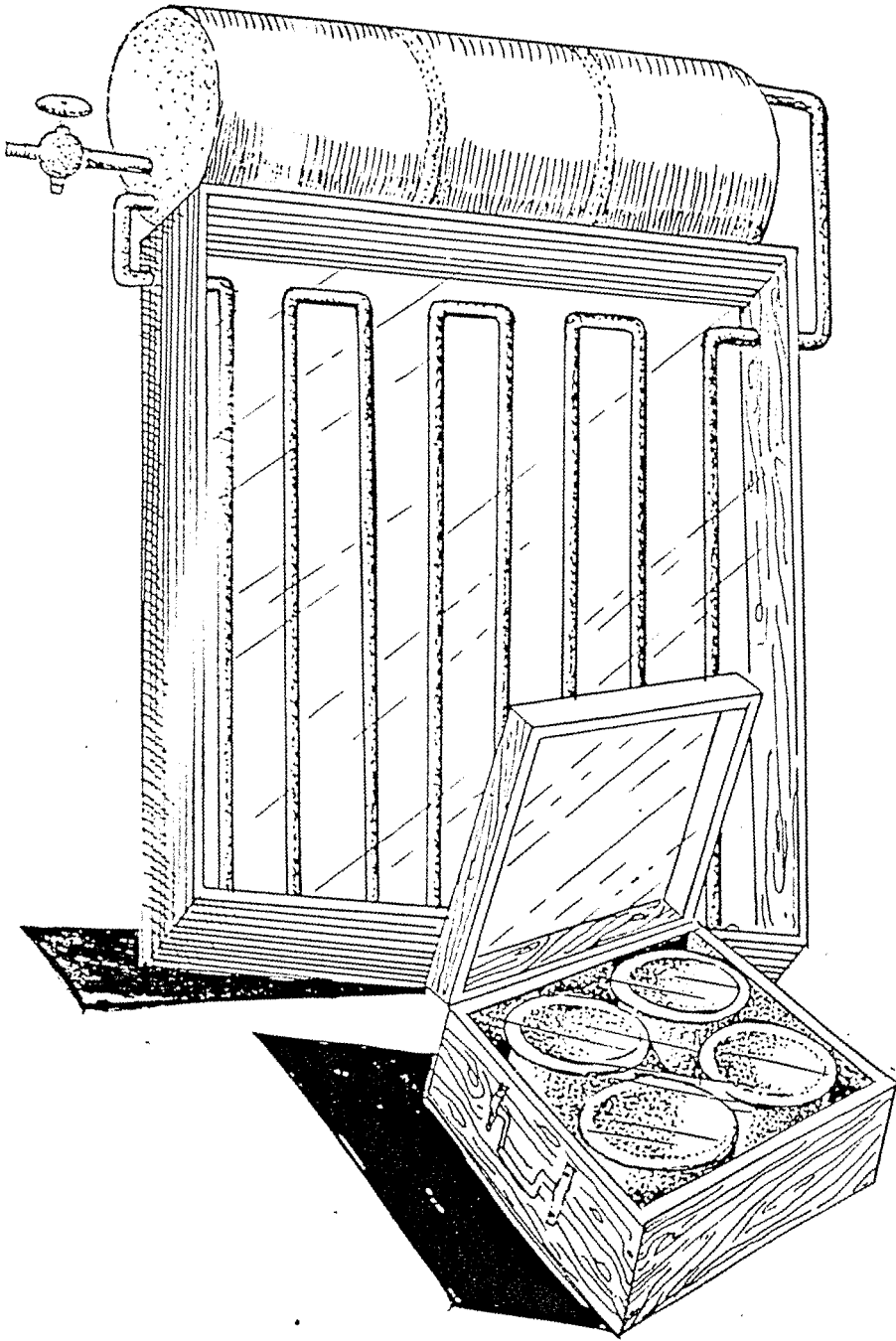
6. Make a survey of the water reservoirs found in your area and estimate the total storage capacity of all the reservoirs.

7. Collect data about the availability of ground water in various areas of your locality and estimate their depth.

#### **ENERGY**

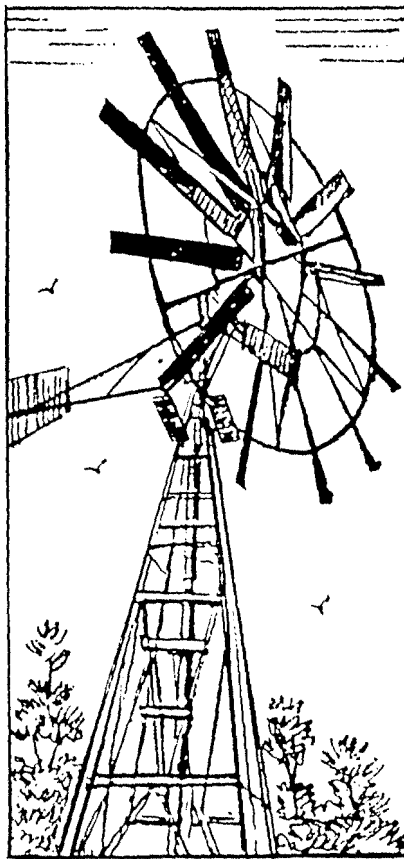
Sun is the ultimate source of energy for all the ecosystem. The process of life is based on conversion, utilisation, storage and transfer of energy. Plants convert solar energy into chemical energy. Animals make use of the energy stored in plants. Energy cannot be created or destroyed. It can be changed from one form to another. Globally there is an increase in our demands for energy due to population growth, industrialisation and advancement in technology.

Apart from sun there are other sources of energy in nature such as - wind energy, hydel energy, nuclear energy, geothermal energy, mechanical energy, fossil fuel energy and natural gas energy. Energy is generated in sun due to interaction of hydrogen and helium molecules which produces



lar water heaters and cookers are becoming popular.





Wind power.

great heat and energy flows from sun to earth in the form of sun light containing a spectrum of electromagnetic waves. Some of the energy is absorbed by the atmosphere and on earth the plants only convert the light energy into chemical energy which is used as nutrients by man.

#### ACTIVITY 1

1. Do the various experiments in school laboratory to know the materials required for photosynthesis.

2. Draw a flow chart to show the energy you require for your activities ultimately obtained from the sun.

3. Identify the types of energies and their sources, used by the industries in your area.

Fossil fuels are oil, gas and coal. They are non-renewable source of energy. Oil forms the major global source of energy. Demand for oil will exceed production before 2000 A.D. The developing countries have an advantageous position, as they continue to depend mainly on renewable energy sources, eg. wood, animal waste, etc. Production of oil and natural gas has adverse environmental effects like environmental pollution, loss of life on land and in ocean due to oil spill and disruption of the ecosystem. Coal is a cheap source of energy and found in abundance and widely distributed. Mining of coal disrupt ecology and its burning causes air pollution. It is estimated that India's coal reserves are 400 crore tonnes

and will last only upto 2050 A.D. at the present rate of consumption. The environmental disruption caused by the exploration fossil fuels is to be weighed against the benefits man gets from their uses. The environmental disruption caused by fossil fuels can be reduced by conservation practices and pollution control. As the fossil fuels are scarce expensive and cause environmental degradation and pollution, an alternate source of energy has to be found.

#### **ACTIVITY 2**

1. Make a study of the uses of coal in your neighbourhood.
2. Collect the newspaper clippings on the ill effects of mining.
3. Discuss and find out the various ways of reducing petrol and Diesel consumption in your locality.

Renewable energy consists of wind power, hydel power, solar energy and bio-energy (biogas). The environmental degradation caused by renewable energy resources will be minimal, unlike non-renewable resources. In India, 45% electricity production comes from hydel power, 45% from coal and the remaining 10% from oils, natural gas and Diesel power plants. The ill effects of hydel power products are changes in watersheds and in ecosystem. The reservoirs submerge hundreds and thousands of acres of forest and agricultural lands and cause displacement of thousands of

people. Solar energy can be used for heating, cooking and generating electricity. It is an inexhaustible source of energy and does not cause any pollution. Government is making efforts for popularising solar energy for domestic and commercial purposes. Wind energy can be used for generating electricity and working of water pumps. Even with moderate winds, wind power can pump water more cheaply than Diesel power. Fuel wood, used in rural households and animal wastes (eg. animal dung, biogas) are the other non-commercial sources. 40% of India's energy requirement is met from non-commercial sources. The other source of energy is nuclear power, which requires expensive technology. It generates radioactive wastes. In the recent accident at Chernobyl, radioactivity was released into the atmosphere.

### ACTIVITY 3

1. Make a visit to a wind mill and observe that it is used for, what are the provisions made to make it work when the wind blows in different directions.

2. In some areas, wind mill is used to generate electricity. Collect the pictures of such wind mills. Discuss how electricity is generated from wind power.

3. Make a working model of a wind mill.

4. Arrange a meeting of the children with the officials of the District Rural Development Agency (DRDA) regarding their efforts to popularise the household solar equipments.

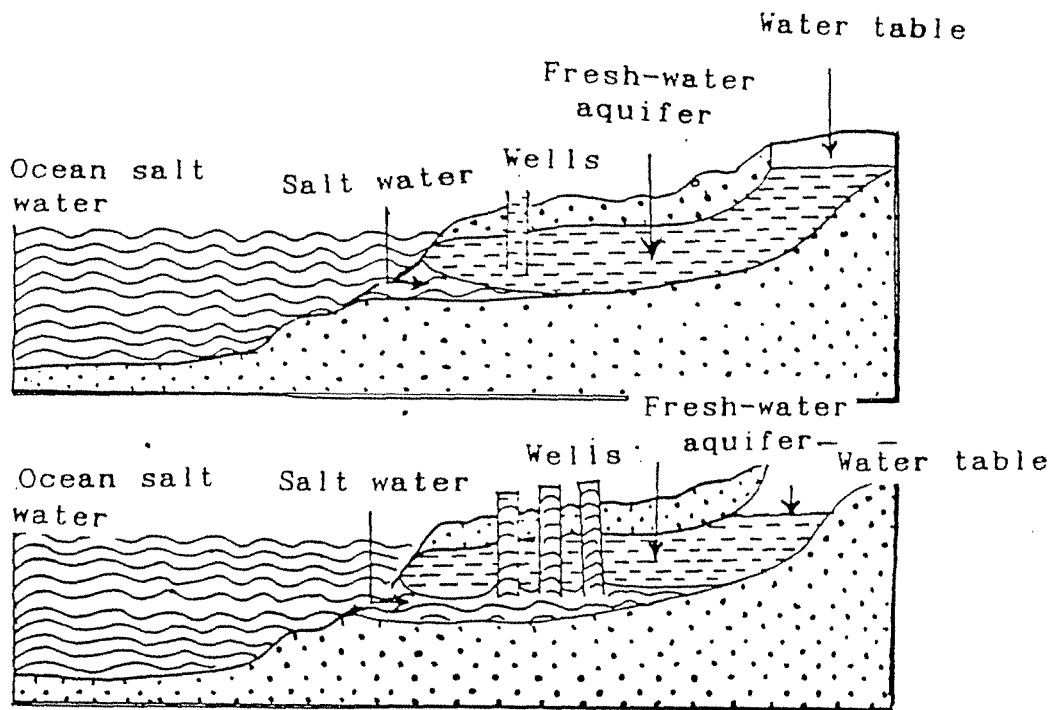
5. Observe the working of a solar power calculator.
6. Observe a simple model of the solar stove.
7. Collect pictures of solar-powered street lights, automobiles, water heaters, etc., visit the establishments which use solar power equipments.
8. Visit to a biogas plant; observe how the biogas is produced and its various uses in the house.
9. Discuss how the people and their culture will be affected, when they are displaced due to construction of dams.
10. Collect news items appearing in newspapers and magazines on how the marine life is affected by atomic power stations.

#### **ACTIVITY 4**

1. Collect information about the newly available fuel saving domestic appliances.
2. Conduct a survey and find out the availability of solar equipments in households.

#### **MINERALS**

Minerals of various kind are metallic or non-metallic natural occurring component of environment and it is needed for the development of animals and plants in a small quantities. The plants obtain the required minerals from



Salt intrusion occurs when.

soil through roots, while the animals get the minerals as a nutrient in the form of plant or animal products.

The industrialisation demands lots of minerals in the form of ores. India is rich in mineral resource both in quantity and quality. The southern states of India produce gold at Kolar mines and Hutti mines (Karnataka); iron at Khudremukh (Karnataka and Andhra Pradesh); manganese at Nizamabad and Visakapatnam (Andhra Pradesh); copper at Khammam and Chitradurga (Andhra Pradesh and Karnataka); mica at Nellore (Andhra Pradesh); coal at Sringeri (Andhra Pradesh and Tamil Nadu); lignite (Tamil Nadu) and petroleum at deltas of Godavari, Krishna and Kaveri (Andhra Pradesh and Karnataka).

Minerals play an important role in our daily life. Man could not have achieved so much advancement without minerals. Due to population growth and industrialisation the current rate of use of minerals exceeds their rate of formation. They are non-renewable sources.

#### **ACTIVITY 1**

1. Mark the places in the map where various minerals are available in India.
2. Draw a histogram about the availability and quantity of various minerals in your states.
3. Visit a museum and observe the various kinds of minerals.

Extraction of minerals have negative effects on environment. The underground mining can damage the environment. For example, waste materials brought to the surface cover large areas and water that drains from the mines is often acidic and can harm aquatic life. Underground mining also affects human health as the mine workers are subjected to high temperatures, harmful dust and poisonous fumes. Surface mining often results in deforestation, dust formation reduced percolation of rain, erosion and landslides. The damages caused by surface mining can be repaired to some extent by placing the top soil adding organic manures and afforestation. But the damages caused to surface waters will continue to exist.

#### ACTIVITY 2

1. Visit a mine and observe; utilisation of the discharged water; steps taken to reclaim the land after mining.

2. Discuss how the air and water get polluted by mining.

#### ACTIVITY 3

Make a visit to a surface mine and estimate the extent of land used for dumping the earth, obtained in mining.

#### EVALUATION 1

1. What is the metal that is mostly used in the things in your house ?



2. What is the handle of the kitchen knife in your house made of ?
3. What is the source material for making a wash basin ?
4. Classify the following materials into having renewable and non-renewable sources, wooden table steel knife, aluminium plate.
5. Which resource, in the construction of houses in your locality, is being consumed at a faster rate resulting in their scarcity
6. Are there any wasteful methods of utilising resources of any kind in your area ? How can this be stopped ?

#### **EVALUATION 2**

1. What are the components of soil ?
2. How is soil formed ?
3. What kind of soil is best suitable for sugarcane cultivation ?
4. How does the top soil get fertility in nature ?
5. How is the soil made fertile ?
6. What are the causes for soil erosion ?
7. State the ways in which man makes use of soil for building houses ?
8. How does the soil erosion spoil agricultural lands in your area ?
9. List the steps taken by the government for soil management in your area.

10. How does the earthworm help in soil fertility and creation of the soil ?
11. Is there any agriculture land in your area, that is affected by soil pollution ? What are the pollutants ?
12. What is the role of polythene waste in the degradation of soil ?
13. How does the soil fertility get affected by brick kilns ?
14. What types of house will solve the housing problems ?
15. Identify the plants used for reducing soil erosion along the coast ?
16. How do the formation of sand affect the agricultural activities in the coastal areas ?

### EVALUATION 3

1. What are the industries in your area, causing air pollution ?
2. What are the components of air ?
3. Where can you get fresh air ?
4. Why don't the plants affected by fumes from vehicles

### EVALUATION 4

1. What are the main causes of water pollution ?
2. What is the source of fresh water, that is available throughout the year ?
3. Where are the hydroelectric projects in your state situated ?
4. Why do we build dams across rivers ?

5. Which are the dams built across the major rivers of your state ?
6. Why should the canals and water bodies be cleared of weeds ?
7. How can the banks of rivers and lakes be strengthened ?
8. What are the ways in which the recharging of ground water can be affected ?

#### EVALUATION 5

1. What are the types of fuel used for cooking in rural areas ?
2. What are the uses of wind mill in your area ?
3. Name the solar equipments that could be used in the house.
4. Rural people use a simple technique to heat water with solar energy. Do you know how ?
5. What are the solar equipments sold by DRDA at subsidised rates ?
6. Fill in the blanks:
  - a. Hotels and guest houses use solar power for \_\_\_\_\_
  - b. Coal is used by people mostly for \_\_\_\_\_
  - c. People get petrol and Diesel for their vehicles from \_\_\_\_\_
7. What are the raw materials used in photosynthesis ?
8. Name the coal mines in your region.
9. In how many ways electricity is generated ?
10. Name the atomic power plants in our country.
11. What are the by products of coal ?

### EVALUATION 6

1. How do population growth and industrialisation increase the rate of use of minerals ?
2. What are the ill effects of surface mining that could be repaired to some extent ?
3. How are the underground mine workers affected physically
4. Can we repair the damages caused to surface water in surface mining ?

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## MODULE IV

### FULAN HEALTH HYGIENE AND ENVIRONMENTAL SANITATION

#### INTRODUCTION

Health is a state of complete physical mental and social well-being and not merely the absence of diseases and infirmity. It is the quality of life that enables the individual to live most and serve best.

Health and happy living can alone be purposeful and meaningful. In order to live a happy life the child has to learn the various components of comfortable living. Our aim is not merely imparting knowledge but preparing the individual to the necessary steps for improving the quality of life. Man is living in an environment which is not conducive for happy living. Health and environment are directly related to each other. Here the community has a major role to play by keeping the surroundings clean, free from diseases and other environmental hazards. The major health problems in our country have their origin from poor environmental conditions, lack of safe water supply, improper disposal of solid waste and excreta, contaminated food, and poorly maintained surroundings. It is found that diseases like tuberculosis, diarrhoea, gastroenteritis, hepatitis, malaria, kalaazar and so on, claim a heavy toll of human life in the developing nations due to poor environmental and sanitational conditions. As far as India

is concerned, health parameters need to be improved to a very great extent to realise health for all by 2000 AD. India has nearly 75 million malnourished children, the third largest number in the world, 88% of pregnant women suffering from anaemia, tuberculosis taking a toll of one death in every nine minutes, 197 districts ranging from 10-65% having goitre out of 239 districts of 29 states, and 2 million cases of malaria reported every year.

In light of the above picture which has emerged from the studies conducted by National Family Health Survey (1992-93), it is imperative that some of the health, hygiene and environmental sanitation problems are addressed and properly highlighted in the transaction of curricular materials in schools.

Here, an attempt is made to provide the information and activities about the human body, food habits, physical exercises, diseases, clothing, recreation and environmental sanitation, etc. concentrated around the learner centred, environment oriented and activity based teaching learning process.

Suitable activities are given in this module for the study of the laws of health and teaching of healthy ways of living. These activities help to fix the concepts firmly in the minds of the children and to acquire the necessary skills and competencies.

Evaluation strategies has been included in this module to assess the overall achievement of the children in all the aspects of human health, hygiene and environmental sanitations.

#### **OBJECTIVES**

After studying this module pupil would be able to -

- define and state the meanings of the concept, health, disease and sanitation.
- understand that diseases spread through improper sanitary habits.
- understand and appreciate the need for both personal and environmental hygiene for a healthy living.
- state the role of various national and international bodies in promoting healthy living.

#### **HUMAN HEALTH**

Health may be considered as a state of body when all the organs in the body are functioning properly at their optimum level. It is also important that a perfect balance is maintained between the external environment and the body. Health is never absolute. It varies in degrees from one individual to another individual at different times. It is a state of complete physical, mental and social well being.

## HUMAN BODY

We have various organ system like digestive, respiratory, circulatory nervous and excretory, etc. Each organ system plays a specific role in our body.

## FOOD AND NUTRITION

Man consumes various food to keep himself alive. The food we consume every day make up our diet. This includes items that we drink as well as those we eat. We need food for various reasons. Food can be classified as energy producing foods, body building foods and protective foods. The food that gives us nourishment, contains nutrients which are listed in the table given below.

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Nutrients	Function
Carbohydrates, starches and sugars	Oxidation - furnishes energy
Fats - Animal and vegetable	Building and repair of cell tissues organs
Proteins - Animals and vegetable	Regulating metabolism
Water - As solvent	Hormones
Mineral salts	Enzymes
Vitamins	

---

Balanced diet is one which contains all the nutrients in required proportions to give necessary calories



and to supply materials for the growth and maintenance of the body systems.

The following figure may be shown to emphasize upon the fact that how the above nutrients are important for the growth of our body.

### Activity

Observe the given figure. Why one boy looks healthy whereas the other boy looks weak? List your observation and reasons.



### Food and Health

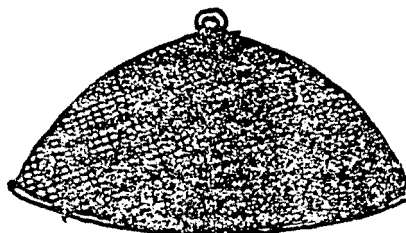
Food is important for the growth of our body and to carry out and to carry out the daily activities. The food which is exposed become contaminated food. Eating such food causes vomiting, diarrhoea, dysentery, typhoid, cholera, jaundice, etc.

Certain chemicals like DDT, and other pesticides are sprayed to the plants to protect food grains and fruits from pests like insects, rats, etc. These pesticides are harmful and poisonous. Hence vegetables and fruits must be washed before use.

The spreading of diseases can be prevented by covering the food and keeping our surroundings clean.

### Activity

Show the figure given below to students. Ask them to observe and tell which food they prefer to eat (one which is exposed or one which is covered). Ask them to state their reasons.



Diet required for an ordinary person of an average size doing normal work.

---

Nutrients	Function
1. Proteins	75 to 100 gms
2. Carbohydrates	400 to 500 gms
3. Fats	75 to 100 gms
4. Inorganic salts	
Sodium chloride	10-15 gms
Phosphorous	1.5 gms
Calcium	1.00 gms
Iron	15 mgms
Iodine	150 mgms
Copper	1.5 mgms
5. Vitamins	
Vit. A	5000 IU
Vit. D	1000 IU
Vit. B1	1.2 mgm
Vit. B2	2.00 mgm
Nichotonic acid	12 mgm
Vit. C	500 mgm
6. Water	1.13 kg

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### Highlights

1. Balanced diet includes energy giving food, body building food and protective food, in required quantities.
2. Milk is a complete food. It contains sugar, proteins, minerals, fat, vitamins.
3. Water and Roughage is a must in our food. Roughage helps in bowel movement.

1. Vegetables and fruits should be washed and cleaned before using them.
2. It is good for health to eat certain vegetables raw.
3. Uncovered food substances kept open in air should never be eaten.

### Activity I

List out the food items prepared at home and the food substances used to prepare them. Classifying them accordingly in the table given here, under respective groups.

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Energy giving food	Body building food	Protective food
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### Activity II

1. Prepare picture/album/to show different food stuffs rich in various nutrients.
2. From the above list write the six food nutrients present in the food stuffs.
3. Arrange awareness programmes talks, etc. on the importance of nutritious food.
4. Prepare a chart showing the important nutrients of milk and their functions.

**Activity III**

Write the names of the fruits and vegetables and the vitamins they have, from the figure 1.

**Activity IV**

Certain vegetables can be eaten raw whereas certain other vegetables can be eaten only after cooking. Below is given a list of vegetables, classify them accordingly in the table given.

Cucumber, Lady's finger, Brinjal, Potato, Chillies, Cabbage, Carrot, Beetroot, Beans, Peas, Leafy vegetables, Bitter gourd, Onion, Tomato, Drumsticks.

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Sl. No.	Vegetables eaten raw	Vegetables eaten after cooking
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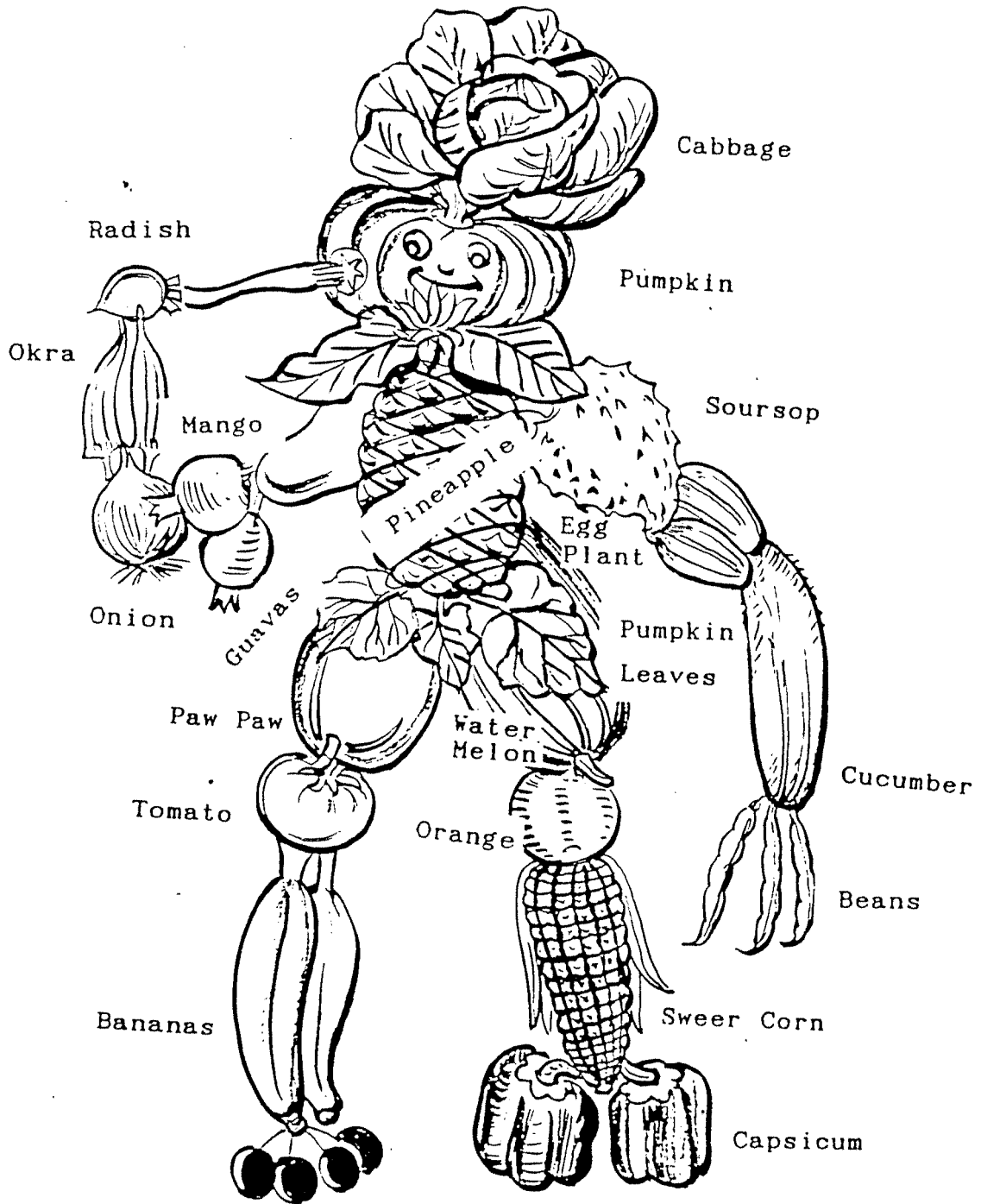
**Activity V**

Name the nutrients present in the vegetables and fruits of the health tree (Fig. 2).

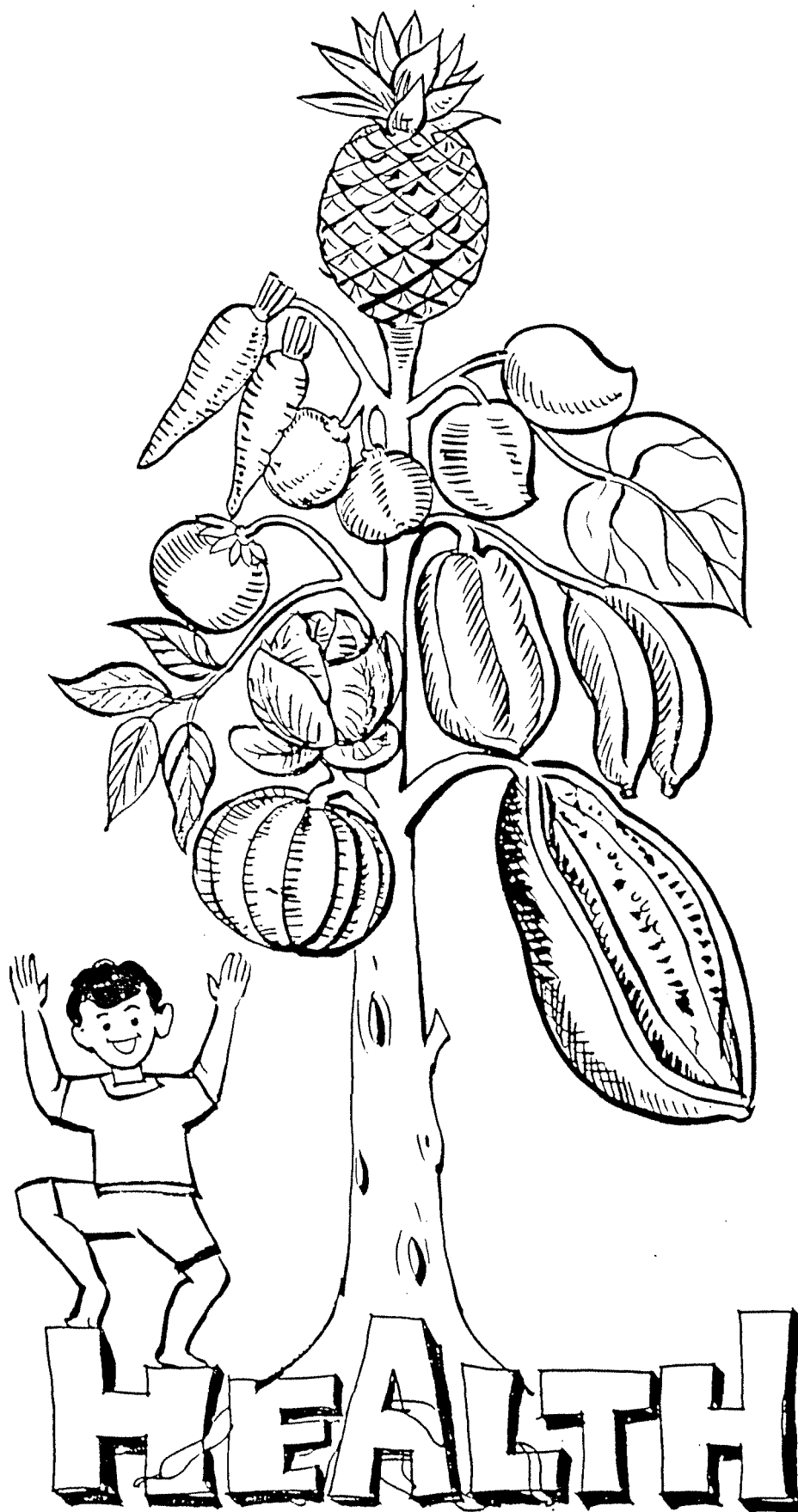
**Diseases**

Diseases cannot be easily defined. It can be said as a state of body which reflects some disturbances of its function or functions. It can be defined as a disorder in

THE VITA MAN SAYS



EAT THESE FOR HEALTH



the physical, physiological, psychological or any other function of the body. Diseases may be caused by nutritional deficiency, genetic disorder, invasion by pathogenic organism, etc. They can also be classified based on their prevalence into endemic and epidemic. Their ability to spread in a given period of time based on this latter criterion they can be classified as: endemic and epidemic. Former is limited to a specific area whereas diseases of the latter type spread by water and contaminated food. In southern region Malaria, Filariasis, Leprosy (tropical region diseases) are prevalent. Contagious diseases like Scabies, Tuberculosis, Typhoid fever, chicken pox and measles are also rampant.

#### Activity I

1. List out the communicable diseases found in your area.
2. What measures are being taken to prevent and cure communicable diseases ?
3. Arrange a filmshow depicting methods of prevention.
4. Arrange talks by experts.
5. Collect the pictures supplied by public health centres.
6. Organise discussions for creating awareness about the diseases.

However, overnutrition may also cause serious problems such as:

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Name of nutrient	Effect
Protein	Dyspepsia
Carbohydrates and fats	Diarrhoea

---



Deficiency diseases that are caused due to lack of a particular nutrients.

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Deficient nutrient in the diet	Effects
1. Proteins, fats and carbohydrates	Digestive troubles
2. Protein (in infants)	Nutritional oedema and syndrome of Kwashiorkor
3. Iron	Anaemia
4. Iodine	Goitre
5. Vitamin A	Night blindness and dry skin
6. Vitamin B	Beriberi
7. Nicotinic acid	Pellagra
8. Vitamin C	Scurvy
9. Vitamin D	Rickets and dental caries
10. Vitamin E	Sterility
11. Water	Disturbance of circulation and heat regulating mechanism

---

### **Activity II**

1. List the names of some fruits and write the various vitamins present in them.
2. List out various diseases caused due to contaminated food and water.
3. Two pictures are given here showing the deficiency diseases (1) goitre, (2) anaemia. Similarly collect pictures regarding the other deficiency diseases and make an album.

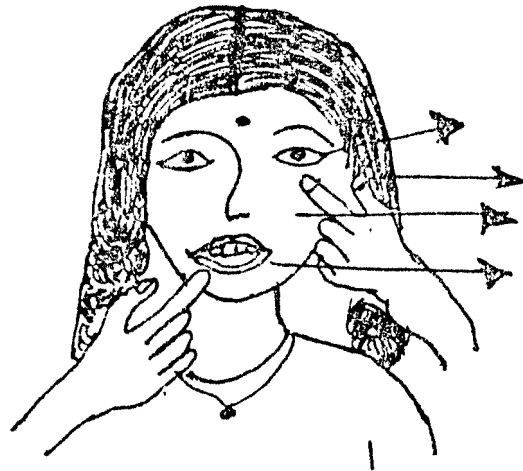
### **Acquired Immunity Deficiency Syndrome (AIDS)**

It is spread by the HIV infected person. This disease is a state of physical health wherein the body loses the immunity. It is spread through -

1. Sexual intercourse with a partner infected by AIDS.
2. Blood transfusion of a person infected by HIV.
3. Through HIV contaminated needles. There is no cure for this. As such it can be avoided by adopting preventive measures scrupulously. People could be educated and awareness be created in them.

### **Activity III**

1. Arrange a lecture on AIDS by an expert.
2. Write down the slogan on AIDS you have seen or heard from various agencies regarding the precautionary measures.
3. Arrange a film show highlighting the importance of precautionary measures to be adopted to avoid AIDS.



### **Physical exercises**

Active muscular exercise not only helps to increase strength, activity and endurance. It also assists in the proper working of all the systems of the body namely excretory, respiratory, digestive and circulatory, etc.

The best results are obtained when exercise is taken in open air. Exercising in the open will help one to interact with the environment. The fresh air invigorates the body and tones up the muscles. It increases the resistance (immunity) power of the body which gives endurance and extra strength. It increases the mental ability also.

### **Activity I**

1. Ask the students to list out the simple exercises they perform daily.
2. Arrange a 'Mass drill' to the students emphasising its importance.
3. Take the students to swimming pool or stream or lake teach them swimming with care.
4. Ask students to maintain a dairy to record how many hours they spend on physical exercises and the effects they have observed in their body.
5. Arrange a health campaign in your school with the help of your students.

## **Yoga**

Besides exercises 'Yogasana' can be taught to school children. Yoga frees the body from the chronic diseases and increases resistance (immunity) power.

### **Activity II**

1. Arrange a yoga demonstration class for the students.
2. Study books on yoga or collect information about the advantages of yoga.

## **Gymnastics**

This form of exercise helps one to build up muscles and gain strength and vitality.

### **Activity III**

1. Arrange a gymnastic demonstration for students.
2. Take the students to a circus if it is there in your place.
3. Visit a gymnastic club and learn. Write a short account of the activities you observed there.

## **First aid and accident prevention**

It is important to have the knowledge and understanding of 'first aid' and the ability to decide whether medical attention is necessary. Every school should possess, well equipped 'First Aid' box. It should be updated with the medicines.

Accidents occur when we are careless and reckless in our day-to-day actions. Some accidents also occur for no fault of ours.

Whenever accidents occur administer first aid immediately to the victim. If a person is bleeding, stop/ reduce the bleeding first and then rush the patient to a nearby hospital immediately.

#### REMEMBER

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1. If you are more careful you can prevent accidents.
  2. You should always follow the safety rules whether in school, at home or on the road.
  3. Always follow the instructions of a doctor carefully.
  4. It is important for us to look and think carefully before we do anything.
- 

#### Activity I

1. Ask your teacher if your school has a first aid box.
2. Well-equipped first aid box and its contents be shown to the students.
3. What action do you take if a person is wounded in the accidents and is bleeding ?

Whenever there is a fracture of a bone it should be tied with wet cloth and he/she should be immediately rushed to the hospital for the needful.

#### Activity II

1. Make and list of the causes of accident.
2. How do you know that there is a fracture of bone ?
3. What do you do when there is a fracture of a bone ?
4. Prepare a model of traffic signal.

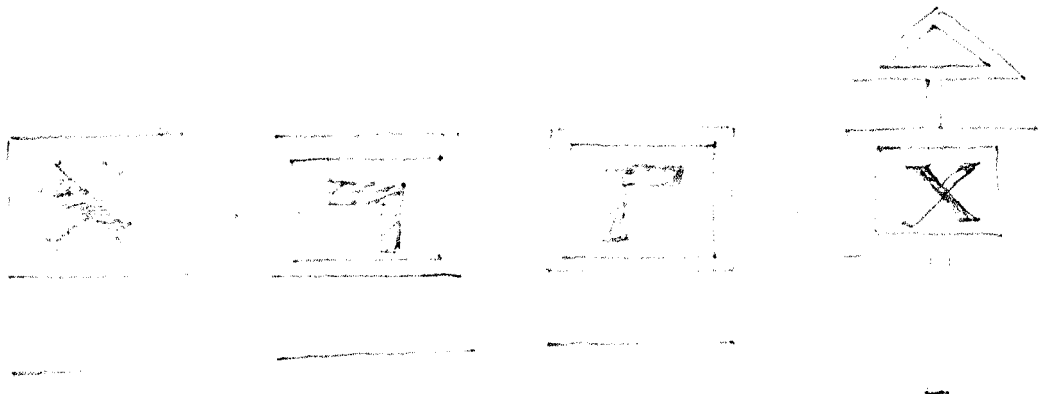
Accidents also occur due to bad environmental conditions like poor visibility, sunlight and hazardous working conditions.

**Activity III**

Observe the pictures given in Fig. 5. What lessons do you learn from them ? Write suitable captions below the pictures.

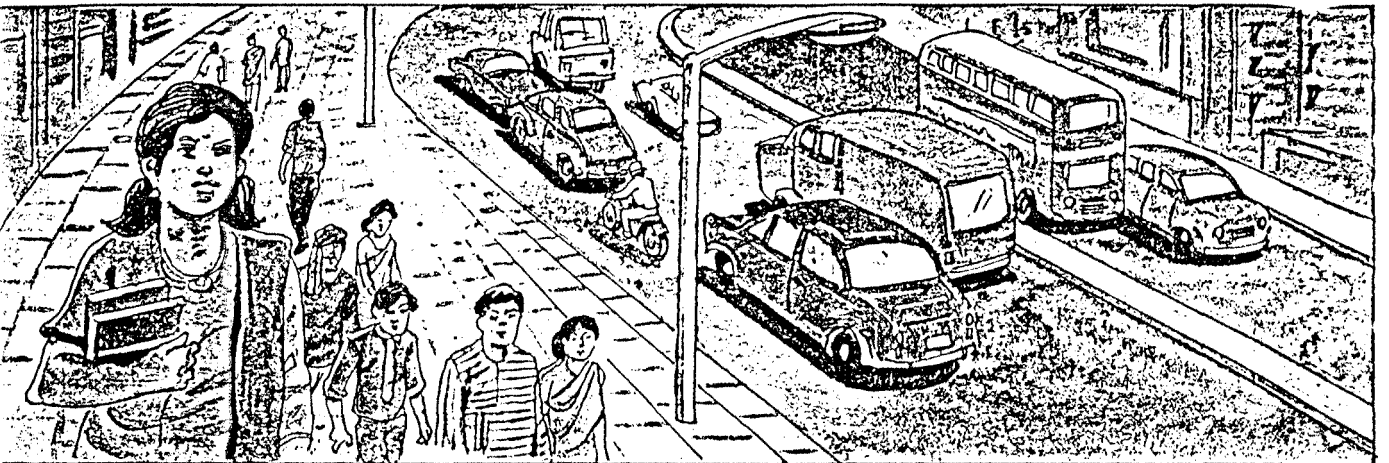
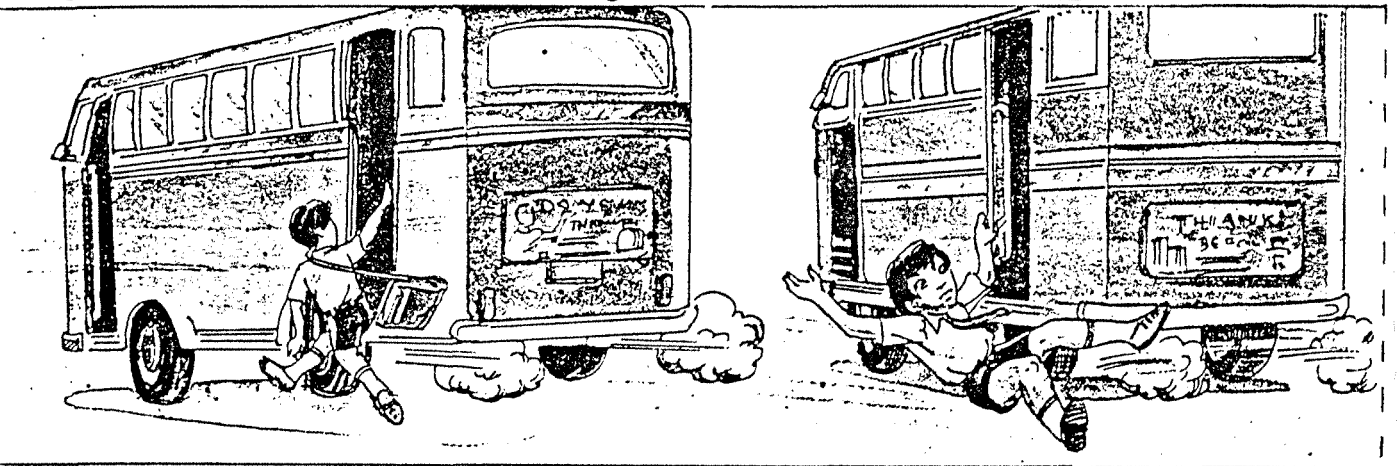
**Activity IV**

Name the warning signals you may see while you are going to school.



**Activity V**

Arrange for a role play of a road accident among a group of students. Let a student enact the role of an injured person, and another who is providing first aid to the injured person. Have the whole class observe the role play and follow it up with a discussion.





## **Blood Donation**

With the advancement of medical science human life expectancy has increased. Organ transplantation and blood transfusion have become the order of the day. Blood banks have come up in cities and towns. They are collecting and storing the various groups of blood. Whenever the call comes for the blood these centres supply the blood to the needy persons. Similarly there are centres at hospitals collecting human organs for transplantation. In order to prepare the children for this, teachers should inculcate in them the desire of help.

### **Activity VI**

1. Teacher should take the pupils to the blood donation centre and they should be shown the process of blood collection and the preservation of blood.
2. Visit the hospital to help the students to see the blood transfusion.
3. Arrange popular lectures on the need for blood - organ donation.
4. Ask students to find out their blood groups and record in their dairy.
5. Orient students regarding different blood groups and the necessity of their matching. Make them aware of the dangers involved if blood groups are not matched.
6. Find out the precautions/safety measures to be borne in mind while donating blood by visiting a nearby health centre or a blood bank.
7. Collect the names and addresses of organisations involved in propagating donation of organs.

## **Personal hygiene**

Personal hygiene is that branch of hygiene which concerns itself with the adjustments which the individual makes to preserve and improve the health of his body and mind. It is not only concerned with matters pertaining to health of a person but also includes observing certain personal habits conducive to one's health. The object of personal hygiene is to maintain a high standard of health.

## **Cleanliness**

It is essential for the upkeep of health and for the normal growth of one's body. In order to keep the skin clean one should take bath daily. Hair should be kept thoroughly clean and should always be kept combed and dressed. Mouth should be rinsed thoroughly morning and evening particularly after each meal and drinks. We should brush the teeth every morning and evening particularly after each meal and drinks. We should brush the teeth every morning and evening with smooth tooth powders and plates. Neem and banyan sticks can also be used. But hard substances such as brick-powder ashes should be avoided.

## **Activity I**

1. Discuss with children about the materials that are used to clean the teeth and take bath.
2. List out the materials used to brush the teeth.
3. Demonstrate to the students the proper ways of brushing teeth.
4. Eyes should be periodically examined and cleaned. Eye defects must be rectified. Ear defects must also be set right.

**Activity II**

1. Cut the nails of your fingers using the nail cutter.
2. Ask the children to wash the hands before mid day meal.  
Feet must be kept clean by daily washing and carefully drying between the toes. They must be advised to wear chappals or shoes. Sexual organs must also be kept clean.
3. Organise a lecture by a competent person on the need for personal hygiene of private parts.

**Activity III**

Prepare a rating scale to evaluate the personal hygiene of students. Observe frequently and record your observations. Help the students to improve their personal hygiene based on your observations. Below is given a model which you can make use of.

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Sl. No.	Personal hygiene habits	Always	Sometimes	Never
1	Keeps nails cut and clean			
2	Washes hair regularly			
3	Keeps teeth clean			
4	Wears clean clothes			
5	Keeps feet clean			
6	Washes hands, before meals and after meals			
7	Rinses mouth after meals			

---

### **Eating and drinking**

It is essential to form good eating and drinking habits. Whole some food should be taken at regular intervals and at fixed hours. One should not eat when fatigued and overload the stomach. Food must be properly masticated and eaten slowly. Bolting of unchewed morsels should be avoided. Reading, seeing TV and too much of eating should be avoided. Water should be sparingly taken along with meals. It is a good habit to take glassful of water early in the morning. Discuss with the students about the right kind of eating and drinking habits and corrective measures to be taken.

### **Habits**

Habits formation plays an important role in the preservation of health. Good habits are:

1. Going to bed early and getting up early in the morning.
2. Regular bowel habits.
3. Brushing the teeth regularly.
4. Taking bath every day.
5. Combing the hair.
6. Taking food at fixed time.
7. Regular exercise.
8. Reading in good light keeping the book at correct angles and distance.
9. Washing the hands before and after meals.
10. Cutting nails at regular intervals.

**The bad habits are**

1. Biting nails.
2. Reading while lying on the bed.
3. Reading while eating.
4. Eating mud, chalk bits, etc.
5. Irregular food habits.
6. Irregular bowel habits.

The awareness about the dangers of smoking and alcoholism should also be created.

### **Environmental hygiene and sanitation**

Environmental hygiene means the maintenance of clean and pollution free surroundings. The environment consists of three aspects namely - physical, social and biological. The physical environment consists of factors like climate, soil, plains, forests, etc. The social environment includes customs, beliefs, traditions, etc. The biological environment consists of plants, animals and other living beings.

### **Activity I**

1. Make a list of festivals you observe in relation to environment in your locality.
2. During which seasons of the year these festivals are celebrated? Find out their significance related to seasons.
3. Write a list of the animals and birds you see throughout the day. Identify their habitats.

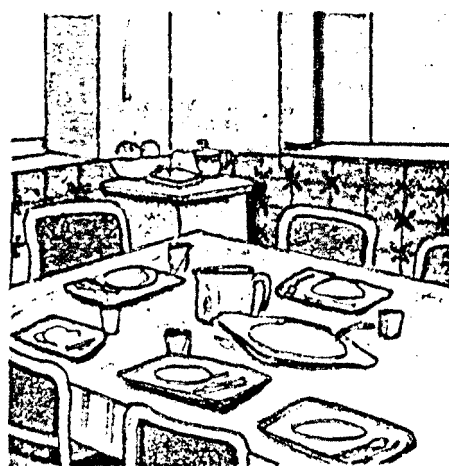
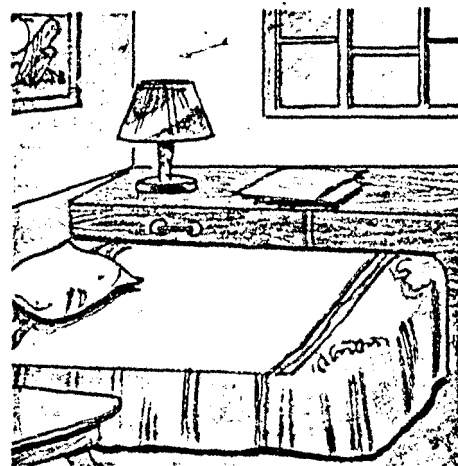
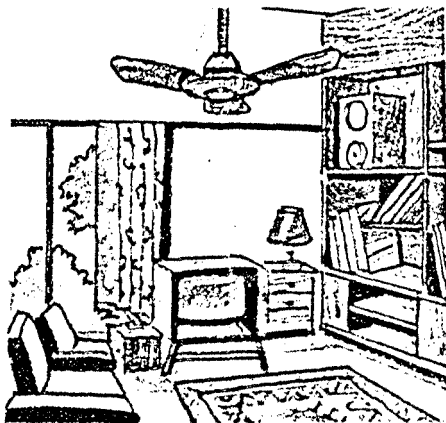
### **Greenery and ventilation**

Trees and vegetation should surround a house. They should not be very near so as to damp the house by obstructing light and air. The house should have enough ventilation and adequate number of rooms for dining, sleeping, living, studying, etc. The standard set for a good house should be adhered.

### **Activity II**

#### **Field trip**

1. Visit houses around and observe the construction of houses. Identify an ideal home.
2. Collecting the pictures of different types of houses.
3. Take the students near an industry, and show them the stream of smoke coming out from the chimney and the way they pollute the air.
4. Ask the children to tell the class about their experiences when they enter a crowded bus/train/a marriage hall.
5. Draw your ideal house, what should it contain and why
6. To which part of the house the following rooms given in the picture belong to. Identify.

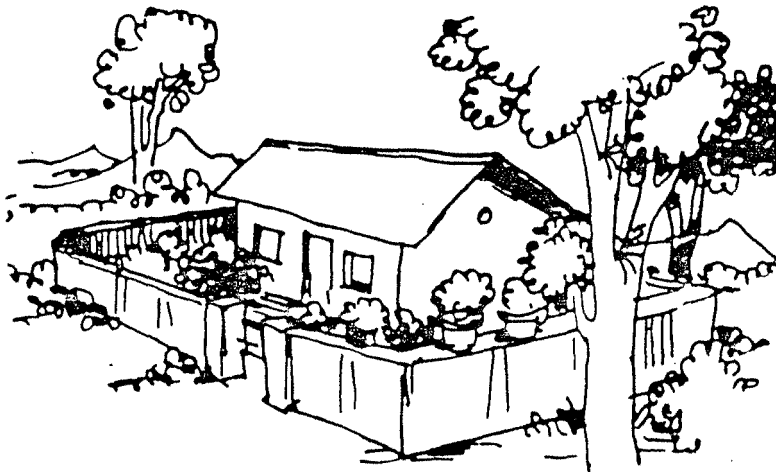


### School

The school should be situated at a reachable distance. It should not be near a factory, a river, lakes, ponds, etc. Adequate ventilation should be provided. Care should be taken to provide adequate drinking water, latrines, urinals and play ground.

### Activity III

Describe the house given in the following picture. Do you like the house? State your reasons for liking or disliking the house.



**Activity IV**

Count and tell the number of class rooms which have -

- a. Vegetation near them
- b. Proper ventilation
- c. No ventilation

**Activity V**

Make a list of schools in your locality and nearby surroundings. Identify the number of schools which are situated in good surroundings and the number of schools which are situated in unclean and improper surroundings. Fill it up in the table provided.

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Number of schools	Schools in good surroundings	Schools in improper surroundings	Reason

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### **Ventilation**

Good ventilation means the supply of pure air keeping the room at a proper temperature and humidity, and having continuous circulation of air. Ventilation of the houses and schools should be taken care of.

### **Activity VI**

Write the need and importance of good ventilation in houses and class rooms.

### **Disposal of refuse**

The collection, removal and disposal of all waste products should be done efficiently. Refuse include excretal refuse, wastewater, dry refuse, etc. Use of latrines must advised. In villages habits of excreting in a pit and closing with mud should be advocated.

### **Activity VII**

1. Keep a waste paper basket in every class room and remove the garbage every day.
2. Asking to tell whether there is a garbage pit in every house or garbage collector in every street.

### **Activity VIII**

Prepare posters and put them in the school.

**Keep your environment clean to remain healthy**

**Throw garbage in covered dust bins**



### Sanitation of fairs and festivals

Many a time fairs and festivals become the source for the outbreak of epidemic diseases, so care should be taken to provide adequate disinfectants and medicines. Anticholera inoculation must be made compulsory. Enough accommodation for doctors, fire fighting personnel should be provided, pure drinking water facilities and good food supply should be ensured. Provision of adequate number of latrines and urinals is a must. Sufficient conservancy staff must be developed for sweeping the roads, cleaning the latrines, urinals, etc.

### Activity I

Run a campaign to disinfect your school toilets. With what disinfectant do you clean the toilets ?

### Public health administrations

State Health Department control the spreading of epidemic disease and promote the health of the citizen.

Hospitals at the taluk and district levels, primary health centres at the block and village levels perform the preventive and curative work. Social workers, public health workers are required to attend to the public health suitably. National malaria eradication programme, national small pox eradication programme, national filariasis control programme have also been launched and carried out to promote public health.

#### **International organisation**

The State Health Department maintains close liaison with health organisations such as WHO, UNICEF, Red Cross, etc. World Health Organisation was founded on April 7th 1948. Every year 7th April is observed as World Health Day. WHO is established to furnish medical facilities, encourage and conduct scientific research to disseminate medical information and standardisation of drugs, biological preparations and diagnostic procedures.

#### **UNICEF**

It is a specialised agency of the United Nations Organisation. This gives aid to projects taking care to prevent diseases and to promote health of the mothers and children.

#### **Red Cross Society**

Red Cross Society is an international organisation which helps the people during war, famine, etc. It will rush

aid wherever necessary. It is doing a great service for the international community.

#### Evaluation I

1. List out the names of sensory organs of human body.
2. Name the nutrients necessary for the growth of the body.
3. What are endemic and epidemic diseases ? Give two examples for each.
4. Name the diseases caused due to the deficiency of following vitamins.  
A, B, C, D and E vitamins
5. What is AIDS ? Why is it considered as the most dreaded disease of the century ?
6. What is the importance of physical exercise in daily life ?
7. What are necessary conditions that must be borne in mind while donating blood ?
8. What steps should be taken to prevent accidents in roads ?
9. See the traffic signals and write down what they stand for.

#### Evaluation II

1. What is personal hygiene ?
2. Write the importance of cleanliness of the parts of the body.
3. List out the good and bad habits.

4. What are the advantages of good food habits ?
5. What is a good reading posture ? Explain.

### Evaluation III

1. What is environmental hygiene ?
2. Do you have pure drinking water facility in your school ?
3. What measures are you taking to keep the school environment clean ?
4. Does your house have enough space around ?
5. How is the air polluted ? List the factors which cause air pollution ?
6. What are the components of air ?
7. What steps has your school taken to dispose the garbage ?
8. What are the preventive measures that can be taken to stop the spreading of epidemic and endemic diseases during the conduct of fairs and festivals ?
9. Name a voluntary organisation devoting its activities for cleaning the environment in your place. What type of activities does it carry to ensure this ?
10. List out the names of international organisations that help to promote health of mankind ?
11. What is the role of the state governments with regard to health of the people ?
12. Fill in the blanks with correct answers:
  - a. Oxygen is obtained on a large scale from \_\_\_\_\_.
  - b. Air consists of \_\_\_\_\_ and \_\_\_\_\_.
  - c. \_\_\_\_\_ and \_\_\_\_\_ are inert gases.

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MODULE V

SOCIO-ECONOMIC AND POLITICAL DEVELOPMENTS

INTRODUCTION

"Environment problems are really social problem. They begin with the people as cause and end with people as victims".

- Sir Edmund Hillary

The environment in which human beings live, is composed of two components; social and physical. The quality of human life in society is influenced by the quality of these two areas. Similarly, human actions and policies determine the quality of the environment. In the context of progressive deterioration of the environment over the years as a result of human exploitation of the resources, there is now an urgent need to take remedial measures to ensure atleast minimum quality of life for all. While social customs, traditions, beliefs and prevalent values contribute to the establishment of a congenial social environment, planned economic growth without undue destruction of the environmental resources, helps to preserve a healthy physical environment. The message sought to be conveyed through this module is growth without destruction.

OBJECTIVES

To make the pupils

- understand that social customs, traditions, beliefs and values influence environment and are in turn influenced by it.

- understand that cultivation and practice of certain socially desirable values like tolerance, cooperation, co-existence, respect for other religions and culture are necessary for building a healthy social environment.
- recognise that economic development through large scale industrialisation leads to environmental degradation in the form of depletion of resources and widespread pollution.
- develop awareness of the need for sustainable development to preserve and protect the environment and at the same time improve the quality of human life.
- acquire knowledge of the measures taken by the government to protect the environment through legislative and executive actions.
- develop awareness of the need for public participation and cooperation by voluntary agencies in protecting the environment.

The environment in which human beings live, consists of a physical and social environment. The physical environment includes land, its resources and the climatic conditions. The elements of social environment are the social customs, tradition, norms, values, shelter, food habits, dress styles and religious practices. It also includes social, religious economic and political ideologies



like the elements of physical environment, the element of social environment which are the products of evolution over the ages. The social environment is influenced to a great extent by the physical environment. A study of history reveals the influence of environment in shaping the socio-cultural developments of human beings. We may recall here how great civilisations flourished in areas which abounded in natural resources necessary to satisfy the basic needs of life. Therefore, we find different life styles in areas with different resources and different climatic conditions.

**ACTIVITY (TEACHER EDUCATORS)**

Discuss the role of different environmental factors in the development of different life styles in different areas in your state.

For a happy, peaceful and prosperous life, we need a healthy environment both physical and social. Just as injudicious tampering with the physical environment creates disorder and imbalance, changes in certain human actions, policies and behavioural pattern in society may also spoil the healthy and congenial social environment making life difficult in society. In this module we will discuss some of the social institutions, customs and practices and the changes that have taken place in them and their impact on the environment.

## **FAMILY**

Family is the basic unit of our social structure. In the past, joint families were very common. They were advantageous for individual members because of assured protection, concern for women and children, guidance and economic security. These joint families made judicious and remunerative use of the natural environment found in the neighbourhood.

With the passage of time, nuclear families replaced joint families. Growth of population, increased opportunities for employment and education, revolutionary changes in the modes of production and distribution, minimization of traditional occupation; have all contributed to changes of far reaching consequences in the socio-economic environment.

## **ACTIVITY (TEACHER EDUCATORS)**

Arrange a panel discussion on the following:

1. The factors responsible for the break up of the joint families.
2. The advantages and disadvantages of joint family vis-a-vis the environment.
3. The growth of nuclear families and its impact on the environment.

## **ROLE OF WOMEN**

Women basically are the cornerstone of development. They control most of the non-money economy comprising

subsistence agriculture, bearing and raising children and domestic labour. In addition to this, they take an important part in the money economy working in the informal sector. Therefore, their contribution is central to development even though much of their work is unrecognised. The costs of ignoring the needs of women basically are uncontrolled population growth, high infant and child mortality, a weakened economy, ineffective agriculture, a deteriorating environment and poor quality of life".

For girls and women it means unequal opportunities, a high level of risk and a life determined by fate and the decisions of others rather than choice. Many women have few choices in life outside marriage and children; it is therefore necessary to initiate strategies which would reduce their dependence on children for status and support. It should remove the existing barriers which prevents them from exploring their full potential. It would include granting them equal access to land, to credit, to rewarding employment as well as establishing their effective personal and political rights. In the long run, investing in women, it must be recognised will have unquantifiable economic value. It will initiate an approach to development which will make the most effective use of limited natural resources; slower, more balanced growth in the labour force, security for the family and most importantly the possibility of better health, education, nutrition and personal

development not only for women but for all people. (Sadik Nafis Dr., Investing in Women: The Focus of the 90's, UNFPA, New York, NY 10017, nd p. 1).

Traditionally in India, man has always been the head of the family and the bread winner while the role of women has been confined to the upbringing of children and management of household duties. This resulted in the denial of the rights of women and the development of their full potential as human beings. As a result, they have become victims of discrimination, domination and exploitation. With the growth of opportunities for education and employment brought about by economic, scientific and technological advancement, the status and role of women have undergone a significant change. Equality of sexes and equal opportunities for education and employment have also been guaranteed to them by the constitution. However, inspite of these developments, women are still subject to discrimination, ill treatment, victimisation and gender bias. Even today a male child is preferred to a female child. A women who gives birth to a girl child is generally looked down upon inspite of the fact that the gender of a child is determined by a combination of 'X' and 'Y' chromosomes produced by the male.

**INDIA: "It was only a girl"**

An investigation of 58 child and infant deaths in 10 villages in the Kachchh district of Gujarat in India showed

17 in the first month of life, usually from conditions associated with the birth itself. Boys and girls were equally affected. But 27 of the remaining 41 children who died were girls.

These children mostly died from diarrhoea (16 deaths), or from starvation or "wasting" (eight deaths). Seven out of the eight children who starved to death were girls. Only 22 per cent of the terminally ill girls were taken to a health facility, as opposed to 80 per cent of the boys. The rest were treated either by a local practitioner or with traditional home remedies. Only one of the boys was treated locally - because his parents were convinced that he had been bewitched.

"After all, it was only a girl", commented one grandmother of a baby girl who died aged just 35 days without receiving any treatment.

#### **Discrimination against girls**

Eight out of nine cultures who express a preference want more sons than daughters. Parents expect little from a girl once she marries and leaves home. Before she marries, though she starts to work at an earlier age than her brothers, and works harder and longer, her economic contribution is seen as less valuable because it contributes less to the family's income.

Greater expectations lead parents with limited resources to invest more in their sons than their daughters. This discrimination begins very early in life. Research in Bangladesh found that under-five-year-old boys were given 16 per cent more food than girls and that girls were more likely to be malnourished in times of famine. A study in India found that boys were given far more fatty and milky foods than girls. Not surprisingly girls were over four times as likely as boys to be suffering from acute malnutrition, but more than 40 times less likely to be taken to hospital. Another Indian study found that sick boys were more likely than girls to be taken to the city hospital when they failed to recover from illness.

Discrimination against girls continues as they grow older. In India girls access to education is severely limited which inevitably leads to lower literacy rate and level for a girl child (see Tables 1 and 2).

Percentage Distribution of Persons Aged 6 and above Never Enrolled as Students and Reasons for Non-Enrolment.

All India : NSS: 42nd Round, July 1986-July 1987.

Reasons for non-enrolment	Rural		Urban	
	Male	Female	Male	Female
1. Too young to go school	5.70	3.88	6.71	3.63
2. Schooling facilities not available	9.94	10.46	5.86	9.00
3. Not interested	25.18	32.32	23.46	33.90
4. For participation in household/economic activity	18.87	9.04	17.11	6.83
5. Other economic reasons	31.12	23.56	34.76	22.59
6. Attending domestic chore	1.27	9.87	0.90	10.70
7. Waiting for admission	0.96	0.51	1.36	00.80
8. Other reasons	6.96	10.37	9.83	13.56
All reasons	100.00	100.00	100.00	100.00

From : B. S. Mishra : Educational Deprivation and its Role as a Spoiler of Access to Better life in india, Technical Report No. 9104.  
 Source: National Sample Survey (1989), Draft Report No. 365, Department of Statistics, GOI, New Delhi (mimeographed) P.38.

Percentage Distribution of Drop-outs by Reasons for Discontinuance

All India : NSS: 42nd Round, July 1986-July 1987.

Reasons for discontinuance	Rural		Urban	
	Male	Female	Male	Female
1. Not interested in education/ further study	26.57	33.25	26.26	23.62
2. Participated in household/ economic activity	26.80	9.38	19.17	22.80
3. Other economic reasons	20.63	14.97	17.11	24.15
4. Domestic Chores	02.01	14.25	05.54	02.20
5. Failure	18.43	16.68	16.29	21.28
6. Others	05.56	11.47	15.63	05.95
All	100.00	100.00	100.00	100.00

From : Minhas, op.cit.  
Source: National Sample Survey (1989), Draft Report No. 365, Department of  
Statistics, GOI, New Delhi (mimeographed) P.38.



Women's role as resource managers must not be underestimated; they provide most of the food, fuel and water for rural households. Women account for half the food production; cultivation and harvesting is only the first stage; twice as much time can be taken up by food processing and preparation. The time and energy required for these processes and for the fetching of fuel and water rarely figure in national statistics.

As policies for sustainable development take shape, more responsibility on managing the resource will fall on women. Therefore, it is crucial that women's dual role is recognised. Secondly, there is an urgent need for better nutrition, access to education and health care. Nearly half of all women of child bearing age are affected by nutritional anaemia (see diagram).

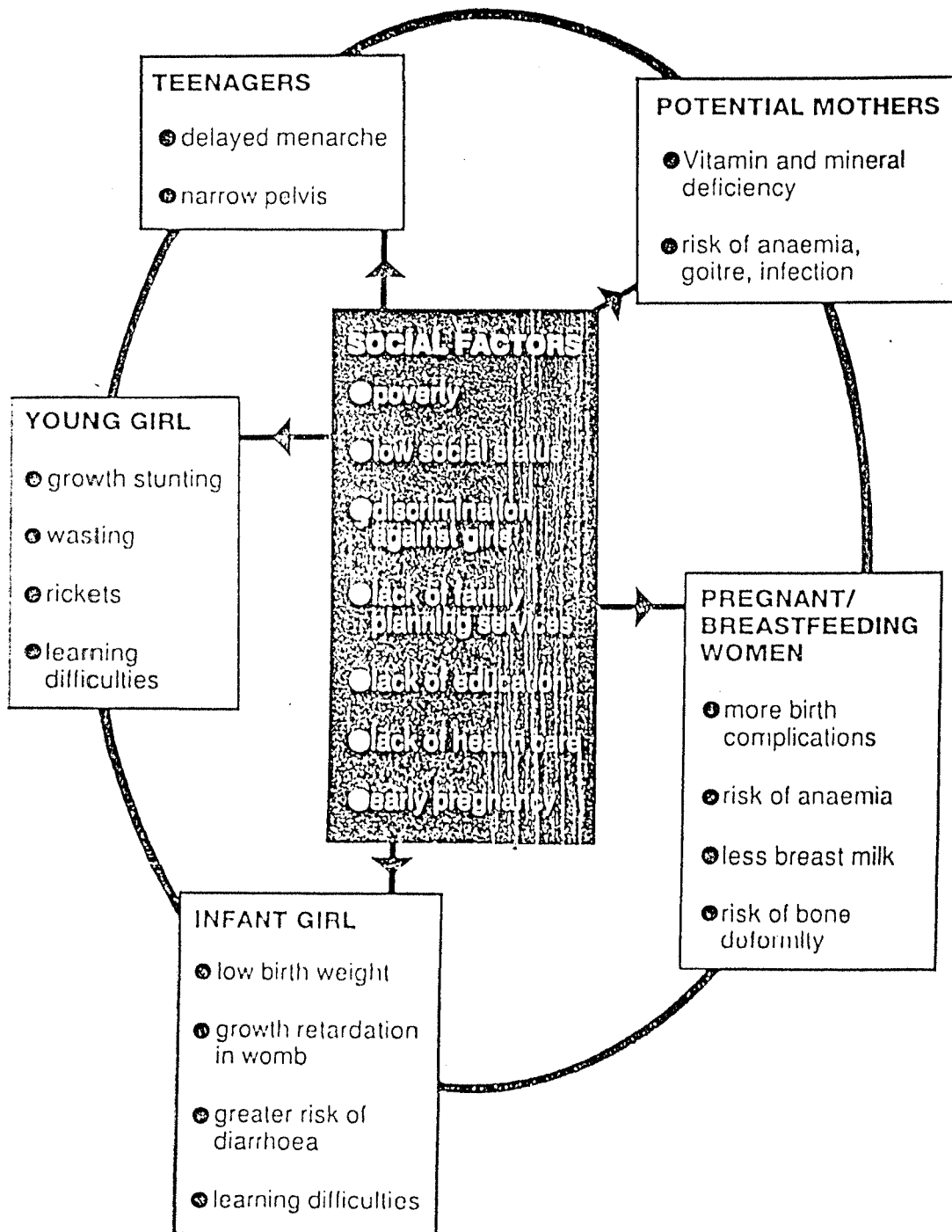
#### **ACTIVITY (TEACHER EDUCATORS)**

Identify different form of discriminations that women in your state are subjected to and discuss the steps taken by the governmental and non-governmental agencies to remove them and their impact on existing discrimination.

#### **SOCIO-CULTURAL PRACTICES RELIGION**

Religion is an important institution of our social life. It has greatly influenced our moral, social and cultural life. India has a plural society with people belonging to several religious denominations. Therefore, for

## The Vicious Circle Of Malnutrition



a harmonious and peaceful community life, it is essential that people should learn to tolerate and respect each others religion and their way of life. Religious intolerance breeds communal conflict and tension. It may even pave way for the emergence of religious fundamentalism which would only lead to the destruction of a healthy social environment and the democratic way of life and ideals enshrined in the Constitution of India.

#### **ACTIVITY**

1. **(Teacher Educators):** "The religious history of India is by and large characterised by the practice of religious tolerance". substantiate this statement with reference to the religious policy in your state at different periods of time.

2. **(Students):** Why has the Indian Constitution declared India a secular state ?

3. **(Teachers):** Arrange lectures by religious leaders of different religions to highlight the essence of their philosophy and the importance given to environmental protection in their respective religion.

#### **FESTIVALS**

Festivals have played an important role in our social life all along. Most of our festivals are closely related to religion and seasons which are linked to different occupations like 'Onam' in Kerala, 'Pongal' in

Tamil Nadu, 'Dasara' and 'Huttari' (Kodagu) in Karnataka. While many festivals are celebrated at the family level, some are organised by the entire community on a large scale, like Rathyatras of different dieties, religious processions or fairs. On these occasions, people congregate in large numbers. Festivals thus provide an opportunity for developing social solidarity. But care has to be taken in maintaining law and order, and health of the people. Care should be taken to prevent pollution of the surroundings. In this context, it may be pointed out here that some of our festivals and social ceremonies are environment friendly while some are not. For instance, the practice of worshipping the tree (peepal tree), snake (cobra), animal (cow, bullock, elephant) and bird (garuda), has come down to us from time immemorial. This practice is a symbolic presentation of the respect and concern for the flora and the fauna in our natural environment. It appears that in ancient India, there was a continuity in the approach to balanced consumption and conservation of natural resources including forests and wild life as is evident from the following statement of the Isho-Upanishad. "This universe is the creation of the supreme power meant for the benefit of all creations. Individual species must therefore learn to enjoy its benefits by forming a part of the system in close relations with other species. Let not any one species encroach upon the other's rights". On the other hand,

certain socio-religious rituals like throwing away into the river half burnt human bodies as is done in Banaras and the bathing by the masses in the holy rivers on different occasions add to the pollution of the river waters and river banks.

**ACTIVITY (TEACHER EDUCATORS)**

1. Arrange a symposium by inviting leaders of different religions to speak on their festivals and its significance.

2. (Teachers) - Arrange a visit to these festivals for fairs for children to study the impact on environment with special reference to -

- i. provision of food, shelter and transport to people.
- ii. arrangements for sanitation, cleanliness and prevention of epidemic diseases.

3. (Children) - Ask the children to write a few lines on the usefulness of community festivals.

**BASIC NEEDS: HOUSING**

Shelter is a basic necessity. It provides protection from the harsh elements of nature; it should also provide proper ventilation and accommodation. There is now an acute shortage of shelter both in urban and rural areas. In the rural areas, the houses are built with materials that are locally available like mud, bamboo, grass, fibres and palm

trees, but are lacking in ventilation and drainage facilities. As a result of urbanisation, there is an increased demand for houses and housing sites but restricted and diminishing availability of land has led to overcrowding in cities. Basic amenities like provision of water, sanitation, garbage clearance and proper roads are also lacking. In large cities, multi-storeyed apartments are coming up due to housing shortages without observing the basic norms of safety. Further more, as a result of economic development and improvement in living standards, the type of construction in both rural and urban areas has also undergone changes. The emphasis is more on concrete buildings using bricks, stones and costly wood instead of houses with thatched roof, built with mud, reeds and leaves in rural areas. Today there is a greater use of fast dwindling resources like granite stones and marbles which may lead to serious ecological problems.

#### **ACTIVITY**

1. (Teacher Educators) - Arrange a discussion on the problems of housing and their impact on environment.

2. (Teachers) - Make the children collect and display pictures -

- i. of rural areas showing lack of drainage facilities, accumulation of waste with people and animals sharing the living areas.

- ii. houses in the urban centres with narrow roads, insufficient ventilation and accommodation.
- iii. well planned extensions with wide roads, well spaced houses and proper ventilation.
- iv. slums in cities.

#### **FOOD HABITS**

Food habits which vary from one region to another are influenced by many factors - environment, physical, socio-economic status and education. There are many plants, herbs, roots and vegetables that could be used with great profit as they are either easily available in the neighbourhood or do not cost more. Cereals and pulses form an important part of our diet. Our farmers are often advised to use artificial manures to increase the yield of crops. Though it may be useful, it is ruinous as it renders land unproductive due to loss of fertility. In the same way, the use of insecticides and pesticides in growing fruits, vegetables and even grass is having disastrous effect on animals and human beings. The cows that eat the grass which is grown by the use of DDT injects the chemicals into its milk which is passed onto the consumers. Similarly today, the spraying of insecticides and pesticides is common in gardens where arecanuts, coconuts, plantains and a variety of vegetables are grown. Consumption of such fruits and vegetables is harmful. Added to this, adulteration of food and drinks by the use of preservatives, colours or aromatics

beyond permissible limits also causes enormous damage to human health. Government, non-governmental agencies and the public should take steps to avoid the use of such harmful food stuffs. One way of minimising the harmful effects of these sprays is to wash all vegetables before use. The norms governing the use of these chemicals have to be scrupulously adhered to.

#### **ACTIVITY (STUDENTS)**

1. Let children make a comparative study of the food used in their homes today with those used by their parents and grand parents when they were young.

2. Arrange a discussion on the harmful effects of the use of chemical fertilisers, insecticides and pesticides.

3. Try to analyse some fruits like apple, grapes, etc. for the presence of pesticides on (in) them.

#### **STYLE OF DRESS**

Dress is a matter of convenience, identity and aesthetics. In the past, people wore dresses made of natural fibres and animal skin. Dress was basically influenced by geographical factors, customs and traditions, economic status and religion. It is easy to identify persons, communities they belong to, their religion and their culture by the dress they wear. But due to the process of secularization and promotion of democratic values, even the



dress styles are undergoing changes and one can no longer associate dress with different castes, communities, culture and even regions any more.

Dress making on the other hand, is a very important industry in our country today, offering employment opportunities to many and contributing to the growth of Indian economy.

#### **ACTIVITY**

(Children) - Observe ten persons - boys and girls around you and find out -

1. the type of dresses worn by them.
2. the materials with which they are made.
3. make a comparative study of the type of dresses with reference to - whether they are
  - a. suitable to the climate
  - b. economical
  - c. comfortable
  - d. easy to wash, dry and iron
4. Collect fibres of different types (cotton, woollen, jute, nylon, synthetic, wood and polyester). Determine the fibre of the dress you wear while working in the kitchen.

#### **VALUES AND BEHAVIOURAL PATTERN**

Values form an integral part of our social environment. They are developed over a period of time

through human interactions within the family and the society, transmitted from one generation to another, values change from time to time to meet with the changing environment and needs of human beings. However, there are certain values which have universal validity and applicability. Values like respect for the parents and elders, respect for the rule of law, respect for public property. Co-existence, cooperation and tolerance for people belonging to another culture and religious denomination. Values determine behavioural pattern of individual members in a society. Strict adherence to these values and their practice through socially desirable behavioural patterns will create a congenial social environment for healthy community life is possible.

Generally we express our concern about deterioration in the natural environment but seem to be oblivious to the fact that deterioration is taking place in our social environment as well. This is primarily due to changing values which are replacing values that have been there for several generations like, our age old value of 'Matru Devo Bhava', 'Pitru Devo Bhava', 'Acharya Devo Bhava' is no longer subscribed to by a large number of youth. A combination of factors like the influence of the media, western life style and education have all contributed to these changing values towards parents and their authority and influence. Similarly teachers are also not revered as

they were in the past. As a result, in many families today there is a growing rift between the parents and children which also manifests itself in conflicting values. Family life is further disturbed because of changing socio-economic scenario and there are several instances of old parents ending up in old age homes. Similarly, the atmosphere in educational institutions today is not cordial enough for effective teaching and learning; large number of students in one class has also made it difficult for teachers to maintain a student-centered. This approach is one of the important reasons that has contributed to increasing student indiscipline in the campuses of the educational institutions of our country.

Thus in this changing social environment values like co-existence, tolerance and respect of each other's religion and culture are not receiving the same importance they did in the past.

Respect for the rule of law is another important value which enjoins on every individual to obey the prescribed law laid down by government at various levels (Panchayat Municipality State and Central Government) and act accordingly. Unfortunately today, the growing tendency to violate the rule of law with impunity has created disturbance in the social environment. Social evils like crime, adultery, hoarding, black marketing, dowry,

smuggling, profiteering to mention only a few are on the increase.

Our values are also determined by national goals like Democracy, Secularism and Socialism.

#### **ACTIVITY (TEACHER EDUCATORS)**

1. List ten social values that our society has inherited and state how many of them are not valid today and give reasons why they have lost their validity.

2. What are the values that could be derived from our national goals of democracy, socialism and secularism ? To what extent are these values being practiced ?

#### **ECONOMIC DEVELOPMENT**

It is interesting to study how all along human beings have put in continuous efforts to improve their lives through economic development. In the process, they have learnt new ways of using their natural resources by utilising the knowledge of Science and Technology. They have also been successful in creating new resources through the application of science and technology. The use of wheel, fire, invention of new modes of transport, generation and use of electricity, eradication of dangerous communicable diseases, improvements in health and nutrition, better planning of cities, conquest of space and the use of satellites for better understanding of our land and ocean

resources. These are two of the notable developments contributing to economic growth which have taken place during the post-industrial era.

Post-independent India on the other hand witnessed rapid economic development to improve the standard of living of the people. Exploitation of the Indian economy by the British, acute shortage of food and other necessities of life caused by the Second World War and rapidly increasing population, left India with no alternative but to opt for the growth model based on industrialisation. Large scale industrialisation led to indiscriminate exploitation of natural resources. India, like all developing countries is facing a conflict as it were, between growth ethics and the need to protect the environment and its resources. These countries are yet to learn to channel and redirect their economic input and output in ways that will not only serve the needs of the growing numbers, but also help in safeguarding the environment. Most of the development related to environmental problems have arisen due to the inability of these countries to make a judicious use of these resources and disposal of waste in a manner that does not disturb the steady state of their environment. The following are some of the development related environmental problems faced by our country.

#### **POPULATION GROWTH**

Population growth, economic development and environment are closely inter-related. If economic

development is not commensurate with the growth of population, the quality of life will deteriorate. Mere economic growth to satisfy increasing needs would mean more intensive exploitation of land and its resources. Indian population accounts for 15% of the world population while land area constitutes only 2.4%. The per capita availability of land is about 0.48 hectares as against 4.14 hectares in the USA and 8.43 in Russia. The man-land ratio in relation to arable land is only 0.27 hectares in India. This is likely to decrease further as the population grows. India is already next to China as far as population density is concerned. This exerts heavy pressure on the environment particularly the land and its resources which are fixed. As demand increases, the per capital availability of resources shrinks. This necessitates extensive exploitation of these resource which in turn leads to further degradation of the environment.

#### **URBANISATION**

Urbanisation is a direct outcome of industrialisation. When large factories are established in an area, people in large number migrate from rural areas to industrial township, called 'urban migration' as it shifts people from smaller to larger communities leading to the process of urbanisation which has resulted in the concentration of 24% of its population in urban centres. The scope for employment, attractive wages, entertainment and

conveniences of city life also contribute to growing urbanisation, which is inevitable in a growing economy. It is also an index of economic growth. Unless proper care is taken urbanisation may lead to several problems like overcrowding of population, growth of slums with poor hygienic conditions, spread of epidemic diseases, lack of basic civic amenities like housing, adequate water supply and electricity. There is also a danger to people's health and mortality because of congestion and insanitary conditions. While encouraging urbanisation it is necessary to see that our new urban towns have open areas and is not overtly crowded. A break up of urban population reveals that slum dwellers account for 15% of 156 million urbanites in India and is likely to go up to 25% by the turn of the century. Developing satellite townships away from the urban centres would be a better alternative to protecting the environment from pollution.

**ACTIVITY (TEACHER EDUCATORS)**

1. Arrange an essay writing competition on urbanisation with reference to problems of -
  - a. housing
  - b. basic amenities
  - c. civic amenities
  - d. effects on the environment of the area in which the urban town is located.

2. (Students) - Arrange a visit for children to urban centres and slums. Make them write a brief note on the environmental problems created by these urban centres and slums.

### **Mineral resources**

India is rich in mineral resources like iron, coal, chromite, lignite, manganese, bauxite, nickel, petroleum, natural gas, etc. Some of them like coal, petroleum, natural gas are fossil fuels and sources of energy. Rapid industrialisation has led to the depletion of both resources - renewable and non-renewable resources posing a threat to our economic growth and ecological balance. Nonetheless we cannot stop using these natural resources because it would mean putting a halt to our developmental activities. We have to think of ways and means of conserving these precious resources. By improving production techniques to reduce the per capita use, by substituting non-renewable and fast exhausting resource with easily available renewable resources and by recycling used metals, we can conserve the minerals and prevent their rapid exhaustion.

### **ACTIVITY (TEACHER EDUCATORS)**

1. Collect the names of various bodies and organisations dealing with different mineral resources and also information regarding total reserves (tonnage) in our country of the following minerals -



- a. iron
- b. coal
- c. chromite
- d. lignite
- e. manganese
- f. nickel
- g. bauxite
- h. oil bearing areas (sq km)

2. Arrange lectures by ecologists on the impact of extensive exploitation of minerals on the environment.

3. (Teachers/Students) help the students in preparing a table/chart as shown below to provide information regarding the mineral resources in the southern region.

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Sl. No.	Name of mineral	Where found	Ist industrial use	Quantity available	If used at the present level, how long will it last	Impact on the environment if totally exhausted
(1)	(2)	(3)	(4)	(5)	(6)	(7)

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### FOREST WEALTH

Forest wealth in our country is getting depleted at an alarming rate due to increasing consumption arising out of population growth and developmental activities. Though the forest department controls India's total forest areas, only about 12% has adequate tree cover. It is estimated that

over one million hectares of forests are cut every year for purposes of agriculture, constructing buildings, roads, railway lines, factories and for meeting the requirements of fuel and raw materials for timber, pulp, paper, railway sleepers, etc. At the present rate of deforestation, India will have no forest cover left in about fifty years. Large scale felling of trees has resulted in massive land slides in the hills, soil erosion, frequent floods silting of rivers, fall in water table, the spread of deserts, destruction of natural habitat of many species of plants and animals besides adversely affecting the ecological balance. Increasing deforestation in the Western Ghats has begun to change the eco-balance in the form of increase in temperature and untimely rainfall. Hence the urgent need to conserve the forest resources.

**ACTIVITY (TEACHERS)**

1. Write an essay on how to conserve our dwindling plant resources with reference to -

- a. restoration of vegetation cover
- b. recovery of waste lands
- c. management of forests, grasslands and crop lands.

2. Frame a few slogans to propagate the message against deforestation and indiscriminate killing of wild animals.

## **WATER RESOURCES**

Water is an important life sustaining resource used in agriculture, industry, transport, generating electricity, recreation and in our daily lives. Increasing consumption, failure of monsoon, increase in temperature during summer, decline in the level of ground water table has created acute water shortage in our country. Intensive irrigation has created the danger of soil salinity and resultant infertility and water logging. The available water is polluted due to the discharge of the sewage and industrial waste into the rivers. Unhygienic practices also contribute to water pollution in slums and rural areas. Conservation and management of water resources should be our major concern. It is necessary that water conservation plans are fitted into a general scheme of environmental conservation. Prevention of soil erosion, through afforestation and proper soil conservation method and judicious use of water in our daily life will go a long way in conserving water. Soil conservation on agricultural land can lead to better use and better storage of soil water and an increase in the level of sub-surface water. Similarly steps have to be taken to prevent water pollution.

### **ACTIVITY (TEACHERS)**

1. Prepare and display a map of India showing the major polluted rivers and describe to the class how this pollution has taken place.

2. (Students) (a) In the class how would you help in preventing wastage of water in your house and locality. (b) How would you help to keep water in your environment clean ?

3. (Teachers) - Let children observe how water is used in their homes. Discuss in the class simple ways of avoiding wastage of water.

4. Form groups of children to undertake a survey of their villages/town/cities and find out how many tanks, ponds or lakes there were 10 years/20 years ago and how many of them have been drained of water now.

#### SOURCE OF ENERGY

Energy is indispensable for keeping the wheels of industrial machinery moving. Economic growth is unthinkable without energy. Oil, natural gas and electricity are the sources of energy for industries - both large scale and small scale. The principal users of coal are railways, thermal power station and a large number of industries including iron and steel, cement, refractories and glass, textiles, paper, sugar and chemicals. We have at present about 1,90,000 million tons of coal reserves down to a depth of 1200 metres distributed on different states. Extensive exploitation of coal has created ecological problems of depletion of coal reserves and pollution.

Oil and natural gas (petroleum products) are found in Assam, Gujarat and in the Arabian Sea at Bombay (Bombay High). We have oil refineries located in Bombay, Cochin, Madras, Vizag, Gauhati, Digboi, Haldia and Barone. As the country is not self sufficient in oil resources, we have to import oil to meet the growing demands. It is estimated that at the present rate of consumption, oil reserves in the world would last for another three decades. Petroleum products are used for automobiles, and for cooking. Large scale industrialisation and consequent urbanisation and improvement in living standard of the people have placed heavy demands on automobiles both in urban and rural areas. The number of vehicles is increasing by the day creating problems of traffic congestion and air pollution in cities. Increasing demand for petroleum products has not only led to extensive exploitation of our limited oil resources, but also to large scale impact at the cost of precious foreign exchange reserves.

Electricity is a major source of energy on which all industries - large scale and small scale depend. Electricity is generated from coal (thermal power) and from the force of falling water (hydro electricity). Increasing use of thermal power leads to the depletion of coal and creates air pollution. Hydro electricity does not create the problem of pollution but many bring about other environmental hazards.

The major hydel projects in the Western Ghats - Koyna, Lingamakki, upper Bhavani and Idukki dams in addition to causing deforestation in the catchment areas leading to soil erosion and landslides. Research has revealed the possibilities of earthquakes being triggered due to the impounding of massive amount of water in them. Seismic tremors have been recorded at these reservoirs. The reality of this hazard was highlighted after the earthquake which struck Koyananagar in 1967.

The above problems relating to the exploitation of the main sources of energy from economic growth have underline the need for going in for alternate sources which are environment friendly like geothermal (energy derived from the earth crust), solar energy, wind energy, tidal and biogas energy. Although all of these are now being tapped, lack of adequate technology prevents their industrial application. Hence the urgent need for research in this area.

#### **ACTIVITY (TEACHER EDUCATORS)**

1. Arrange a panel discussion on the environmental implications of the use of coal, petroleum, natural gas and electricity in industry.

2. Arrange lecture by experts on the use of non-conventional energies like wind, tidal wave solar and biogas energies.

3. (Teachers) - Visit hydro-electricity project centres in your state and report the impact of these project on the environment of the area in which it is located.

4. Make the students collect statistics from the Regional Transport Office regarding the number of vehicles registered during the past ten years.

#### **TRANSPORT**

To accelerate the pace of development, the country has been giving great importance since independence to the development of various modes of transport. The importance of transport for trade and commerce, and rapid industrial growth is too well known to need any elucidation. The country is served by a network of roads and railway lines. The national highways link all the states together to facilitate free movement of goods and people. Similarly well knit system of the railways administered by nine zones serve as the nerve centre of our economic activities. Water transport including river, inland water and ocean contribute their share significantly on promoting economic growth. However, development of roads and expansion of railway lines in hilly regions and plains has resulted in the destruction of forest and agricultural lands. Heavy movement of traffic on national and state highways and by the railways has contributed in extending environmental problems of both air and noise pollution from urban to rural areas.

### **ACTIVITY (TEACHERS)**

Make the children observe and record the number of goods laden trucks, buses and other automobiles passing on the highways running through their village (if any).

### **POLLUTION**

Pollution is another problem associated with economic growth. In India the major sources of pollution are domestic waste, thermal power, industries and auto exhaust emission. Industrial activities create air pollution. The levels of sulphur dioxide and particulate matter have already exceeded the permissible limit. Industrial cities have become gas chambers. Carbon dioxide emanating from the chimneys of factories is already being felt in the form of more heat and drought in summer and more rain, and floods during monsoon. Industrial pollutants which are discharged into the river have polluted the water of our major rivers and sea coast. For detail, see module on 'Environment and Pollution'.

The foregoing discussions clearly proves that most of the environmental related problems arising out of economic development are due to excessive resource exploitation combined with a poor understanding of the inter-relationship between man and environment. The pace of economic development is hampered by these problems like soil erosion and land degradation, deforestation, problems of



water management, depletion of mineral resources and excessive population pressure on land. The mounting problems of pollution due to unimaginable interference of human beings have been adversely affecting the quality of life.

#### **SUSTAINABLE DEVELOPMENT**

Economic development is a continuous process. It can be halted only at the risk of increasing human misery and suffering. Environment has to be exploited for development. Any development or growth of our economy always destroys and even pollutes the environment to some degree. But non-growth is equally dangerous. This means for development, we have to use the environment and at the same time save it from destruction, by building environmental concerns into developmental programmes leading to what is known as sustained development. This plan of action is regarded as making efforts for sustained life and for avoiding the imminent death trap. In other words, it is an approach by which population, environment and natural resource policies are integrated into national development strategies so as to ensure environmentally sound sustainable development. The major emphasis of this approach is on meeting the basic needs of the people and improving their quality of life without adversely affecting the viability of the environment. It calls for development strategies which anticipate environmental problems and take precautionary measures to avoid the resultant problems. Invention and use

of new production technology to reduce the per capita consumption of resources, recycling, substitution of scarce and non-renewable sources by renewable ones, efficient water resources management to conserve water, forest conservation through afforestation, crop rotation, application for new technology to prevent pollution, etc. are some of the strategies that could be built into a programme of sustainable development.

The concept of sustainable development is slowly and steadily picking up. There is an increasing awareness among people of the impending danger posed by environmental crisis like depletion of precious resources, shrinking of forest, increasing desertification, loss of agricultural land, salinisation, alkalisation, water logging, acid rain and hazardous waste. The Chipko movement in Uttar Pradesh to prevent deforestation, the role played by Kerala Sahitya Parishad environmentalists like Sunderlal Bahuguna of U.P., Baba Ampte of Maharashtra and Shivaram Karanth in Karnataka to mention only a few testifies to this increasing public awareness.

#### **ACTIVITY (TEACHER EDUCATORS)**

1. Arrange a panel discussion on the concept of sustainable development.

2. Collect information on voluntary agencies that are engaged in creating awareness among people and policy

makers on the need to protect the environment from degradation and destruction. Discuss the extent to which they have succeeded in their efforts.

3. (Students) - Collect pictures about the projects contemplated by government like Kaiga, Silent Valley, Narmada Dam, etc. Write a few sentences on why people are opposed to these projects.

4. Arrange lectures by eminent persons in the field of environmental conservation on 'sustainable development'.

#### **POLITICAL DEVELOPMENT**

Indian concern for the environmental degradation began to be expressed even before independence. During the freedom struggle, in the annual session of the Congress, the need for protecting the environment was highlighted. Mahatma Gandhi rightly foresaw the impending danger to the environment through large scale industrialisation. It is for this reason that he vehemently opposed large scale industries and advocated the need to build and strengthen rural economy based on small scale and cottage industries which are not only environment friendly but also conform to the doctrine of sustainable development.

The concern for environment the politicians and freedom fighters expressed itself in the constitution in the form of assurance given by the state "to protect and improve

the environment" and "safeguard the forests and wild life in the country". Further, protecting and improving the natural environment including forests, rivers and wild life is made a fundamental duty of the citizens.

Besides the provision made in the constitution for the protection of the environment, various programmes have been undertaken under the five year plans as part of the Government's concern for the environment. Soil and water conservation programmes initiated during the first five year plan have been progressively intensified over the successive plan periods. The land area covered by various conservation measures has considerably increased. The sixth five year plan gave great importance to environment protection and emphasised the need to bring environmental considerations into the developmental planning process.

Despite these measures, it appears that awareness of environmental problems among our politicians and policy makers has sufficiently developed. In fact, it may not be wrong to state that politics has its share of contribution to environmental degradation. Very often environmental interests are subordinated to political interests. In a representative democracy like ours, the elected representatives in a bid to please their electorate try to extract from the government maximum benefits for their constituency and in this process the more influential has greater

advantage over the less influential. The result is, very often developmental projects like irrigation, dams and heavy industrial plants tend to be located in regions of areas which are not viable from the point of view of environmental preservation. This has evoked public protest in the form of agitations like Narmada Bachao Andolan, agitation against the Silent Valley Project in Kerala and the ongoing agitation in the Dakshina Kannada district of Karnataka against the proposed establishment of mega industries there.

The increasing concern for the environment in India began to be felt after the United Nations Conference of Human Environment at Stockholm in June 1972. Mrs. Indira Gandhi, the then Prime Minister addressing the conference underlined the need to safeguard the natural resources of the earth for the benefit of the present and future generations through planning and management. During the sixth general elections in 1980, for the first time, the issue of environmental protection figures in the election manifestos of many political parties. The most encouraging development regarding the environmental problems is the reference in the speech of the President of India in his address to the Houses of Parliament in 1982 to the importance of environment. A strong emphasis on the need to practice ecological wisdom was made in the speech of the Prime Minister.

## ENVIRONMENTAL POLICIES AND PROGRAMMES

The serious environmental problems have called for concerted state action to combat them effectively to mitigate the danger posed by them to the Indian ecosystem. A comprehensive integrated view of environmental problem and improvement with emphasis on the sustainable use of natural resources for development began to influence policies and actions of the Government. In February 1972, a National Committee on Environmental Planning and Coordination (NCEPC) was set up as an advisory body in the Government in all matters relating to environmental protection and improvement. The committee consisting of ecologists, experts from different areas of specialisation, senior officers of Government agencies concerned with environmental matters as also representatives of citizen groups and voluntary agencies was entrusted with the responsibility of preparing relative costs and benefits for all developmental projects having impact on the environment. The establishment is a clear indication of Government's earnest endeavour to pay proper attention to the problem of environmental protection. This body was subsequently replaced by a National Committee on Environmental Protection (NCEP) with almost the same functions with the additional role of preparing a 'state of environment' report to promote environmental consciousness. In 1981 a new Ministry of Environment with a Department of Environment under it was created.

The Ministry of Environment serves as the Nodal agency in the administrative structure of the Government for planning and coordinating environmental programmes. Its functions are (1) to bring to the attention of the Government instances, causes and consequences of environmental degradation and to establish environmental intelligence and early warning system, (2) to assess environmental impact of developmental projects, (3) to monitor and control air and water pollution, (4) to protect and conserve wild life, (5) to establish an environmental information system and data bank and (6) to promote environmental research and to interact and cooperate with NCEP. Before undertaking developmental projects, it is now made mandatory that environmental issues, possible ecological effects are identified in advance and corrective measures incorporated to reduce undesirable environmental impact.

The Central and State Pollution Control Boards are established for the assessment and control of water and air pollution. These boards fix minimum standard for liquid and gaseous effluents for major polluting industries. A significant step in the direction of controlling water pollution is the setting up of the Central Ganga Authority to prevent the pollution of the river Ganga.

Alarmed by the extensive destruction of forest wealth in the country and to arouse public awareness on the

importance of forest wealth, an annual tree planting festival was started by the Government in 1950. But unfortunately the initial enthusiasm of the public in celebrating the 'Vanamahotsava' has waned over the years, reducing the celebration to a routine annual ritual. Another major step in the direction of preserving forest wealth is the programme of social forestry launched in 1986. To bring about a qualitative change in the programme, the National Wasteland Department Board was set up in 1988 to regenerate wasteland through massive afforestation and tree planting. Further to ensure environmental stability and equilibrium vital for the sustenance of all forms of life - human, animal and plant, comprehensive policy was evolved in 1988.

Several laws seeking to protect the environment have been framed. A few are -

1. The Insecticides Act, 1963
2. The Wildlife Protection Act - 1972
3. The Water (Prevention and Control of Pollution) Act, 1974
4. The Forest Conservation Act, 1980
5. The (Prevention and Control of Pollution) Act, 1981.
6. The Environment Protection Act (EPA), 1986.

It is unfortunate that despite the above mentioned programmes and laws, the degradation of the environment



continues unabated. The reason for this sorry state of affair is the lack of sincere efforts to implement them by those involved. In the face of pollution control legislation and declaration of policy on sustainable development, it is incumbent on the courts to take action to discipline polluting industries, as the consequence of not doing so is silent death for generations to come. Cooperation by the voluntary agencies and citizens will be of great help to the law enforcing authorities to contain environmental degradation.

**ACTIVITY (TEACHER EDUCATORS)**

1. Arrange a debate on Gandhian Socialism with reference to the policy of sustainable development.
2. Arrange a discussion on factors inhibiting environmental protection despite several measures taken by the Government including legislative enactments.
3. (Teachers) - Collect important legislative enactments relating to environmental protection. Examine their provisions and prepare an essay on how they helped in achieving the goals for which they are intended.
4. Arrange a visit by your students to the local panchayat or municipality and make them collect information from the appropriate authorities regarding the steps taken by them to keep the village/city clean.

## EVALUATION

1. What are the basic needs of human beings and the sources available in the environment to meet them ?
2. Why is a nuclear family referred to a joint or large family ?
3. Identify and mention some social evils prevailing in Indian society. What measures would you recommend to eradicate them ?
4. How does sex preference affect the size of the family ?
5. How do festivals and fairs help to strengthen the unity of the village community ?
6. What are the dangers of using vegetables and fruits grown with chemical fertilizers ? How could this danger be minimised ?
7. The use of large turbans by the people of Rajasthan and lungis by the people of South Indian States is influenced by the geographical conditions of their states. How ?
8. What are the factors leading to the migration of people from one region to another ? Examine the effects of such migration on the environment.
9. How does construction of big and sophisticated houses on a large scale affect the environment ? What are your

suggestions to make construction of houses economically and environmentally viable ?

10. Why do food habits, dress styles differ from region to region in India ?
11. How is social environment polluted
12. What are your suggestions for creating a healthy social environment in a plural society ?
13. How does population growth affect the environment ?
14. How does urbanisation affect environmental quality ?
15. What is 'recycling' ? How does recycling help to prevent environmental degradation ?
16. Explain the impacts of deforestation on the quality of life.
17. Explain factors that lead to the depletion of water resources. What are your suggestions to conserve the water resource ?
18. Mention the important sources of energy. What are your suggestions to conserve the depleting sources of energy ?
19. How do road and water transport system affect the environment ?
20. Describe different types of pollution and their effects on human health.

21. What is meant by sustainable development ? Why is it necessary for India to adopt this approach to development ?
22. Economic growth causes environmental hazards. Therefore there should be no economic growth. Do you agree ?
23. Why did Mahatma Gandhi prefer small scale and cottage industries to large scale industry ?
24. Does the Government of India have an environmental policy ? If yes or no, write a few lines giving your reasons.
25. Give reasons why India inspite of several legislations has not been able to control environmental degradation. What are your suggestions in this regard ?

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## MODULE VI

### IMPLICATIONS OF SCIENCE, TECHNOLOGY AND INDUSTRY

#### INTRODUCTION

Environment is the key factor to determine the quality of life. A thorough understanding of the world around us and our environment and its problems, are necessary for participation in the protection of sustenance of our environment, so that it may contribute to the quality life.

The industrial revolution and advancement in the field of science and technology brought much comfort to human life, but on the other hand injudicious use of technology has caused serious environmental problems of pollution. Always in a country, where there is laxity, the industry demonstrated its greed, and lack of concern for environmental protection.

Moreover in the new economic scenario, where the developed countries have the trend to dump their wastes in the developing countries, who were left with no option but to accept it. Thus bring in a new problem, which is not environmental friendly.

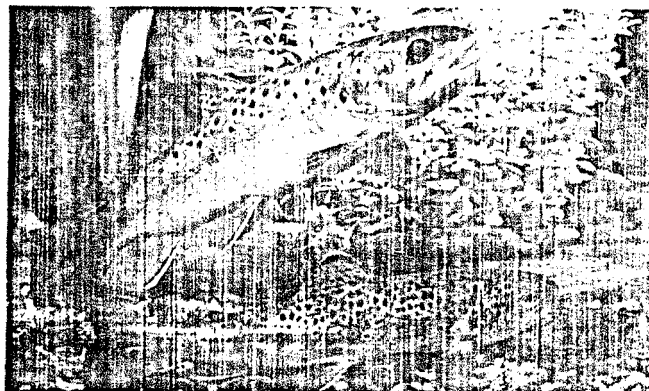
Increased industrialisation in cities and towns results in urbanisation, growth of slums causing degradation of the environment. Acid rain is a serious environmental

threat. It destroys trees and leads to the poisoning of lakes and rivers, which in turn kills fish stocks, forests and crops.

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The main culprits are sulphur dioxide and nitrogen oxides which are emitted from the power stations that burn fossil fuels to make electricity. Nuclear power stations, with their insignificant emissions, make no tangible contribution to this damage; global warming, ozone depletion, contamination of fresh water sources, depletion of natural resources, imbalance in ecosystem, etc. is necessary to contemplate suitable actions to restore the quality of environment. Now it is high time to re-look at human actions and inventions in the area of science technology and industries in light of their environmental friendly terms.

It is required to educate the people especially school children about the pros and cons of nonjudicious use of technologies and over exploitation of the limited natural

resources by taking much care to protect the resources of the environment.

An attempt is made to provide a variety of activities to pupils in order to give them first hand information such as activities out of class, group work, experiments, observations, group discussions and interviews.

#### **OBJECTIVES**

- To provide possible information to pupils about modern innovations in the field of science and technology.
- To enable the pupils to appreciate the innovations in science and technology, industry and its contributions/ comforts to human life.
- To develop awareness among pupils on environmental problems, related human actions.
- To enable the pupils to understand the need and importance of science and technology for global harmony.
- To develop love and affection among pupils towards nature.
- To bring an attitudinal change in their words for protection of environment.
- To encourage pupils and teachers to participate in the environmental activities which promote quality of life.
- To encourage the teachers and pupils to conduct campaigns to build up awareness among local communities and to



sensitise them on the possible hazards of non-judicious human actions in the industries and to motivate them to resist and protect the environment for the quality life.

- To enumerate environmental problems related to the use of modern science and technology.
- To justify the utility of modern scientific and technological tools in agriculture, industries, transport, communication, energy and health sciences.

#### **IMPLICATIONS OF SCIENCE, TECHNOLOGY AND INDUSTRY**

##### **TRANSPORT**

Today we see bicycles, cars, buses, trucks and trains which are moving on land. Boats, steamers, ships on rivers, lakes, canals and seas. The means of water transport. Helicopters and aeroplanes which move in air. Bicycle is the healthiest and the cheapest mode of transport for many, whenever they move within the cities, towns, villages, fields and suburbs, it requires no fuel like Diesel and petrol and does not emit any poisonous gases like carbonmonoxide (CO) and carbondioxide (CO<sub>2</sub>) like scooters, motor cycles and other automobiles. It provides a healthy physical exercise to the body too.

There has been significant advancement in the field of transportation due to the advancement of science and technology. The number of vehicles have increased in fourfold manner, when compared to the last decade. Tractors

have replaced bullock carts in rural area. Even the remote places have been connected by roads. There has also been a sharp increase in the number of two-wheelers. Transport in modern day has become a comfort rather than a necessity. The availability of essential commodities like food, medicine, milk to various remote location is possible because of the easy transport network available to the common rural folk. The role of science has remained out of the intellectual.

Glories in the history of man and most of its application has been for betterment of human life. This scientific knowledge has been and is a most powerful tool for solving human problems. Today science and technology has become a synonym of progress and civilization.

In recent years the urban population are facing more problems related to this rapid scientific advancement.

In places like Visakhapatnam in Andhra Pradesh, where zinc smelter has caused lots of health hazards.

In case of silent valley in Kerala also, there was lot of hue and cry in giving permission for construction of a hydro-electric power project. We need electricity, but at the same time its environmental repercussions are to be looked carefully.

Many people in Kakinada in Andhra Pradesh have to evacuate their places and to go to safer places because of

the ONGC rig failure. Recently in Visakhapatnam, because of the LPG gas tank leak of (HPCL) on 14th September 1997, caused fire and toxic effects of 20,000 PPM, account of mass deaths of CISF jawan and labourers.



In Karnataka, Andhra and Tamilnadu specially in cities. All the vehicle which run on petrol or Diesel should have an "emission certification" to reduce the pollution.

We should follow bio-ethics to control pollution, in all major cities of south.

\* To bring down the pollution individuals should group together and use vehicles rather than using individual vehicles.

\* Use public-transport systems, like city bus, trams or trains. Avoid using car, jeep, scooters and motorcycles.

\* Checking the vehicle carburetors, engine tuning regularly helps in reduction of air pollution.

\* Construction of chemical/any industry in the midst of the city to be avoided.

\* Using the modern scientific gadgets for waste disposal/garbage utilisation we need scientific advancement for recycling of paper/glass/garbage.

\* Using bio-degradable materials for carry bags and in household utility.

\* Avoid plastic/no plastic to be used as far as possible.

#### **ACTIVITIES**

1. Discuss why bicycle is the healthiest mode of transport.

2. Write a note on the means of transport used in your locality.

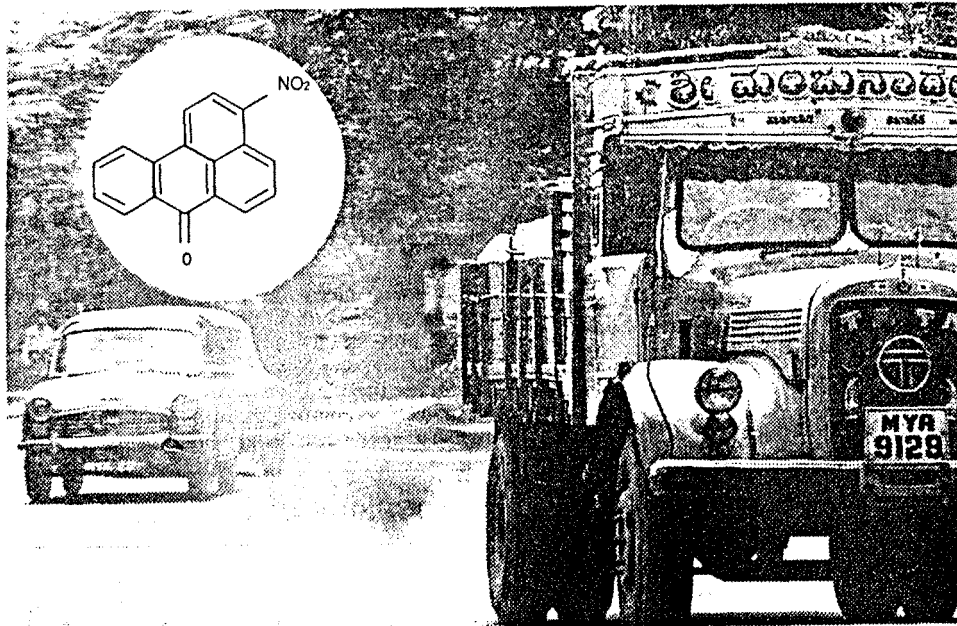
3. List the industries located in your city or town, or near to your village.

4. Do you experience any problem when you are on busy road with lot of smoke of vehicles.

#### **NEGATIVE IMPLICATIONS**

As a result of increase in the number of vehicles year after year, the concentration of air pollutants namely

$\text{CO}_2$ ,  $\text{CO}$ ,  $\text{SO}_2$ , oxides of nitrogen in the atmosphere have increased. All the vehicles use fossil fuels which comes under non-renewable sources of energy such as petrol, Diesel, etc. We have to conserve our precious fossil fuels for future because they are of limited supply. The increase on the concentration of  $\text{CO}_2$  will have the global warming and increase  $\text{CO}_2$  will effect human health.



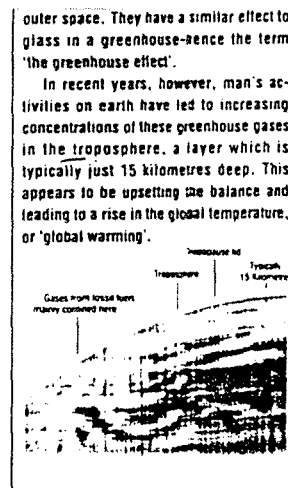
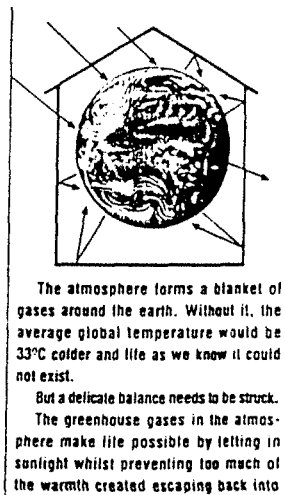
### The Cold Reality of Global Warming

Our planet is warming up at a faster rate than at any time in the last 10,000 years.

The increasing amounts of  $\text{CO}_2$  we emit through electricity production, heavy industry, aviation and even our own cars - is exacerbating the greenhouse effect. In effect, heat which should escape from the earth into space is being trapped, with the result that the world is getting warmer; hence the term 'global warming'.

If we carry on as we are the overall temperature of the earth could rise by 1°C by the year 2030. This may sound tiny, but the effects could be profound, especially (and cruelly) in areas of the world which are least able to cope with them.

A rise in sea level, droughts, failures of crops, low land flooding, salt water contamination and storm surges are well very real threats with uncontrolled global warming. And while some species may acclimatise to the changing conditions, the consequences for the wildlife, plants and trees we value could be devastating. Indeed, for every 1°C rise in the earth's temperature many will have to move some 90 kilometres towards the poles to survive. Others will simply become extinct.



The general consensus of the world's scientists is clear: we must control greenhouse gas emissions now, aiming not only to stabilise them but ultimately to achieve a significant reduction.

Trees are the factories of production of oxygen. They absorb  $\text{CO}_2$  and release oxygen in the process of photosynthesis. An effective way to minimize the pollution is to plant trees in and around houses, schools, factories, wastelands and near tanks, etc.



*Elatobium abietinum*, a forestry pest which strips needles from spruce trees. Mild winters could lead to population explosions of this aphid and devastation for Sitka spruce plantations.



The weed *Alopecurus myosuroides* (or black witch) poses a threat to arable land in the South of England. Restricted by current summer temperatures it would be likely to spread northwards.



The Arctic hare, a species which has adapted specifically to the cold, Arctic-zone conditions of mountains. It is likely to decline in a warmer climate.



Aggressive, warm-loving plants may colonise on hills in higher temperatures. The purple saxifrage, a mountain plant, will be unable to compete.



The Whitethroat. As desertification occurs in regions such as the North African Sahel, this species may not survive it's migratory journey.

### ACTIVITY

1. Trees are the best sources to maintain the balance between the concentration of  $\text{O}_2$  and  $\text{CO}_2$ . Discuss.
2. Discuss the measures to be taken to control the overuse of fossil fuels.

In addition to the release of  $\text{CO}$  and  $\text{CO}_2$  the vehicular traffic also releases suspended particulate matter (SPM) product of dust and soot. SPM may cause respiratory

problems and interfere with photosynthesis and other physiological functions when deposited on the surface of the green leaves. Further, excessive burning of fuels by vehicles leads to carry photochemical reactions. These reactions lead to the formation of ground level ozone which affects the human health and plants and animals. The automobile exhaust also release lead into the atmosphere which is a very toxic chemical.

The products of burning of fossil fuels, viz.,  $\text{SO}_2$  oxides of nitrogen when release into the atmosphere get oxidised and combine with atmospheric water vapour to form sulphuric acid and nitric acid respectively, and this results in acid rain. This acid rain kills fish and other aquatic organism in water bodies and also affects monuments.

The limited use of individual vehicles helps to protect and maintain healthy environment, thus reducing pollution too.

#### **ACTIVITIES**

1. Collect rain water in your local area and test its acidity with litmus paper.

2. Compare and contrast the plant and trees in the eroded traffic places and in the traffic free areas and tabulate the data.



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Sl. No.	Name of plant/tree	Area	
		Traffic free zone	Busy traffic zone

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**NOISE POLLUTION**

In addition to poisonous gases, the vehicular traffic also produce noise-pollution. Noise-pollution creates tension, headache, sleeplessness, vomiting and even it results in deafness. The intensity of sound is measured in decibels.

**STEPS NEED TO BE TAKEN**

1. Use of speakers in public meetings, marriages and religious places should be strictly prohibited.
2. Growing big trees on either side of the roads reduces noise.
3. Fixing silencers to the vehicles.
4. Building cinema halls, factories and other noise producing places should be built with sound proof materials.

The transport of oil through tankers in seas and oceans spilling several tons, caused severe damage to marine life.

The use of mechanised boats fishing travellers in fishing cause disturbance to the aquatic ecosystem. It effects not only the growth of fish but also the entire marine-biota.

5. Burning crackers, during festive/marriage occasions.

6. A workshop or metal modifying factories should be barred in the midst of city.

7. aerodromes should not be in the midst of the city.

#### **ACTIVITIES**

1. List out the poisonous gases emitted by vehicles. Mention their impact on plant and human life.

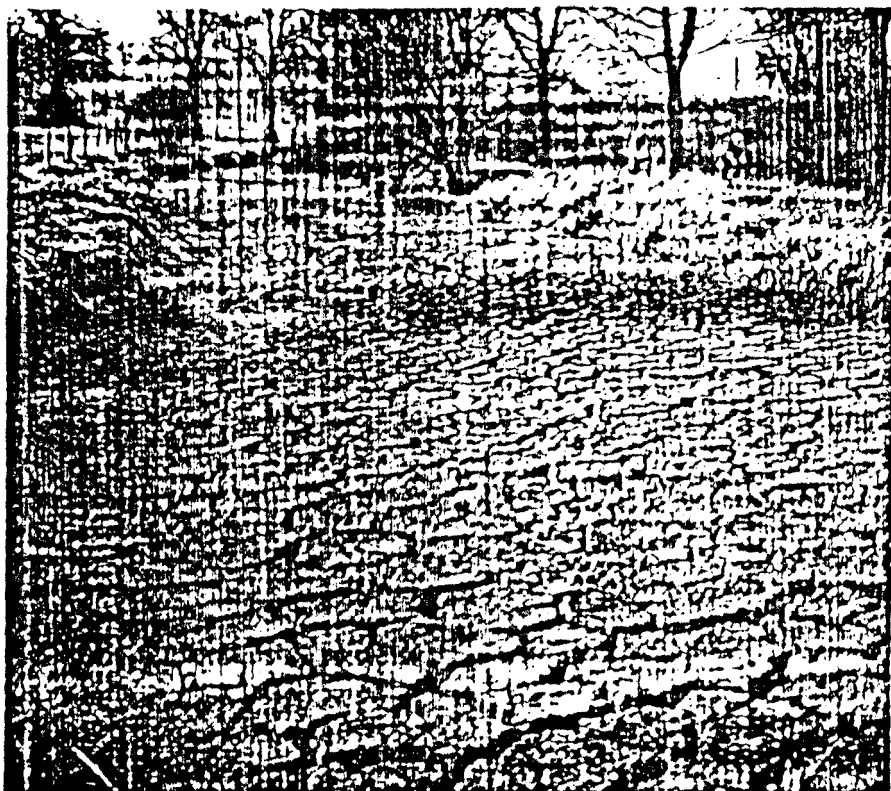
2. Develop flash cards in each of the atmospheric pollutant and discuss.

3. Discuss with your parents about transport systems, its advantages and disadvantages.

#### **FOOD AND AGRICULTURE**

The advancement in the field of science and technology has brought evolutionary changes in agricultural practices.

In traditional farming formers mostly used renewable biomasses in the form of compost to keep the field fertile.



**Global warming: We have been warned**

You may be all too aware that recent years have seen a series of exceptionally hot summers, resulting in droughts and water restrictions.

It would be simplistic to lay all the blame with global warming. It has, however, given us a tangible insight - and warning - of the conditions we could be bequeathing for future generations.

With rapid growth in population the need for self sufficiency in food production has become necessity. This has been achieved through bringing additional land under cultivation, an intensive farming, use of better seeds, has increased the use of chemical manures.

**NEGATIVE IMPLICATIONS OF SCIENCE AND TECHNOLOGY IN THE FIELD OF AGRICULTURE**

The improved practices of agriculture involving the use of fertilisers and pesticides have caused several environmental problems.

The pressure of the growing human and cattle population have seriously affected the environment. Vast tracts of agricultural land have been degraded due to faulty agricultural practices, indiscriminate tree felling, over grazing, etc. Soil degradation has a serious economic and ecological implications for a country like India. Soil

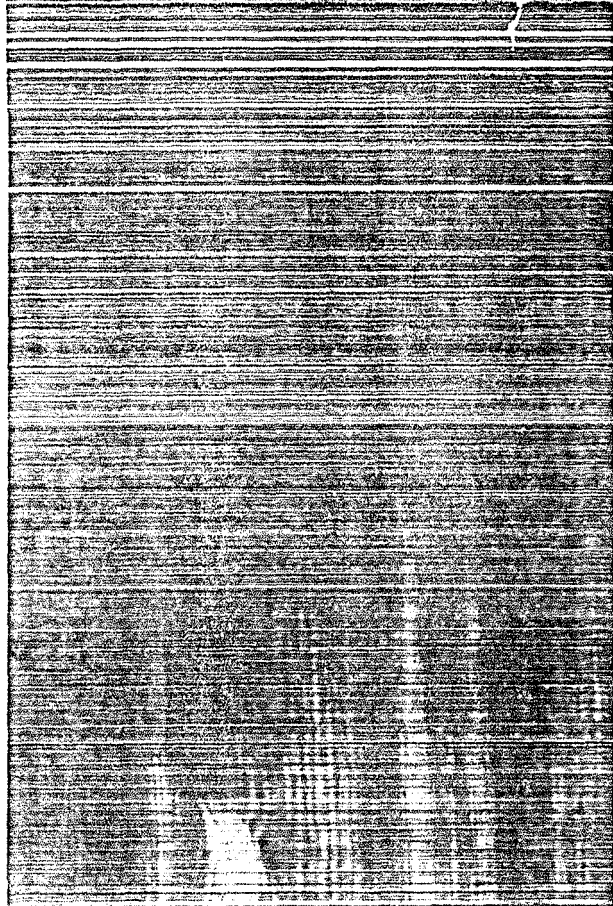
erosion increases the silt load in a river system affecting aquatic productivity adversely. This siltation, reduce the dams and reservoirs.

The increase use of fertilizers in quantity more than required will result in eutrophication of the water bodies resulting in increased nutrient availability to the weeds. This depletes the dissolved oxygen in water, more over some of the chemicals like pesticides can enter the aquatic food chain utility affecting human beings, and causing diseases like cancer, hormonal imbalance and modulation.

#### MANAGEMENT OF SCIENCE AND TECHNOLOGY FOR QUALITY LIFE

The traditional agriculture had been based largely on renewable energy source. There was very little fear of adverse effect on environment. Further the technology was introduced when the fossil fuels were cheap, abundant and readily available and energy was not a constraint.

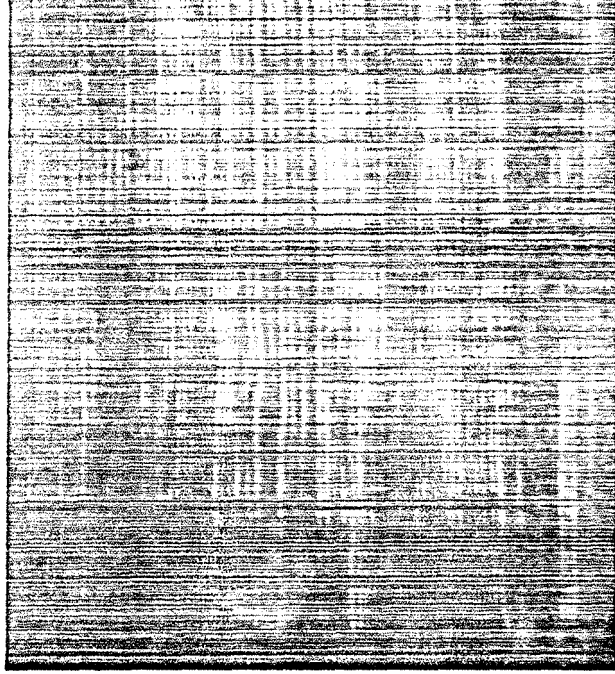
The present day agriculture is energised intensive with increased used of chemical fertilisers which causes great harm to the environment. The time has come to rethink of our past practices and try to evolve a new agricultural practices which are environmental friendly. The agricultural practices could be improved by adopting simple methods of soil conservation, water conservation and the use organic manure, by doing so the fertility of the soil would be



The production of nuclear electricity does not contribute to either global warming nor acid rain; it is an energy that is clean and green.

The nuclear fuel we use is uranium, a resource which is not only plentiful but logical since there is no other day-to-day use for it. It is also extraordinarily efficient; two uranium pellets the size of sugar cubes will meet the electricity needs of one person for an entire year.

In fact, nuclear power currently provides sufficient energy for eight million people, or a fifth of England and Wales' total demand.



## Radiation.

To many, radiation is synonymous only with nuclear power. What might surprise you, however, is that the UK nuclear industry contributes a minuscule amount to the radiation you actually receive.

Radiation is a natural phenomenon which occurs, and always has occurred, all around us. Indeed some 87% comes from outer space, the air, the earth, food, drink and even our own bodies. The remainder comes from man-made sources, most notably the X-rays we routinely receive in hospitals or at the dentist.

maintained and at the same time the soil moisture will improve. The water management practices will further add to the growth of water table.

It would be an advantage to the farming community and the population at large if greater awareness is created among the farmers on the misuse of fertilisers and pesticides and also the advantages of organic farming.

#### **MANAGEMENT OF LAND**

The land-man ratio in India is 0.019 hectares 1990. It is likely to come down by 2000 due to increasing demand for aerable land for urbanization and industrial activities. This calls for efficient land management.

#### **ACTIVITIES**

1. Discuss with farmers in your area and collect information about what types of pesticides they use for what purposes and prepare a report.

2. Discuss with elderly farmers about agricultural practices then and now.

3. Project work preparing compost manure in schools by collecting the papers and other bio wastes and placing in a pit and watering it frequently and to use in school garden.

4. Visit an agro-shop collect information about the different fertilisers and pesticides sold.



5. Discuss about the local practices of preparing bio-manures and its applications.

#### **IRRIGATION AND ELECTRICITY**

Irrigation was known to Indians from a long time. The success of agriculture is dependent on availability of water. It is rightly said that the Indian agriculture is mainly based on rain in monsoon, hence the importance of irrigation. In India there are three main sources - wells, tanks and canals. Many parts of India suffer from water scarcity. Yet, India uses only one-tenth of its annual rainfall. Water management practices such as collection and proper storage of water and the afforestation in the catchment areas would prevent such scarcity.

#### **NUCLEAR ELECTRICITY: POWER WITHOUT POLLUTION**

A nuclear power station is a somewhat unspectacular sight from the outside.

Aside from the odd wisp of steam there is very little to catch the eye, but then nuclear generation does not involve tall smokestacks emitting environmentally dangerous gases.

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The advancement of science and technology has enabled India to construct many multipurpose dams across major rivers. The major objectives of these dams are to provide irrigation.

Ground water is an important source of water for drinking, industry and irrigation. Through suitable

technology, ground water from 300 to 500 feet is lifted through borewells and tube wells.

In Karnataka, at Kaiga, power generation with heavy water is used for the irrigation.

#### **NEGATIVE IMPLICATIONS OF SCIENCE AND TECHNOLOGY IN THE FIELD OF IRRIGATION AND ELECTRICITY**

The advancement in the irrigation sector in southern India through construction of major dams has caused many environmental problem along with prosperity. Lakhs of hectares of forest lands are submerged and thousand of families are displaced. A living example for thesis the silent valley hydroelectric power project in Kerala which needs a comprehensive study of all the aspects.

#### **EFFECTIVE MANAGEMENT PRACTICES**

Effective land and water management system in command areas can stop soil degradation and further helps in irrigating tail-end lands effectively. Proper inter-linking of canals with good maintenance can improve water transportation to a greater extent. Planting trees, coconut trees on either side of the canals and rivers can improve the environment and reduce the pollution. Suitable legislation should be made to regulate the use of ground waste by fixing the depths of borewells. It can control the indiscriminate digging of the borewell in closer distances.

Suitable steps may be taken to install air pollution controls equipments. In thermal power stations and also necessary arrangements can be made to cool the water with the help of cooling towers.

Further the use of renewable sources of energy such as solar energy, wind energy bio-gas, hydro thermal energy, tidal energy may cause less environmental destruction than non-renewable energy sources.

#### **SOLAR ENERGY**

India is indeed fortunate to receive abundant sunshine. Use of heating devices, solar cookers, solar driers, etc. are very much in practice. Solar energy can also be converted into electricity by photovoltaic system. This is accomplished by a silicon cell when exposed to sunlight gives electricity. In urban areas like Hyderabad, Bangalore, Trivandrum, solar energy is converted to power to run water pumps, traffic light, radio, television and other appliances.

#### **WIND ENERGY**

In rural areas, in Karnataka, Andhra Pradesh and Tamilnadu wind energy is used for lifting water, grinding grains, sugarcane crushing, winning the seed. Wind energy may contribute electricity to the national grid.

#### **BIO-GAS**

Cattle dung, human excreta and other organic wastes which have biological origin pose a great danger to public

health if not disposed off safely. These wastes can be converted into useful products mainly bio-gas a clean fuel and organic manure. The governments of Andhra Pradesh, Karnataka, Tamilnadu and Kerala are encouraging the farmers who use the bio-gas plants for cooking, lighting, pumping, water and a fuel for any purpose and for organic manure, by providing them subsidy for bio-gas plant.

#### **TIDAL ENERGY**

India especially south India possess a vast coastal belt, a potential site for harnessing the tidal energy. The up-serging waves can be used to run turbines for electricity generation.

#### **ACTIVITY**

1. Identify major South India rivers and dams in the map.
2. Observe and write down the sources of irrigation in your local area.
3. Collect information form agricultural officers to reduce acidity and alkalinity of soil.
4. Discuss with elders about the sources of energy for pumping water and for other home appliances.
5. Visit your nearby thermal plant or hydel-plant and observe the process of electricity generation.
6. Collect leaves from nearby thermal plant and away from it and clean it in two beakers separately and observe the dust that washed into the different beakers and analyse

them and find the inference and discuss the reasons for it ?

7. Visit the nearby bio-gas plant in groups observe and discuss with owners about inputs and outputs, and its uses.
8. How many people do you see using solar cookers in your place ? List them.
9. Do you have any problem of current in your city ? List them.
10. Collect different water from different places and taste them. Note the inference.

#### **CONSTRUCTION AND BUILDING TECHNOLOGY**

There is a revolutionary change in the construction and building technology as a result of advancement in science technology and engineering. Huge constructions are coming up in cities and towns using the basic materials such as cement, iron and gravel. Multistoried shopping complexes and residential apartments are coming up keeping in view of the increasing needs of the evergrowing human population.

#### **NEGATIVE IMPLICATIONS OF CONCRETE STRUCTURES**

As an advent of new technology in building construction using cement, iron and gravel transformed majority of cities and towns in India into concrete jungles. Several environmental problems like growth of mushroom apartments generated unhygienic housing atmosphere such as

lack of ventilation, air space, etc. It has posed greater problems with regard to water especially in case of Hyderabad and Channai where nearby river sources are not available and drying of borewells due to the lowering of the ground water table. Further these concrete structures generate problems of radiation. The earth absorbs the heat and radiates into atmosphere and cools down by evening but concrete structures absorb greater amount of heat and radiate slowly even in the nights thereby increasing the temperatures of the cities and towns to a greater extent.

#### **MANAGEMENT ASPECTS FOR PROPER USE OF TECHNOLOGY IN THE FIELD OF CONSTRUCTION AND BUILDING TECHNOLOGY**

It is evident in most of the villages in South India people used to construct the houses by using available soil and other bio-products, viz. thatched sheds huts, tiled houses, mud houses, etc. which provides shelter from heat of summer, winter cold and rain. People lived naturally without causing problems to the environment.

Imposed technologies in brick preparation such as hallow bricks, may be commissioned in places of furnaces in industries construction of simple houses using natural materials such as wood, tiles and mud, etc. with proper ventilation. The technology may also be used to develop and make use of strong absorbing materials too.

### **ACTIVITY**

1. Prepare a picture chart of different types of houses.
2. Visit a building construction spot and observe the materials used.
3. Observe the heat at noon and evening in a concrete house, and a mud house and a thatched shed - compare.
4. Visit the spot of preparation of cement, mud bricks, hallow bricks, and record. Discuss about the cost effectiveness and strength of the above bricks with a building technician.

### **COMMUNICATION**

There are enormous developments in the field of communication. Television, computers, satellites, new processes of printing, information sharing, etc. They have brought enormous benefits to people. They have helped almost all fields of human activity, healthy living, management of place and time, and enjoyment of life. But they have also some drawbacks with reference to environmental degradation.

### **NEGATIVE IMPLICATIONS**

Television has brought many changes in the physical, social and economic changes in the life of people. In most of the households people normally are confined to their TV sets for observing the programmes. It has greater impact on social relations and individual participation of people in social functions. The conversation abilities, the play activities among poor groups are highly affected. It also



poses many problems in the health of individuals because of faulty viewing habits, such as viewing the programmes by sitting very close to the TV and by putting the lights off, bad sitting postures, increase sound, etc. will have many health hazards pertaining to eyes and ear, because of noise pollution.

Now-a-days the TV programmes highlight sex, crime, emotional stresses, greed for material comforts and enjoyment. These programmes have an unhealthy effects on the moral and ethical-values of the viewers. There is a consequent increase in juvenile delinquencies and crime. There is a need for better management of this communication medium.

#### **ACTIVITIES**

1. Discuss with your elders about the communication system of the present and past.
2. Develop a flip chart on the relative advantages of different communicational devices.
3. Enlist the environmental related programmes you have seen in television.
4. Write a letter to your pen friend to cultivate two important practices/habits for improving the quality of environment.
5. Visit a planetarium.
6. Collect the pictures of different communication devices.

7. Collect the pictures of Indian artificial satellites and other information and their applications.

## **INDUSTRY**

India predominantly is an agricultural country. Now we find a shift from agriculture to industry. All the developed countries have a dominant base of industry. Growth in population has created a demand for more food, more goods which trigger fast development of different kinds of industries to meet a variety of human needs.

The growth of industries provide livelihood for millions of people. Industrial production has improved the quality of life of the people and provided many comforts. The finished products such as clothes, foods and beverages, radios, televisions and sophisticated vehicles, beautiful buildings, variety of footwear, books, paper and other coloured printing materials, electric goods, such as fans, water pumps, motors, grinders, pressure cookers and ovens, are the off shoots of the impact of the implications of science and technology in industries.

## **NEGATIVE IMPLICATIONS OF GROWTH OF INDUSTRIES ON ENVIRONMENT**

The growth of industries has caused severe damage to the environment. Increasing industries has led to an increasing energy consumption; which uses more and more non-renewable sources of energy. The industries pollute the atmosphere by releasing harmful gases and effluents.

The growth in industries has polluted all the water sources like lakes, rivers, streams, and other water bodies and making water less suitable for drinking or for domestic use, and for other purposes. Industrial effluents containing various toxic pollutants such as nitrates and heavy metals like mercury, chromium, lead, hydrocarbons and fluorides, etc. are released into nearby water bodies and ocean. These effluents also pollute the ground water and pose threat to the very survival of humanbeings. The untreated domestic sewage when discharged into the water bodies will deplete the dissolved oxygen and will lead to the spread of water born diseases.

#### **MANAGEMENT OF INDUSTRIAL POLLUTANTS FOR BETTER ENVIRONMENT**

People must be vigilant on the harmful effects created by the industries in the local area. They must insist on the installation of pollution control equipment to reduce pollution. Children and teachers must create awareness among the community on the possible impact of industrial pollution on plants, animals, water and soil, so as to built pressure on political decisions in granting permission to new industries which do not observe pollution control measures.

#### **FOLLOWING STRATEGIES MAY BE FOLLOWED FOR SUSTAINABLE DEVELOPMENT**

1. Economical and Environmental considerations in decision making.

2. Proper resources pricing (large quantum of materials the industries use such as water, minerals, fuels which are precious natural resources should also be priced while taking into consideration of economics of inputs and outputs).
3. Development on integrated protected area for the preservation of genetic diversity such as parks, lakes, forests.
4. Waste managements: The waste products of the industries must be recycled. Recycling of the waters should also be thought of to conserve the natural resources.
5. Environmental education - Necessary education may be provided to all people, on the impact of human action on environment: to take up necessary action individually and community wise to protect the environment for quality life.

#### **ACTIVITY**

1. Visit a factory and observe the following things and develop a report:
  - i. The inputs required by the factory.
  - ii. Things it produces.
  - iii. Emission of gasses from the factory, their smell and source into which this waste is released.
  - iv. The type of liquid waste it releases, its colour and source into which this waste is released.
  - v. Peoples attitudes towards factory.

2. Collect the leaves of the plants from nearby factories, stone crushing machines and from a clear area and wash into beakers separately and observe the colour and texture of water and discuss.
3. Develop a flip-chart on the hazards of air pollution, water pollution and soil pollution by industries.
4. Take little water from nearby pond, observe its colour, smell and evaporate it by boiling and observe the matter left in the beaker.
5. Plan a field trip to a nearby polluted pond and river observe the colour, smell of the water and vegetation that grown in the water, record and discuss.
6. List out the renewable sources of energy and their daily use in your local area.
7. Arrange a debate to discuss different ideas to conserve natural resources.
8. Collect information from your parents and teachers on the major industries in your district and state and their implications on human life and environment.
9. List out the renewable and non-renewable sources of energy available in your state.
10. Write about the factories and their products in your local area and its impact on humanbeings and environment.

11. Arrange a visit to the office of the District Pollution Control Board.

#### **EVALUATION**

1. What impact has the growing technology on transport ?
2. Discuss critically about the steps need to be contemplated to check vehicular pollution in cities and towns.
3. Increased percentage of carbon monoxide and carbon dioxide is very harmful to us. Why ?
4. Describe recent advancement in agricultural practices.
5. Write down few names of high yielding varieties of crops that is used in your local area.
6. List out the major dams and their corresponding rivers in South India and its uses.
7. Building dams across major rivers is the need of the day - develop your argument.
8. Identify some of the water logging areas in your locality and list reasons for it.
9. What alternative sources of energy would you suggest in place of coal and petrol ?
10. Suggest a few ways of using the solar and wind energies in your daily life.
11. Concrete houses are hotter than traditional mud houses. Mention the reason.
12. Write about furnaces in your local area and how they cause damage to the environment.

13. List out the recent advancement in communication systems in post and telegraph/telephone/television/radio.
14. How do television and news papers help in the development of quality environment ?
15. Discuss the pollution caused by industry and its effects.
16. List out the different gases that are released into the air by industries which pollute the air.
17. What chemical industries and sewage does affect the flora and fauna of the water system ?
18. What is Pollution Control Board ? Why is it necessary ?
19. List out the strategies to be followed for sustainable development of industries.

## MODULE VII

### ENVIRONMENTAL PROBLEMS AND POLLUTION

#### INTRODUCTION

"Upon our own generation lies the responsibility of passing onto the next generation the prospects of continued well-being"

- Paley Commission Report

Environmental problems are really social problems. They begin with people as the cause, and end with the people as victims. Environmental pollution is a term that refers to all the ways by which people pollute their surroundings. The extensive destruction of forests causes problems of soil erosion, flood, etc. The ozone in the upper atmosphere that protect all life from the sun's harmful ultraviolet rays is being depleted by chemicals released from air conditioners, refrigerators, etc. Indiscriminative use of material resources and technologies for short term gains is counter productive and self defeating in the long run. Every one understands that it is high time to stop this destructive process, but we are not hurrying with the decisive initiatives even after Bhopal and Chernobyl tragedies, Gulf wars, etc.

Some of the major environmental concerns facing the world today include:

1. greenhouse effect and global warming
2. ozone depletion



3. urbanisation and its associated problems
4. degradation of land
5. air and water pollution
6. loss of biological diversity
7. depletion of natural resources
8. disposal of waste

Relevant information on natural and social environment is already incorporated in the school textbooks. The teaching-learning process is expected to highlight the critical issues like the protection of the environment, conservation of scarce sources and protecting nature from manmade pollution.

The activities suggested in this model are expected to involve the learners in understanding environmental problems. The teachers may feel free to supplement with suitable activities relevant to the locality and from regional situations as best as possible. More than the testing of information passed onto the learner, his or her participation and response to the activities would help in evaluating performance.

#### **OBJECTIVES**

After studying this module pupil would be able to

1. acquire knowledge about the immediate and distant environment that affects directly or indirectly to the life of human beings.

2. identify the ways by which people pollute their surroundings - air, water, soil, etc. and the consequences.

3. acquire knowledge about the relationship of different environment problems and the consequences of the same on man.

4. create an interest to engage in activities/ measures to check pollution.

5. develop an awareness of the need for proper maintenance of cleanliness at home, school and public places.

6. develop skill in resource mapping of the locality and prepare an action plan to ensure the judicious use of resources.

7. develop an attitude for protection, conservation and management of environment through participation in various activities organised by Government agencies and NGOs.

#### **ENVIRONMENT**

The environment is not only the sum total of all material things that constantly interact with each other and which make up the mosaic of this countryside landscape. It also includes the socio-economic institutions with air and habit of people in different parts of world. In short, environment includes not only the physical or material factors but the economic and cultural ones as well.

## **POLLUTION**

Pollution is an inextricable part of our population growth and of our energy and material use, it flows from our landuse patterns, it is encouraged by the dynamics of our economic system and by our traditional social, philosophical, and even religious values.

## **POLLUTION CONTROL**

Pollution is mainly by-products of technology that are harmful to the well-being of the society. Pollution is, therefore, an unwanted negative product. The determination of what is "pollutant" can be done by measurement of physical harm to some object or living organism or it can be done in an arbitrary manner. However, precise the definition of what a particular pollutant may be, there is still a considerable amount of value judgement to be made in arriving at a legal definition.

There are various types of pollution that must be controlled. One author categories pollutants into four categories.

1. Direct assaults on human health for example, lead poisoning or aggravation of lung disease by air pollution.

2. Damage to goods and services that society provides for itself. For eg. corrosive effects of air pollution on buildings and crops.

3. Other direct effects on what people perceive as their 'quality of life', eg. congestion and litter.

4. Indirect effects on society through interference with services that are provided for society by natural ecosystems such as ocean, fish production and control of erosion by vegetation. Eg. of such indirect effects as destruction of vegetation by overgrazing and logging and poisoning of coastal water with oil and heavy metals.

Air, water and soil are essential for living organisms. Everyday, million of tonnes of harmful wastes go into the air, water and soil. The wastes, poison the environment. Pollution can be controlled to some extent by various methods. It can be done by avoiding direct disposal of household, industrial and other wastes into the sources of water like rivers, ponds, lakes and public places.

#### ACTIVITY 1

Visit a grocery shop in your locality. Observe how things are arranged. List various items and classify them as essential items and other items.

---

Sl. No.	Essential items	Other items
1		
2		
3		
4		
5		

---

### ACTIVITY 2

Collect waste packets and classify them on the basis of the type of packing such as paper packet, plastic bottles, etc. Discussion on avoidable things in daily life development of packet food, presence of same food in different kind of packets, influence of advertisement in consumption, etc. can be done.

### ACTIVITY 3

Dig two small pits, collect leaves and vegetable wastes. Dump it in one pit. Put the collected plastic material in the other pit. Observe the pit after three days. Discussion on changes happened to materials dumped in different pits, insolubility of plastic material in soil, etc. can be followed.

### ACTIVITY 4

Collect waste materials in a dust bin kept in the classroom. Observe the quantity of wastes disposed everyday. Dump the collected wastes in the compost pit. Discuss the benefits of collecting and dumping waste things in a compost pit.

### ACTIVITY 5

Design a school garden with the help of teachers. Collect seeds and plants. Utilise the service of agricultural officer to develop and maintain the garden. Use the manure from the compost pit.

### WATER POLLUTION

**"Everything originated in the water**

**Everything is sustained by water"**

- Goethe

Without water, all life ceases. Water is getting increasingly polluted. Water pollution may be defined as a natural or induced change in the quality of water which renders it unusable or dangerous as food, human and animal health, industry, agriculture, fishing or leisure pursuits.

TABLE

Pollution and related data for India and some estimates of pollutants entering the sea around India.

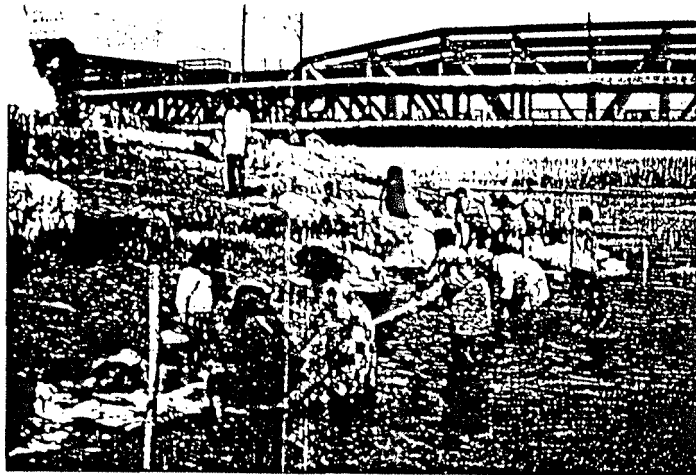
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Population	630 million
Coastal population	155 million
Land area	$3.27 \times 10^6$ sqkm
Exclusive economic zone	$2.015 \times 10^6$ sqkm
River runoff (annual)	$1645 \text{ km}^3$
Rainfall (per year on land)	$3.4 \times 10^{12} \text{ m}^3$
Rainfall (per year on Arabian Sea)	$6.1 \times 10^{12} \text{ m}^3$
Domestic sewage added to the sea by coastal population (per year)	$35 \text{ km}^3$
Industrial effluents added to the sea by coastal industries (per year)	$3.5 \text{ km}^3$
Industrial effluents added to the sea through river runoff (per year)	$0.1 \text{ m}^3$
Solid waste generated by coastal population (per year)	$96 \times 10^6$ tonnes
Pesticides manufactured per year	50,000 tonnes
Synthetic detergents manufactured per year	125,000 tonnes
Oil transported in 1978 across the Arabian sea	$975 \times 10^6$ tonnes
Tar deposition on beaches for Kach to Kerala 1975-76	1000 tonnes, 750 tonnes

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### ACTIVITY 6

Show the following picture to the students and discuss the issues related to it.



### ACTIVITY (TEACHERS)

Take three glass tumblers. Pour equal quantities of water in them. Add common salt in one tumbler, sand in the second one and mud in the third tumbler. Stir it with spoon. Observe what happens in three tumblers. Which dissolves more quickly ? what conclusions do you come to with regard to the three materials added to water ?

### PURIFICATION OF DRINKING WATER

Contaminated water can spread diseases. For healthy life we have to drink only purified water. Water borne diseases spread fast during rainy seasons. The disease causing germs spread through contaminated water. In order to protect us from diseases, it is necessary to purify the drinking water.

The clay particles present in water can be removed by adding alum to water. Impurities such as clay and dirt settle down at the bottom. Alum classifies water by sedimentation of clay and dirt. Bleaching powder can be added to water to kill the disease causing germs. The chlorine present in bleaching powder kills the germs. Do not add too much bleaching powder since excess of chlorine is injurious to health.

#### **ACTIVITY 1 (TEACHERS)**

Take an earthen waste pot. Fill it with wastewater and cover it with a tight cork. Insert a tube and attach it to the another pot placed under an ice container. Provide an outlet for collecting purified water. Boil the wastewater. Observe what happened to the wastewater. This is one way to kill germs and purify water. The collected water should also be handled and stored in a safe manner.

#### **ACTIVITY 2 (TEACHERS)**

Arrange a water container with six layers. Provisions may be made to channelise water from one layer to the other through tiny holes. Fill the container with dirty water. Put small pebbles, mixture of calcium oxide and sand, charcoal (coconut shell), rough sand, nice sand in the subsequent layers. Allow the water to pass through. Collect the purified water in a clean bucket. Observe how we can make water free from impurities.



### **ACTIVITY 3 (TEACHERS)**

Take a glass full of water. Add a teaspoon of fresh bleaching powder. Do not touch the bleaching powder with bare hands. Add spoonful of this solution in a bucket full of water. Mix well. The bucket should have about fifteen litres of water. Use the water only after few hours.

Bleaching powder kills the germs in the water. Another way to kill germs is using potassium permanganate.

### **HOW WATER IS POLLUTED ?**

You have learnt that water dissolves many substances. That is why it is used for cleaning and washing. The water used for cleaning and washing makes the water dirty. When this dirty water is allowed to flow into the rivers, ponds, lakes and wells, the water gets polluted.

### **ACTIVITY 1 (STUDENTS)**

Find out the major sources of water in your locality. Is the water from all these sources fit for drinking ?

### **ACTIVITY 2 (TEACHERS)**

Make the entire students of a class into three groups, allow one group to visit a pond, second group a river, and the third group the nearby wells. Ask them to observe the various human activities taking place around these water sources.

They find people washing clothes and bathing. Some are washing animals. Some persons are collecting drinking water. People also wash utensils and dirty clothes. They drain out water from the well by using a dirty bucket. Where does all this dirty water go ? Allow the groups to present reports on their experience during the visit. The groups are expected to suggest some ways and means to prevent water pollution in a well, pond, river, etc.

### ACTIVITY 3 (TEACHERS)

Show the following picture to the students. Conduct discussion based on the following questions.

1. What do you observe in the picture ?
2. Do you think that water can be used for drinking?
3. You find some people carrying water in their pots. What ways do you suggest to purify that water ?
4. What measures do you suggest to prevent people from using the water in rivers and ponds ?



RIVERSIDE SIGHTS - SITES OF POLLUTION

#### **ACTIVITY 4 (TEACHERS)**

Conduct an expedition to a river bank along with the activists/environmentalists in the locality. Observe and discuss the following items.

1. How water gets polluted ?
2. Density of water - present and past.
3. Changes in life style of surrounding people.
4. The quantity of sand removed daily for construction purposes.
5. The measures to be taken to protect the exploitation and pollution.

#### **WATER-BORNE DISEASES**

Cholera, malaria, dysentery and typhoid are some of the diseases caused by the water. These diseases spread fast during rainy seasons. Since water gets contaminated quickly during rainy seasons. These diseases are highly injurious to health and even may cause deaths. In order to protect us from these diseases, it is necessary to purify water before drinking and cooking.

#### **ACTIVITY 1 (STUDENTS)**

Visit the nearest Primary Health Centre and discuss with the medical officer on water borne diseases.

#### **ACTIVITY 2 (STUDENTS)**

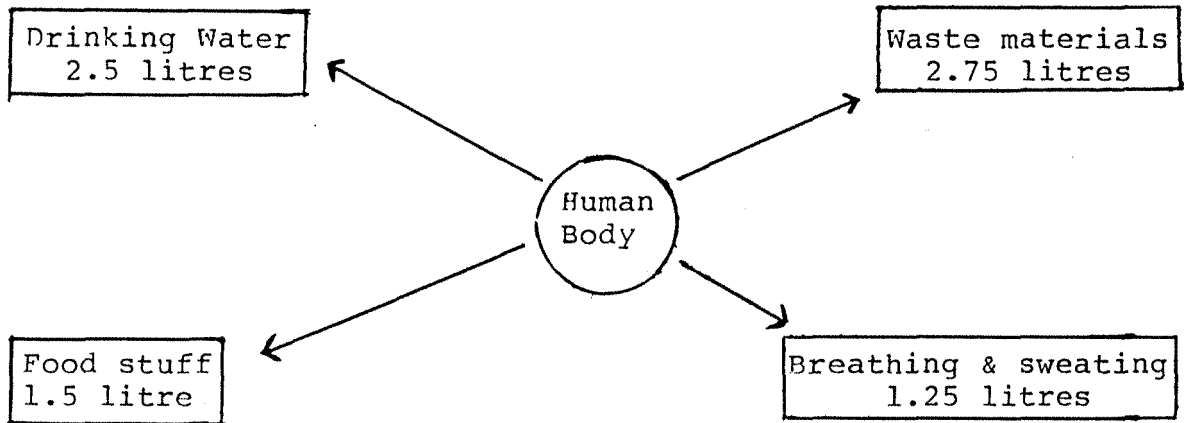
Collection and exhibition of pictures/photographs/reports on water-borne diseases.

**ACTIVITY 3 (TEACHERS)**

Preparation of ORS liquid and discussion on its application.

**IMPORTANCE OF WATER**

Every one of us use nearly 125 litres of water every day. The amount of water in human body is about 70% by weight. Blood is made up of about 80% of water. On an average we drink 2.5 litres of water and derive 1.5 litres of water from the food we get every day. Every day about 2.75 litres of water is removed as waste from the body and 1.25 litres of water is lost due to breathing and sweating.



Water is the basic requirement for agriculture. Plants absorb nutrients from the earth as watery solution through their roots. In industries, water is used to wash equipments, produce chemicals, produce steam, heat substances and remove waste materials. The energy of water let out from the dams is to be used to produce hydro-electricity. The hydro-electric power stations in South

India are located in places such as Mettur and Papanasam in Tamil Nadu; Idukki, Malampuzha, Pallivasal, Kakkayam (Kuttiadi) in Kerala.

**ACTIVITY 1 (TEACHERS)**

Develop a model of hydro-electric projects.

**ACTIVITY 2 (STUDENTS)**

Collect pictures/photographs of various hydro-electric projects in South India.

**ACTIVITY 3 (TEACHERS)**

Arrange a field visit to the nearest hydro-electric projects and report to your class.

**CONSERVATION OF WATER**

Water is useful to us in several ways, therefore it is essential to store water and use it economically. The water we get during rainy season should be stored in wells, lakes and dams. Instead of wasting the rain water by allowing it to run into the sea, we should allow it to seep into the earth and store it as ground water. The water that is stored in the rainy season may be used during other seasons.

We get pure water only through the rains. To get more water through rains we should grow more trees and conserve our forest resources.

Artificial rain making and desalination of sea water are used to overcome water scarcity.

Water is a natural resource. It is essential to conserve water by using it economically for useful purposes. It is our duty to preserve water resources of our country.

**ACTIVITY 1 (TEACHERS)**

Take one bucket full of water. Allow the students to use the water as they like. Observe the number of students who use the water. Then take some quantity of water in another bucket. Provide a glass to take the water. Ask students to use the water in a judicious manner. Compare the number of students who used the water in the first and second instances.

**ACTIVITY 2 (TEACHERS)**

Show a picture of overflowing water in a bucket. Another picture with full of water in a bucket and a closed tap. Discuss the following aspects.

1. In which picture does wastage of water happens ?
2. How can this wastage be prevented ?

**ACTIVITY 3 (STUDENTS)**

Conduct a survey on the number of wells, ponds in your locality. Collect information on the depth of the well/pond and the ground water level, and prepare a graph.

## RIVER POLLUTION

Chemical factories (Grasim Industries, Mavoor, Kozhikode, and fact Aluva, Ernakulam) often produce many toxic chemicals as wastages. In most of the industries, these are not properly treated before throwing them out. This industrial waste is discharged into rivers. The river water thus becomes poisonous for the fish and the river plants. A flowing river can purify a certain amount of its water by natural processes. And many industrial waste products cannot be cleaned easily by natural processes. The water stays polluted and causes several diseases to the people who use it.

What are the chemicals that pollute the water? Where do they come from? and how can we remove them and make water safe for use? Compounds of several metals such as Lead (Pb), Mercury (Hg), Cadmium (Ca), Chromium (Cr) and Arsenic (As) are highly toxic. They are used in the chemical, textile and leather industries. Dye-stuff and paint factories use and throw out as waste material many organic compounds that are harmful for health. Agriculture uses fertilisers and pesticides. Many of the chemical gets washed off by rain water into ponds, rivers and seas. Now these chemicals do not get decomposed by natural methods or by microbes. Hence these chemicals get accumulated and pollute the water.

Control and removal of polluting substances need to be done. The source or the factory level is one, where these toxic chemicals must be treated chemically and converted into harmless compounds. This is to be done by the factories and the industries themselves, before they release the chemicals to the environment. The second level is the purification of the rivers and streams, ponds and lakes. This is done both by industries and the government. One such example, the Ganga Purification Project. The Indian Government has taken up the task of purifying the river Ganges. This is being done by treating the sewage in all towns and cities on the banks of the river. This treatment makes the sewage water harmless before it is released into the Ganges. The industrial waste will be initially treated at the industries. The treated water is then let out into the river. Along the banks of the river will be planted many trees and shrubs. These not only add beauty to the scenery but also help in cleaning up the environment.

Rivers and lakes are the carriers of wastes generated by production and consumption activities of the humanbeings. Drinking water for most Indian cities comes from rivers and other surface sources. All the major rivers of south India are subject to severe contamination and pollution today. The main contaminants of our rivers and lakes are city sewage and industrial wastes. About 70% of the water bodies in India are polluted. Sixty four highly polluting industries



discharge more than one million litres per day of toxic, industries effluents. Most of the south India cities lack sewage treatment plants. Large scale destruction of aquatic life have been reported due to lack of dissolved oxygen content which is due to the effluents discharged by the industries into rivers like Cauvery and Krishna.

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Sl. No.	Name of the river	Sources of pollution
1	Bhadra (Karnataka)	Pulp, paper and steel industries, tanneries, distilleries, sewage, pulp, paper, chemicals, sewage.
2	Cauvery	
3	Chaliyar (Kerala)	
4	Pamba	

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Periyar, Mahi, Chaliyar and Pamba industrial wastes and sewage combine to pollute river Godavari. However, more than natural factors, it is the unprecedented industrial production rate that is responsible for pollution our water sources.

#### ACTIVITY 1

##### BACKGROUND INFORMATION

The students may be provided the following information.

The town of Kalpnagar has a population of about 25 lakhs and is situated on the banks of river Kalpananda.

River is one of the major sources of water for the people in the town.

The Municipal Corporation supplies drinking water to the city through old pipelines which were laid many years ago. These pipelines have outlived their lives and at some places even broken. Sometimes these pass very close to drainage lines. About fifty percent of the domestic water requirement is met from river water through these pipes.

Drainage from residential areas is collected in sewerage pipes and taken to a treatment plant. It is then emptied into the river. During rains, the water collects filth from roads and empties it into the river. Garbage is scattered all over the city.

#### **THE PROBLEM**

The town has experienced heavy monsoon this year. There have been many cases of cholera, jaundice and other water borne diseases, some deaths have also occurred. Newspapers report that the drinking water and groundwater are contaminated. This has raised a lot of hue and cry. Some action needs to be taken immediately.

Thrust area - Pollution of Water  
Subject - Science, Social Science  
Location - Classroom  
Duration - 45 minutes  
Materials - Information from different sources about the spread of diseases

Ask the students to read the given background information. The problem under consideration may be discussed and explained to the group.

Assigned the following roles to different individuals:

- |                        |                         |
|------------------------|-------------------------|
| 1. A slum dweller      | 2. A youth              |
| 3. Doctor              | 4. Reporter             |
| 5. A Housewife         | 6. Municipal Corporator |
| 7. A social worker     | 8. A teacher            |
| 9. A concerned citizen |                         |

The specific role may be explained to every individual (if need be, time for preparation for acting the role may be provided).

Ask them to discuss the problem in a meeting and prepare a detailed report to be submitted to the state authorities. The report should include immediate actions to improve the present situation and the long term actions for prevention of such occurrences in future.

#### **EXTENSION**

Discussion may be initiated in the class about the issue and students may be asked to how every individual can play an effective role to prevent such occurrences.

#### **ACTIVITY 2 (STUDENTS)**

Collect paper cuttings/pictures on industrial pollution in southern India.

**ACTIVITY 3 (STUDENTS)**

Prepare an outline map of South India and mark the course of the major rivers. Also locate the industries situated near the rivers.

**ACTIVITY 4 (TEACHERS)**

Conduct field trips to a nearby factory or industry and observe the effectiveness of pollution control measures adopted by the authorities.

**ACTIVITY 5 (TEACHERS)**

In order to develop healthy attitude towards environment - water, certain slogans, versus, vedic hymns and poems may be quoted or written on the cardboards and placed on the walls. One such example is given hereunder.

Water according to Hindu mythology is a powerful medium of purification and also source of energy. A narration in Manusmriti suggests this:

One should not cause urine, stool and cough in water. Anything which is mixed with these unpious objects, blood and poison should not be thrown into water.

(Manusmriti 4.56)

**STEPS**

1. Observe various units - processing, raw material used - finished products - height of the chimney - outlets to channelise sewage, chemicals, wastes, etc.

2. Discussion with engineers/technical workers and management.

## AIR POLLUTION

Atmosphere is the life blanket of earth, the essential ingredient for all living things. Air constitutes about 80% of the men's daily intake by weight. We breathe about 2,200 times a day inhaling around 16 kg of air. It is therefore essential that we know more about the atmosphere and the ways in which it is polluted.

Air pollution is a major environmental problem which may cause impact on human and ecosystem. Major sources of air pollution are industries, automobiles and consumption of domestic fuels.

### MAJOR POLLUTION DISCHARGED BY EACH POLLUTION SOURCE

Sl. No.	Sources	Major pollutants
1	Industry	SO <sub>2</sub> , NO <sub>2</sub> , SPM
2	Automobiles	NO <sub>2</sub> , CO, He, Pb
3	Domestic fuel (coal)	SPM, CO, CO <sub>2</sub>

A list of air pollutants should cover not only the items, smokes, dusts and other gases but also other items that satisfy the definition such as noise, heat or cold, fog, radio activity excess radiation and similar properties.

## NOISE POLLUTION

Noise - unwanted sound - sound in the effect that rapid, local fluctuations of the atmospheric pressure have

on ear. Energy consumption, automobiles and industries together have damaged the urban atmosphere. Coimbatore, Ernakulam, Madurai account for 80% of air pollution in the country. Hyderabad, Chennai, Thiruvananthapuram, Kozhikode, Cochin are the highly sound polluted cities in south India.

Mumbai emits 350-400 tonnes of  $\text{SO}_2$  every day. Vehicular traffic add to the pollution of the atmosphere. The citizens of Mumbai with more than 8.5 lakhs of vehicles are already facing high pollution problems. Mumbai has the most populated urban environment with 62.5% air pollution by automobiles. Almost all the major rivers are polluted by untreated effluents dumped by the various industries.

#### POLLUTANT FORMATION

1. Sulphur dioxide is formed rapidly in the combustion process. When sulphur contains the fuel reacts with the oxygen in the air. Variation in the combustion process are not effective in reducing  $\text{SO}_2$  emissions. Rather sulphur must be removed from the fuel or once formed,  $\text{SO}_2$  must be removed from the exhaust gas.

2. Carbon monoxide is also produced rapidly in the combustion process. Carbon monoxide become a problem because CO is slow to oxidise to  $\text{CO}_2$ . The conversion of CO to  $\text{CO}_2$  is accelerated by elevated temperatures and excess oxygen.

3. Hydrocarbons emissions are fuel fragments that have not had the opportunity to fully react the resources.

- a. Insufficient air is provided to fully oxidise the hydrocarbon.
- b. Fuel adjacent to relatively cold surface cannot react because of low temperature.

4. Oxides of nitrogen from combustion are a combination of nitric oxide and nitrogen dioxide comprises typically less than 10% of total NO emitted. As a result, NO and NO<sub>2</sub> are often used interchangeably.

#### **OZONE AND ITS ROLE**

The ozone in the upper atmosphere that protect all life from the sun's harmful ultraviolet rays is being depleted by chemicals released from air conditioners, refrigerators, etc. Ozone is minor constituent of the atmosphere. If all the ozone in the atmosphere from ground level to a height of sum 60 km could be assembled at the earth surface, it would comprise a layer of gas only about 3 mm thick, weighing some 3000 million tonnes. Most of atmosphere's ozone is called the stratosphere. Inspite of this life depends on the presence of ozone.

#### **ACTIVITY 1 (STUDENTS)**

Observe the kitchen of your house. Watch the type of oven used to cook food. Observe and analyse the reason for the presence of large quantity of carbon and smoke in walls and roof of the kitchen. Pay visits to five neighbourhood houses to observe the kitchen. Discuss with the housewives

on cooking problems. Try to see and understand the functioning of smokeless oven developed by Kerala Sathra Sahitya Parishad (KSSP) and ANERT. Compare the two kinds of oven/choolas and visualize the need of installing smokeless oven in your locality.

#### **ACTIVITY 2 (TEACHERS)**

Participate in meetings/discussions conducted by NGOs/neighbourhood groups on different types of choolas, ovens, fuel saving techniques, cooking methods, preparations of nutritious food from locally available things.

#### **ACTIVITY 3**

Observe the number and type of vehicles passing through a particular time. Try to collect the approximate number of passengers carried by the vehicles. Also listen to the sound produced by the vehicles and observe the quantity of smoke coming out from the vehicles. Compare the vehicles having low and high frequency of sound.

#### **ACTIVITY 4 (TEACHERS)**

Ask the pupils to observe the leaves of trees seen in streets having heavy traffic. Compare the nature of these leaves with the leaves of small trees seen away from the road - Discussion.

#### **ACTIVITY 5 (STUDENTS)**

Collect water in two bottles. Insert a tiny creature in these bottles. Allow smoke to pass through one bottle.



Observe the condition of creatures present in the bottle -  
Discussion.

#### ACTIVITY 6

Visit the RTCs office to collect the number and type of vehicles registered in that office in the previous year. Also gather information on pollution testing measures and punishments for violation of rules.

#### ACTIVITY 7

Mime a factory atmosphere in the class. After a signal produce the huge sound of machines. Share the uncomfortable situation experienced by them due to the sound.

#### ACTIVITY 8

Read the following poem to the students. Invite their reactions regarding the safety of our earth. Ask them to compose poems of this kind on environment.

OH GOOD EARTH

Think of the earth on which we live today  
Our responses to the gifts of Mother Earth  
have been one of betray.

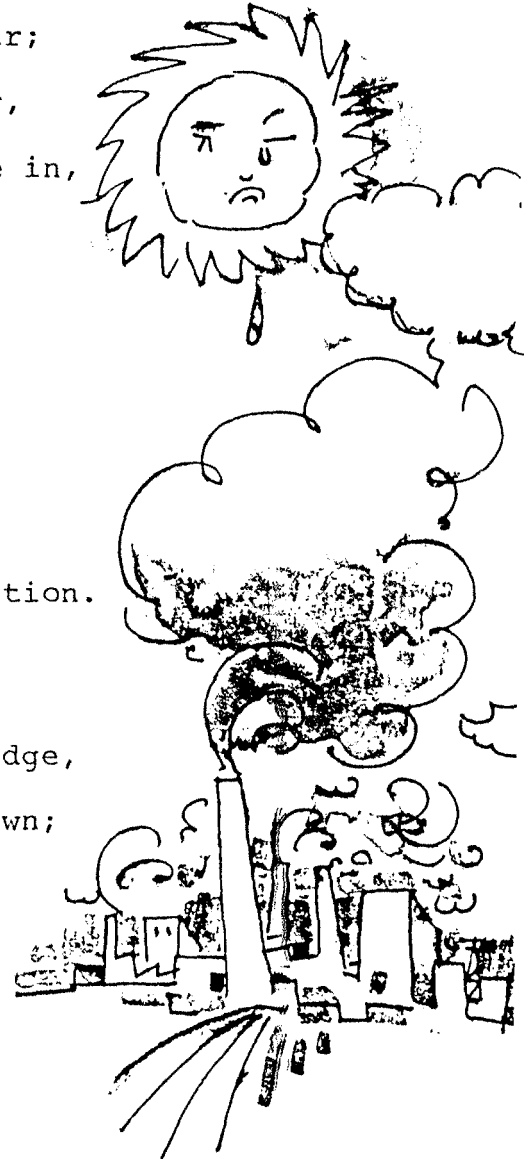
Smoke dust and chemicals fill the air;  
Garbage and sewage form another pair,  
to make the place unhygienic to live in,  
Today, the whole world seems to me  
like an enormous dustbin.

Exhausts that vehicles create  
And noises that add to the fate.  
Of the dirty world of pollution  
Have led to nature's gradual destruction.

Its time we take a pledge  
That nowhere along land or water's edge,  
Should even a piece of paper be thrown;  
Because the harm done  
will be your own !

We should take not India,  
But the world as a whole,  
Only then can we reach  
Our long cherished goal.

So, we should try to keep our earth pure,  
Because precaution is always better than cure.



## SOIL POLLUTION

Soil is needed for crops, building houses making utensils, toys and so on. Plants grow and depend on soil. Animals depend on plants. We depend on both animals and plants therefore without soil life on earth would not be possible.

### ACTIVITY 1

Take some soil from a field. Put the soil in two pots. Take a pinch of fertiliser, dissolve it in water and pour it on the soil in one pot. Put small plants in both pots. Observe their growth over some days. Record your observations. Plants grow well in the soil mixed with fertilisers. Urea is a common fertiliser and nitrates and phosphates are some other common fertilisers. Find out from a farmer what fertilisers are used by him.

## EXCESSIVE USE OF FERTILISERS AND PESTICIDES

The ever increasing demand for food and cash crops has led not only to the proliferation of large and small irrigation schemes, but to the increasing agrochemicals, mineral fertilisers to improve soils. Pesticides to control insects as well as plants growth regulators. The use of modern pesticides helps to control water borne diseases (malaria, typhus) and increases in crop yield throughout the world by reducing pre- and post-harvest food shortage.

But the excessive use of fertilizers and pesticides causes harm in many ways. The most recent estimates suggest that the number of acute pesticide poisoning is of the order of one million cases per year with an overall fatality rate of between 0.5 and 2.0% (while the figures represent only 4.0% of unintentional acute poisoning worldwide, it must be emphasised that most of them are avoidable).

Survey conducted by United Nations, Food and Agricultural Organisation found that highly toxic pesticides were widely available in at least 85 developing countries. The sale of pesticides nearly doubled since the mid 1970s by nearly 18 billion dollar a year. Much of this sales growth has taken place in the third world. The World Health Organisation estimated in 1986 that as many as million people among their farmers in the third world suffer from acute poisoning from pesticides every year resulting in the health per year.

When an insecticide is used in a rice field both harmful and useful organisms are killed resulting in the result of the insect fauna of the farm ecosystem. This means that natural establishing mechanisms have been compensated by technology inputs. This results in high vulnerability of crops to pests and diseases. There is a great need of appropriate pest management with a strong basis for

biological control which is specific, long lasting and non-pollutive.

#### **WIND AND SOIL**

Some of our soils are highly productive; others are not, we must strive to maintain the good lands and to improve the poorer areas. We shall now consider the various forces that damage land and interfere with farming. One of the most important of these forces is the wind.

#### **WIND**

When the wind blows over land on which there is no cover, there will be damage to the top soil. The wind dries out the moisture in the surface and moves the soil. Heavy soils are more resistant to such damage than are lighter soils, but some of the heaviest soils, such as clays rich in calcium, are highly susceptible to wind erosion.

The amount of soil moved depends on the velocity and the duration of the wind as well as the ground protection. We cannot control the velocity of the wind, but we can reduce it and even eliminate it at the surface of the soil. To reduce soil movement by wind, we must try to reduce the velocity of the wind on the surface.

#### **SOIL**

Wind erosion is a complicated process, since it is affected by many factors, but the principles of control can be expressed in rather simple form. They are:

1. Reduce wind velocity near the ground by maintaining crop residues and by erecting barriers of various kinds.

2. Increase soil aggregation in such a way as to increase resistance to wind.

3. Decrease the area of the field.

Methods of control must vary to suit different soil types and climatic conditions.

#### ACTIVITY 1

Fill a pan with light soil. Mulch the soil with a twig of straw. Expose it to the wind from an electric fan for three minutes. Determine the amount of rippling or other soil movement. Then remove the mulch. Expose the soil to the wind for one minute. Again examine the surface. How much protection did it provide ?

#### ACTIVITY 2

Examine some public land such as a park, forest, watershed or school land. Observe the following factors: flood prevention, water intake, income and appearance. Keep a score of your survey by rating each factor good, fair or poor.

How does the management of this land affect ground water supplied, flooding and forming in your locality ?

### ACTIVITY 3

Observe a site after a heavy rain with a spade. Determine the depth of water intake on cultivated land, in grass cover land and land covered by trees.

### LOSSES FROM RUNOFF

Watching a river at flood stage we wonder where all the water comes from. Even after the rains stop and the snows are melted, the river remain at flood stage. Floods are responsible for damage to property, great losses of soil and crop. They carry away nutrients, present navigation and sanitation problems, and reduce soil moisture.

This is a serious matter. What can we do about it? There is plenty we can do both collectively and individually. First, we must understand each step of the runoff problem. Then we must evaluate the relationship of these steps.

### RAIN

We know that runoff begins as rain or snow. We cannot control the amount of natural precipitation or the times at which it occurs. Although the removal of surplus water is practical and rain making has possibilities, there are management practices we would follow that will give us water control, reduce damage to our land and provide more soil moisture. They are:

1. reducing the damage from intensive rains.
2. reducing the length of the slope.

3. controlling the volume and the velocity of runoff by providing water detention.
4. increasing the infiltration rate and improving moisture-holding capacity.
5. repairing damage from erosion.

#### **THE RAINDROP**

Splashing occurs when a raindrop falls on unprotected soil. It is actually a small explosion - the drop bursts. The force separates the drop and each part carries soil particles in suspension.

Splashing can be eliminated with cover. On cultivated land grass, cereals or sand dust will intercept the raindrop, thus reducing the force.

#### **ACTIVITY**

After an intensive rain, collect water samples at a channel outlet. Use quart jars, filling them one at a time during a given period of time. Record the number of quart jars collected. Consult the weather report for that day and learn the amount of precipitation.

During a normal rain, collect more samples of the same location, during the same length of time. Learn the amount of total precipitation. What difference you observe ?

This test can be repeated by several members in your class to determine an average.



### **INTENSIVE RAINS**

Intensity of rain is a factor beyond our control, but there are practices that will protect our land from damage by heavy rains.

#### **ACTIVITY 1**

By studying the rainfall records of a locality we can determine the normal distribution of precipitation. The rainfall chart made by your class will help for your locality. We then determine the amount and the time of the most intensive rains. From this data we can estimate the maximum runoff and the time of year when it is likely to occur.

The quality, distribution and intensity of rainfall constitute the greatest factor affecting volume of runoff. Other factors are slope of land, topography, cover and soil characteristics.

#### **ACTIVITY 2**

Collect samples of runoff in bottles from - (a) a muddy stream, (b) a stabilized gully and (c) a grassed waterway. Allow the sediment in each to settle. Determine the amount of soil carried in each per gallon of water.

### **URBANISATION AND POLLUTION**

Urbanisation means the redistribution of population and a change in the demographic balance between rural and

urban areas. Urbanisation is growing at a tremendous rate. It has been estimated that world which was 29% urban in 1950 and 39% in 1975 will be half urban, half rural by the year 2000.

The growing concern is that as cities grow larger environmental stress multiplies. The unprecedented growth in world population, accompanied by technological and economic growth have enhanced urbanisation. This increases the pressure on existing facilities of housing and infrastructural facilities besides leading to congestion.

The adverse impact of urbanisation on ecological balance is mainly reflected through deforestation. The consumption of firewood in many cities are high because of poverty and proliferation of slums resulting from urbanisation. All this leads to deforestation.

With urbanisation even the simple matter of waste disposal becomes a problem. The 'throw away' societies of cities generate the most trash disposal, which poses a major threat today.

Urbanisation in India has given rise to acute shortage of housing facilities that ends up in proliferation of slums. A break up of urban population reveals that slum dwellers account for 15% of 156 million urbanites and this is expected to go upto 25% by the end of the country. In

cities like Mumbai and Calcutta, slum population accounts for 40% and in Chennai about 30%.

Solid wastes disposal is also a serious problem in Indian urban areas. The per capita solid waste reaching disposal sites in Mumbai, Calcutta, Chennai and New Delhi ranges from 45-60 kg per day. Density value of refuse in Indian cities varies from 300-560 kg/m.

#### **ACTIVITY**

Suggest an activity to create awareness among people regarding disposal of various types of waste separately. People of a given area can form a committee and educate others about it, eg. plastic waste, vegetable waste, etc. should be collected separately.

#### **POPULATION AND ENVIRONMENT QUALITY**

Most of the writers on environmental crisis consider population as the prime cause of environmental problems on the ecosystem is alarming. The increasing human numbers may outstrip earth's ability to provide sufficient food and simultaneously impair that ability through environmental degradation. This has led to desertification, soil erosion, deforestation, loss of soil fertility, waste logging and salinisation of the soil.

Population growth has increased the consumption of resources leading to their depletion. Consumption of

aluminium, copper, iron, lead and zinc have been on the increase. So also the consumption of energy from coal, crude petroleum and natural gas.

Increase in population growth will only increase diseases, economic inadequate and environmental abuse. Hence there is no doubt that the explosion should be checked.

#### ACTIVITY 1

Collect information on slum/slums in your area. Also on people living in these areas - states from which they have come, why they have come to cities, problems faced by the people in the slums. After listing the problems, a discussion on how to improve conditions in the slums.

#### ACTIVITY 2

Read the poem given to the students and call for a discussion. Ask them to compose a poem of mankind (safety of the earth).

Read the following poem from "Earth Prayers" to them and pin it up on the class board for everyone to read.

Earth teach me stillness

as the grasses are stilled with light

Earth teach me suffering

as an old stones suffer with memory

Earth teach me humility

as blossoms are humble with beginning

Earth teach me caring  
as the mother who secures for young

Earth teach me courage  
as the tree which stands all alone

Earth teach me limitation  
as the ant which crawls on the ground

Earth teach me freedom  
as the eagle which soars in the sky

Earth teach me resignation  
as the seed which rises in the spring

Earth teach me to forget myself  
as melted snow forgets its life

Earth teach me to remember kindness  
as dry fields weep with rain

Ask the students to compare their own lines and ideas with those in the poem and encourage them to write similar prayers/poems for school magazines, other periodicals and newspapers.

#### **DESTRUCTIVE FISHING TECHNIQUES**

Fish is a main source of protein and fishing is a major economic activity of southern coastal area. Traditional fishing by the nets and traps are simple and ecological. The mesh size of nets is large enough to allow small fish to escape. Coral reefs continue to serve as rearing and feeding grounds for diverse fish species and as

protective barrier against the damaging effort of waves. Coral reefs are considered one of the most productive ecosystem. Their productivity exceeding that of open ocean. Introduction of modern fishing techniques blast fishing resulted in tremendous destruction of coral reefs.

#### **ACTIVITY**

Conduct a survey of fisherman's village and collect data on following items:

1. Availability of kind/type and size of fish at different occasions.
2. Change in fishing techniques, income, processing of fish and opinion on trolling.

#### **BALANCE IN NATURE**

Ecology is the study of organism at home or in places where they live. Ecosystem functions refers to how biotic units are organised and process energy and nutrients through societies interactions. Tropic organisation involve the assignment of biotic units into different trophic levels of food chain and food webs in ecosystem as well as ecological dominance among species through number of biomass. The flow of energy and cycling of essential nutrients are reflected in the productivity of ecosystem.

No organism can live alone. Each organism is dependent upon the other organisms which live along with it.

It also depends on the biotic substances. Thus an organism is having inseparable relationship with the environment.

#### **ACTIVITY**

1. Collect booklets/photographs, folders, etc. issued by NGOs and governmental agencies on environment protection.

2. View slides, films and photographs and pictures on natural resources, ecology, etc.

3. Collect information on environment protection act and rules.

#### **DEFORESTATION**

The tropical rain forests are considered the earth's oldest and richest ecosystem. 80% of world's tropical rain forests have disappeared. Already eleven million hectares being felled and burnt per year. Many plant communities in Western Ghats and Silent valley are expected to vanish in a few decades. Massive deforestation has multiple ecological and social consequences including the loss of land rights and way of life for thousand of tribal people in India. Massive soil erosion and loss of valuable top soil and much reduce intake of rain water in catchment areas resulting in excessive water runoff as flash floods. There is now growing concern about climate changes resulting from forest denudation.

Two common mega-projects in the energy sector are the large hydro-electric dams and nuclear power plants. Both have serious problem of sand risks. In the case of huge dams large tracts of forested area are flooded including human settlements, thus causing disruption of the way of life of thousand of people living in the different forests.

Deforestation arises from four principle causes, often in combination with each other, excessive felling of trees for timber, over grazing, fire and clearance of land for cultivation and pasture. Today vast stretches of forests are lost as a process for development. The Silent Valley project, for example, proposed to be built on the 'Kundipuzha', river in Palghat district in Kerala would have submerged nearly 85 hectares of virgin tropic evergreen forests. Whatever be the cause this deforestation has serious consequences on quality of life. The influence of forests on environment may be localised or far reaching. The climate, rainfall, relative humidity, wind, soil, etc. are all influenced by forests. Hence indiscriminate felling of trees or deforestation disturb ecological balance deterioration of quality of life.

#### **ACTIVITY**

School can maintain a small corner for maintenance of plants.



## **RESOURCE MAPPING**

There are plenty of resources around us. Some of the resources are scarce. But most of us are not aware of it. Often we use resources lavishly. Our indisciplined activities make environmental pollution also. Hence the hurdle is within us. Proper planning of resources is an important activity to overcome this hurdle. After collecting knowledge on the available resources around us one can prepare a resource map. With the help of teachers and other local experts in the fields, the students can prepare a resource map of their locality.

### **ACTIVITY 1**

Prepare a classroom map. Initially the teacher can locate any one of the objects in the classroom in a drawing sheet. After that the pupils locate the setting arrangements, the windows, doors, table, blackboard, etc. in the sheet. Then ask any one member to walk in the classroom and the route followed by him can be marked in the map.

### **ACTIVITY 2**

Prepare a map of the school campus. Locate the boundary of the school campus, buildings, urinals, garden, playground, staff room, library, laboratory, road to school, etc. by using the symbols.

### **ACTIVITY 3**

Prepare an area map of your village using pedestrian map. Mark the different resources such as land, water,

agricultural crops, industrial factories, other institutions by using symbols, colour and scale. Identify the cultivated land, waste land, water sources, etc.

#### ACTIVITY 4

Prepare an action plan to ensure the optimum utilisation of resources through proper planning and popular participation. Priority areas that need immediate attention can also be fixed.

#### ACTIVITY 5

Collect pictures/songs that give environmental messages and conduct discussions in the classroom.

#### ACTIVITY 6

Give the following information to students to develop an awareness and attitude towards protection of environment.

#### VALUE OF A TREE



The commercial value of a tree depends on its weight, the quality of timber and the biomass or fruit it produces. All these however only add upto 0.3% of its real

value. The other benefits derived for a medium sized tree of about 50 tonnes could be computed as under:

1. Production of oxygen	: Rs. 250,000
2. Humidity control and recycling of water	: Rs. 300,000
3. Air pollution control	: Rs. 500,000
4. Controlling of soil erosion and fertility	: Rs. 250,000
5. Sheltering of birds, squirrels, insects and plants	: Rs. 250,000
	-----
	Rs. 1550,000
	-----

This value of Rs. 1550,000 for a medium size tree of 50 tonnes during a life span of 50 years does not include the value of its timber, fruits and flowers.

#### **ENVIRONMENTAL MANAGEMENT**

Man has realised the hazards of pollution created by himself to his own environment. One of the steps applied at the present time is to treat the sewage effluents in order to make them less harmful or totally harmless. Laws for the control of environmental pollution exist in almost all the countries of the world and they are either modified or updated from time to time to suit the changing situations.

Sewage is often released in the sea after preliminary treatment (mostly removal of solids and floating material) and in some places after secondary treatment (mostly removal of organic and toxic material). If it is properly subjected

to secondary treatment the resulting water will contain mostly phosphorous and nitrogen compounds which could be profitably used for irrigation and fish culture.

Oil spills can be tackled by several physical and chemical means. The physical means consist of checking the oil from spreading and recovering the oily water for further separation. Chemical means include the use of disperants which have been tested and confirmed as non-toxic, to couple the oil and then to sink it to the bottom or to recover complexed materials, oil can also be degraded by spreading selected bacteria over it.

The most important aspect of environmental management is regular monitoring of pollutants. Concentrations of dangerous chemical should be measured at regular intervals and suitable steps should be taken to prevent the damage.

Qualitative monitoring of the environment can, perhaps, be profitably in the science study courses of schools. It will be very useful if the students can carry out experiments using samples of water, oil, flora, fauna, etc. collected from the surrounding villages.

#### **ACTIVITY 1**

Make posters of the following for display.

##### **HOW CAN WE PROTECT ENVIRONMENT ?**

1. Minimising waste
2. Keeping surroundings clean

3. Planting and protecting trees
4. Saving energy
5. Saving water
6. Protecting ponds and rivers
7. Using public transport
8. Using paper wisely
9. Reusing containers
10. Reading books on Earth and sharing information with others.

#### **ACTIVITY 2**

List the priorities of the environmental issues prevalent in your surroundings. Present your observations in the school Parliament meeting/assembly, etc.

#### **ACTIVITY 3**

Prepare a write-up to create environmental awareness among village people with the help of local experts.

#### **EVALUATION**

1. How will you remove (a) clay and dirt particles, (b) diseases causing germs in water ?
2. Discuss the initiatives the school children can take to avoid water pollution in their locality.
3. Find out how many litres of water you have used in a day.

4. Find out the quantity of water consumed by the members of your family. Make a comparison on the availability and consumption of water.

5. Recall the instances you have witnessed misusing water. What are the things you have done to prevent the wastage of water ?

6. The development of smokeless oven is one method which helps to improve the quality of village life. Can you identify five other areas of rural life that need development through the application of rural technology.

7. In what month of the year do you have the most intensive rains ? What is the rate of rainfall per 15 minutes ?

8. Assume you have 30 inches of rainfall per year. Also assume 15 inches is used to grow a crop and 4 inches is lost as surface runoff. What happens to the other 11 inches ? Can any of the 1 inch not used by the crop be saved ? How ? Will cover crops save any of this loss in your area ?

9. Collect reports from newspapers periodicals and other media on environmental issue and record it as given hereunder.

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Sl. No.	Activity area	Response from the authority	Roll of NGOs	Suggestion to improve situation
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10. How environmental protection initiatives taken by KSSP and other environmentalists to protect Silent Valley.

11. How can you protect the water sources of your locality from pollution with the help of NGOs ?

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**MODULE VIII**  
**CONSERVATION AND PRODUCTIVITY**

**INTRODUCTION**

Nature in all its diversity is totality of natural conditions for the existence of life on earth. The development of life and human beings changed the environment.

Human wants are unlimited and the means to satisfy those needs are scarce. Scarcity of a resource may be the result of the non-judicious utilisation of environment, less productivity and the non-preservation of what is produced. In the wake of modern technological developments, man's environment is changing and his needs are multiplying. To meet the evergrowing needs, it is very necessary that environmental resources are preserved and used judiciously. In addition to this, new resources have to be created as not all resources are renewable, some steps taken in this direction will help productivity and satisfy the needs of human beings. This module attempts to develop an awareness of the needs and the importance of the processes and advantages of conservation and increased production.

Hence, an awareness is inculcated among our young generation through teaching learning process. Here is an attempt to suggest some activities for promoting conservation and productivity of our environment.

## **OBJECTIVES**

To enable the children to understand various ways of conservation and protection of domestic wild animals, birds and plants, develop right attitude to use our forest profitably, create an awareness about how to conserve and increase productivity of our precious water resources. Develop right attitude towards keeping the sources of water clean develop an awareness about the importance of soil conservation and productivity. Create an awareness of the need for conservation and proper utilisation of our energy and mineral resources. Understand various methods of converting waste materials into useful products.

## **NATURAL RESOURCES**

All of us use resources provided by nature to fulfil our needs. The water, air sunshine, soil, plants, animals and fossil-fuels are useful to us. The growth of population and scientific advancement have accelerated the use of natural resources. It is necessary that environment should be protected for the healthy living of humanbeings. Let us analyse the present position with regard to the utilisation and distribution of these resources to understand the magnitude of the problem.

## **PLANT RESOURCES**

Plants are called primary producers because they can produce their own food. They feed all the living organisms

directly or indirectly, they provide us food, fuel, fibre and a variety of items for different uses. Plants cover about thousand million hectares of land surface. They may be grouped into four major biological systems - forests, grasslands, crop lands and deserts.

Forests are complex ecological systems dominated by trees. Originally forests covered about 1/4 of the earth but today they cover only 15% of the earth surface. It is estimated that they are disappearing at the rate of ten million hectares per year. Humanbeings fell trees for the purpose of agriculture, constructing buildings, roads, railway lines, factories and meeting the requirement of fuel and raw materials for timber, pulp, plywood, paper boards, railway sleepers, etc.

#### **FOREST RESOURCES**

Forest being one of the important natural resources in a reservoir of flora and fauna. It maintains the natural beauty of a country. Temperature, rainfall and the climate of a country is regulated by the forest. About 22% of the total land area is under forest in India. A part from wild life forests also give us wood, herbs, medicinal plants and fruits, protect areas like Wynad, the Nitambar forest, the Madumalai forest, the Nilgiri, and the entire Western Ghats, the Sholayar forest and Bandipur forests.

Our forest resources are to be used judiciously, so as to conserve the precious wild life and maintain ecological balance. For this purpose government has passed the "Forest Protection Act" and "Wild Life Protection Act", etc. To develop an awareness among the children, "Social Forestry Clubs" are formed in schools.

#### ACTIVITY

Teachers are expected to collect statistical data of their state regarding the total area of the state/area of the agricultural lands/area of forests and tabulate the details in a chart from the census report for ten years from 1951 onwards.

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Year	Name of the state	Total area of the state	Area of agricultural land	Area of forest
1951-60				
1961-70				
1971-80				
1981-90				

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Indiscriminate felling of trees has destroyed our forests resulting in massive land slides in the hills, frequent flood, siting of rivers, fall in the watertable, the spread of deserts, etc.

An activity suggested for recording the observational details of rainfall during five years period.

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Year/ month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1991												
1992												
1993												
1994												
1995												

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**ACTIVITY**

In order to ascertain the learner with the locally available plants and animals used for food, shelter and clothing, prepare an exhaustive list and tabulate these in order of their importance.

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	Name of the	
	Plants	Animals
Food	1.	1.
	2.	2.
Shelter	1.	1.
	2.	2.
	3.	3.
	4.	4.
Clothing	1.	1.
	2.	2.
	3.	3.
	4.	4.

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2. With the help of locally available examples of plants and animals explain the model of simple food chain and show how the animals like fish, poultry, sheep have their food from nature and that to from plants.

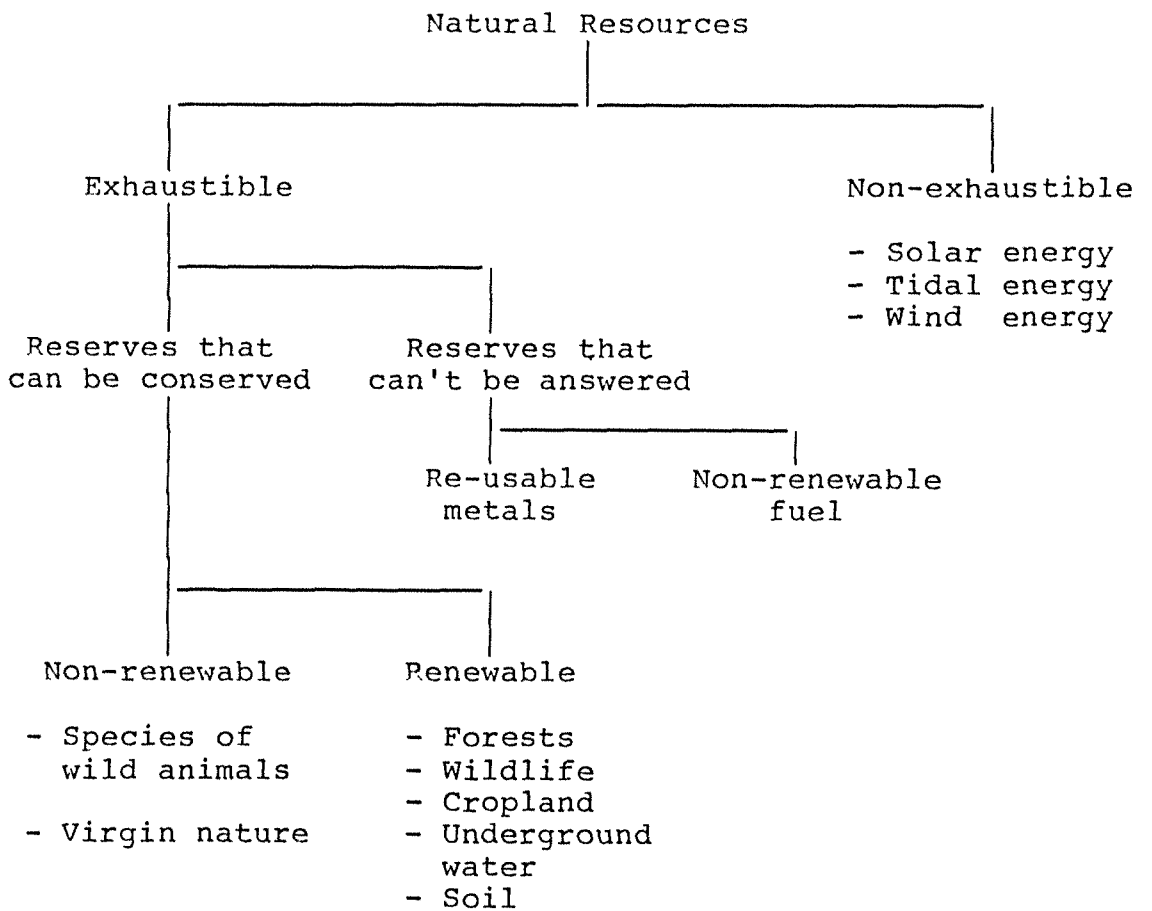
Deforestation has affected the natural habitat loss of many species of animals and plants giving rise to imbalance in the natural eco-system of the region. The grasslands support the world's 3,000 million domesticated animals. However, overgrazing and conversion of these graze lands into crop lands have caused deterioration and destruction of the grassland. As a result, there is a lack of insufficient pastures for the animals and the soil loses its fertility due to the absence of grass cover. The fertile top soil is been eroded due to the lack of grass cover because of surface flowing of water during rainy season.

Crop lands provide food for humanbeings, with the increasing population, the pressure on land too is increasing. Agricultural lands are being put to non-agricultural uses like settlements, industries, transport and communication trees, consequently more people have to be fed on smaller areas of land. The vegetation of desert land is totally different. It is mostly cactus and other kinds of thorny bushes which are drought resistant and normally grow with less water. The soil is not productive. due to the callous attitude of the humanbeings, the desert lands are spreading fast.

### NATURAL RESOURCES ARE RENEWABLE AND NON-RENEWABLE

The world 'resonance' means a source of supply or support generally held in reserve. In other words, natural resources are the components of the atmosphere, hydrosphere and lithosphere which can be drawn upon from their reservoirs for supporting life. These include energy, air, water, land, soil, minerals, plants, and animals. For man resources are those materials and sources of energy which are needed for their survival and prosperity. Natural resources are basically classified into

1. Non-exhaustible
2. Exhaustible resources



## CONSERVATION OF PLANT RESOURCES

### 1. RESTORATION OF VEGETATION COVER

There is an urgent need to restore the vegetational cover that is forests, grasslands and crop lands which have been destroyed beyond the critical level, besides maintaining the ecological balance care should be taken in selecting plant species. Only those species should be planted which do not destroy nature's harmony. This activity could be undertaken by different agencies like the government, voluntary organisations and community groups and the individuals. The Government of India has undertaken different programmes for this purpose, viz., afforestation, social forestry, and agro-forestry programmes.

### 2. RECOVERY OF WASTELANDS

Depending upon the nature of the land, suitable plant species should be grown to improve the soil structure, eg. coastal and denuded land unsuitable for the growth of trees and crops may be used for growing grass. This would also help to solve the fodder problem.

### 3. MANAGEMENT OF FORESTS, GRASSLANDS AND CROP LANDS

Care should be taken to utilise forest grasslands and crop lands. Careless felling of trees, overgrazing and unplanned destruction of crop lands should be checked. The productive potential of the forest areas should be assessed and measures taken to reach the target. Steps should be



taken to make people aware of the need for conserving forests. Since people depend on the forests, grasslands and crop lands for various purposes, their protection would depend upon the availability of rate alternative sources to fulfill their requirements.

#### **ACTIVITY**

Visit a botanical garden or agricultural farm and observe how various plants are grown and protected. Discuss the issues with the agricultural officer.

#### **PROJECT**

After supplying seeds, children are asked to make a kitchen garden through group activities. Each group is given a plot. A daily observation schedule is maintained by each group. The teacher reviews their work through discussions and observations, and gives timely instructions to maintain vital and healthy growth of the plants. At the end of the project, the best performance be rewarded.

#### **ANIMAL RESOURCES**

There is a variety of living organisms around us. They cannot live in isolation. They depend on one another for their existence. Some of them are found inland and some in water. All are inter-dependent and play a role in maintaining the flora and fauna.

The animal kingdom consists of domestic and wild animals. These are integral parts of bio-systems. Wild life

in its variety of beauty is a magnificent asset as well as mankind's heritage. The indiscriminate killing of animals for their fur, hides, bones and horns and other parts as well. The destruction of natural habitat has led to the extinction of certain species. Within the last 300 years many species of animals and birds have become extinct. It is common knowledge that the Indian Cheetah became extinct year back in the 1950s and some species like the Indian wild Manipur deer are on the verge of extinction. In Kerala, it is also noted that the lion-tailed monkeys, peacocks, elephants are on the verge of extinction due to illegal poaching and hunting.

Domesticated animals provide us milk, meat, eggs, wool, fur and skin. Meat, milk and eggs constitute nearly 18% of the total world food but growing live stock for meat production at the expense of foodgrains is highly uneconomical and environmental degradation because the per unit energy requirement is more in the production of meat than foodgrains. The Sahara region in North Africa faced acute drought condition because the local people increased their herds due to the demand for meat in the neighbouring countries. As a result, the available pasture land fell short of the rising demand. These animals then started looking for their food from other plants and trees over a wider area. The rainfall was reduced and led to a famine. This is an example of ecological imbalance caused by improper planning and management by human beings.

For maintaining the quality of the environment, it is for maintaining the ecological balance it is necessary to preserve animal life. For this, their natural habitat to be preserved and restrictions placed on hunting. Realising the importance of this, several national parks and wild life sanctuaries have been developed in our country. To protect the natural surroundings there is a complete ban on hunting of wild life.

The decrease in number of creatures like frogs from our paddy fields due to excessive application of pesticides, fertilisers, and export of frog legs has created a natural imbalance in our environment. In the absence of enough frogs, the insects become a menace to our paddy fields.

**ACTIVITY 1**

The students are asked to enlist the dwelling places of animals and birds and their food.

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Sl. No.	Name of bird/animal	Food	Dwelling place

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**ACTIVITY 2**

Arrange a discussion based on the enlist chart about the food cycle of animals and birds.

### ACTIVITY 3

Conduct a field trip to the zoo or sanctuary and prepare a note on the animal life.

### ACTIVITY 4

Conduct a discussion, after inviting the nearest veterinary doctor to the school on animal life and caring of domestic animals and birds.

### PROJECT 1

Ask the children to conduct a survey of birds and animals found in their locality.

### PROJECT 2

The teacher may know the legislations passed by the Government to protect the animals, birds and trees like the Teak Plantations of Kerala and Tamilnadu reserve forests of Wynad, Mysore sandal wood forests, etc. Students should also know voluntary works organised by various organisations, collect paper cuttings and pictures from newspaper and prepare an album with the help of the teachers. In addition students are expected to make picture album of animals.

### ACTIVITY 5

Prepare a wall magazine showing the names of state bird, state animal, state trees of southern states of India, along with the names of national bird, national animal and national tree.

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Name of state	Name of state tree	Name of state animal	Name of state bird
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Name of nation	Name of national tree	Name of national animal	Name of national bird
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### ACTIVITY 6

Prepare a list of national parks, bird sanctuaries, wild life sanctuaries, snake parks, of your state.

### WATER RESOURCES

#### CONSERVATION OF WATER

We know that water is essential for the existence of life. Many human activities require water. After using water in home, in agriculture or in industry the water gets contaminated. The used water may contain waste and harmful substances called pollutants. Sewage and garbage also cause water pollution.

If we drink polluted water, it will cause diseases. In our country most of the rivers and lakes are polluted.

Efforts are being made to control water pollution. The pollution can be controlled to some extent by various methods. It can be done by avoiding direct disposal of the household, industrial and other wastes to the source of water like rivers and lakes. Pollution of water in the well can be prevented by covering the wells. We should avoid cleaning utensils and washing clothes near the source of drinking water. It would also help to keep them clean.

Water is a natural resource and is freely available. One can go near a well or a river or a pond and draw water, and can analyse the safety of the water for drinking. It is desirable to treat it with some chemicals like potassium permanganate and chlorine for about twenty minutes. In cities, water is supplied through pipes after treatment. In some places, people are making use of the underground water through borewells. Geologists are against the exploitation of ground water. In some southern states, the government is considering how to prevent the excessive use of ground water. The potable water which is safe for drinking is not available in plenty. Water must not be wasted. It should be conserved. Conservation means careful and economic use with less wastage. In order to conserve water, every one should make efforts in this direction. Efforts should be made to minimise the pollution of the sources of water.

You are already familiar with various uses of water. In many areas, water is drawn from wells in large quantities

for use in agriculture and at home. When rainfall is insufficient, the water level in wells goes down. In southern states the main source of electricity is from hydro-electric projects. Lack of enough water in the dam of Idukki, Tungabhadra, Nagarjunsagar, Bluff leads to shortage of the electric power. It is a main threat to the southern states like Karnataka, Tamil Nadu, Kerala and Andhra Pradesh.

Forests help in increasing the rainfall, therefore, we should not destroy forests and should grow more forests.

The scarcity of water can be managed by collecting rainwater in tanks, by building underground storage tanks or by constructing small dams. In addition to these in our country during the rainy season, a large quantity of water flows to the sea and it causes serious damage to our land and surroundings. If we can store this water, we will be able to utilise the same during drought season and also prevent to a certain extent the calamities caused by flood during the rainy season. The construction of dams across the rivers will help us in this regard.

Due to the scarcity of water in some advanced countries wastewater after purification it is again used. In Gulf countries they are using the desalinated sea water for their drinking purposes. But it is uneconomical affair to us and India cannot afford it.

**ACTIVITY 1**

The students are asked to conduct a local survey to find out different sources of water in their locality and they are instructed to find out how our water sources are being polluted.

**ACTIVITY 2**

Conduct a school level campaign to the local people for developing awareness about how to minimise the wastage of water and how to keep the water sources clean. Arrangements may be made for lecture by experts like P.W.D. Engineers, Agricultural Officers and the Doctor of Primary Health Centres.

**ACTIVITY 3**

Conduct a field trip to the near by, dam/irrigation projects/hydro-electric projects. And they are asked to note down how water is stored and used for various purposes.

**ACTIVITY 4**

Children are asked to prevent the flow of rain water from their compound to a near by compound by erecting bunds properly. This will also help to retain the water content of the soil. Also plan other methods of conserving rain water in their houses.

**ACTIVITY 5**

Ask the children to make use of the wastewater through proper drainage system so as to reach the wastewater



to the roots of nearby trees like coconut tree, fruit tree or any other useful plant growing in the compound.

By maintaining proper drainage system, the wastewater will not get stored in our premises thus resulting in mosquito free place.

#### **ACTIVITY 6**

The children are asked to find out the ways in which the wastage of water is occurring after the introduction of public tap system under water supply scheme.

#### **DIFFERENT KINDS OF WATER RESOURCES**

As far as our country is concerned, we are having a large quantity of water resources. We have a precious sea shore which comes to more than the half of our total border line length. If we utilise our sea wealth properly and judiciously we can save a lot of resources to our future generations. Our country has large number of big and small rivers, lakes and ponds which serve as great natural water resources.

#### **FISHES**

Fish being the biotic component of the sea, provides us a good chance to have lot of food and international trade. We cannot produce any product or exploit any natural resources with least cost except fish. Hence we must turn our attention towards the sea wealth to increase the

productivity and conservation of the sea resource at the maximum. And keeping the utility at an optimum level.

A large number of fishes are being destroyed or wasted by the use of unscientific methods for fishing. The use of net save the fishing industry from great problem of "species conservation". In order to protect the sea environment our Government is taking precautions by making legislations to prevent overfishing and destruction of "fish". It may also lead to the extinction of some "species" from our sea resources. In order to enhance the availability of fishes, the Government is now planning to make artificial ways of cultivating fishes in large scale in ponds and lakes by using advanced techniques of fish farming.

#### **ACTIVITY 1**

Visit to a fisherman colony in groups and collect the different names of fishes available for the last ten years and also the proportion of each fish available yearly should be noted down. Find out if there has been any difference in the quantity of fish catch in a season.

#### **ACTIVITY 2**

Visit a nearby fish farming centre and observe and note down the different kinds of fishes growing there. Measure the weight of each fish during the fishing period and how they are preserved and protected.

### ACTIVITY 3

Conduct a discussion on the consequences that may arise out of over fishing of the smallest fishes in large quantities before their average growth.

### SOIL

#### SOIL CONSERVATION

The soil cover on the earth is very thin compared to other layers of earth crust. However, this is the most important layer because it supports the life on the land. It is the place in which the plants and nutrients are produced, and the water for the plants is stored. Soil is formed as a result of weathering of rocks. The fertility of soil is increased by the decomposition of organic matter. Organisms now as humus enter into the composition later. Water and air fill the porous space between soil particles. Large space between soil particles facilitate porosity and aeration. On the other hand, small spaces enhance water retention for example water drains quickly through sand particles, where as clay soil holds water.

The soil differs from place to place depending upon the nature of the parent rock, topography, climate and biota. Each soil type has certain physical and chemical properties - colour texture and structure, salt content, NPK and other organisms and other inorganic nutrients - together, determine the productivity and fertility of the soil.

### ACTIVITY 1

Ask the children to collect different types of soil of different regions, keep them labelled in separate containers and then prepare the chart showing the names of plants and trees growing in different soils.

### ACTIVITY 2

Ask the children to locate the regions where different types of soil is found in India/State by shading with colour pencils in the outline map of their State/India.

### ACTIVITY 3

The members of the science club are asked to collect a sample of soil from the school compound and obtain the test result of the soil from the nearest soil research centre and discuss in the class about the content of the soil and identify the deficiencies and make them aware, how to increase the fertility of the soil.

### PROJECT

Grow three plants of ladies finger in the school premises separately. For one plant apply fertilisers (and pesticides) as suggested. The second plant is given the pesticides and fertilisers in abundance. The third plant is given no pesticides or chemicals fertilisers. All the other treatments given to the three plants remain the same. Ask the children to observe the plants daily and keep a record of the changes seen by them separately. After weeks, pluck

the vegetable from the three plants if available and keep them separately and get them tested from a horticultural laboratory and note down the harmful poisons percentage contained in each of the three vegetables and discuss about the consequences and reasons among the students.

The top layer of the soil is constantly eroded by water and wind. The slow removal of soil is called "soil erosion". As the rate of soil erosion may be speed up, due to deforestation. The top soil is washed away and the land becomes unsuitable for agriculture. In the absence of vegetative cover, the semi-arid areas due to high rate of soil erosion will get converted to an arid or dry regions like the desert. Soil is also degraded by mismanagement or careless human activities, viz. water logging. It has been estimated that if the degradation of land continues, 1/3 of the world's arable land will be destroyed by the end of the present century.

In India, about 81 million hectares of land is subjected to soil erosion. 1/4 of it has already become useless for agriculture. Deforestation and overgrazing have been the main reasons for the fast rate of soil erosion in our country. It is thus apparent that we have only very little land, resources in terms of fertile soil supporting the whole of bio-sphere. You can, therefore, understand how essential it is to maintain and conserve soil and prevent further degradation.

## **HOW CAN WE CONSERVE SOIL ?**

### **1. Checking soil erosion**

Since a high rate of soil erosion is closely related to the destruction of vegetative cover, one of the important steps to check soil erosion is to maintain a reasonable proportion of vegetative cover. The ideal situation is to have 33 per cent of the total land area of a region under forest cover. For maintaining a reasonable amount of forest cover, it is therefore necessary that indiscriminate felling of trees is to be stopped. Forests are not to be destroyed for other developmental activities. Those areas which are unsuitable for agriculture may be used to grow vegetative cover such as trees, grasses and shrubs. Other areas which are arable but susceptible to erosion may be managed better by practicing effective soil conservation methods such as:

#### **a. Contouring**

This is a general term for ploughing, planting and cultivation along with the natural contour lines of sloping grounds. The crop grown, on small bunds or ridges are erected at right angles of the down slopes of the land. Contouring thus creates obstacles to the flow and increases surface retention of water.

In southern states we can observe, so many hill areas like Wynad Ghat, Idukki, Nilgiri, Coorg, Araku valley in Andhra. In these regions, plantations of tea,

coffee, rubber, etc. have been developed by making use of contour methods.

**b. Crop Rotation**

Different crops consume different nutrients from the soil in varying proportions. Some of the crops like leguminous crops enrich the soil by adding nutrients like nitrogen. As such the soil becomes deficient in certain nutrients. If the same crop is grown year after year. Crops, therefore, are grown in rotation so that the soil nutrients are replenished. The usual practice is to grow legumes to increase nitrogen content of the soil, a grass crop to improve the tilling cereals or cash crops.

**c. Strip Cropping**

Different crops are planted in narrow parallel belts side by side. When practiced as contouring it allows the close growing crops to catch soil particles which otherwise would have been washed away with the surface run off from the slopes.

**d. Terracing**

This is a kind of contour ploughing as ditches and embankments are constructed along the contour. It is an ancient practice which has been carried out effectively on slopes of hills, eg. rubber plantation in Western Ghats.

**e. Removing Salinity**

Salinity can be removed by providing adequate drainage along with irrigation. Extra water is added to the field to allow the soil to absorb water. If the natural drains are inadequate, artificial drains should be made. Besides addition of certain chemical and green manure one can improve the alkaline, acidic and saline soils.

**f. Checking Desertification**

To check the spread of deserts different plant species should be grown in small squares of the boundaries of the moving sands. This acts as an effective barrier to the moving sand dunes and check the spread of desert. Ploughing the land at right angles to the direction of the wind further helps wind erosion.

**ACTIVITY 1**

Ask the children to locate the places where the soil erosion is taking place in school compound and also instruct them to do necessary work to prevent the soil erosion.

**ACTIVITY 2**

1. Suggest three ways for increasing the productivity of land.

2. What are the measures taken by the Government to prevent soil erosion ?



### ACTIVITY 3

Visit to a nearby river bank or seashore to see how the soil erosion is prevented there. And make a note on this subject.

### MINERALS AND OTHER SOURCES OF ENERGY

Minerals are naturally occurring non-living substances having certain physical properties and definite chemical composition. This may be metals such as copper, lead, gold, iron or non-metals such as gypsum, quartz and mica. Fuels like coal, petroleum, etc. are other sources of energy.

Minerals have become indispensable to human life because of the variety of uses. Machines, ships, ornaments, buildings, coins, et. contain minerals. Coal, petroleum gas, Uranium and Thorium are used for generating power to run machines, industries and automobiles to illuminate buildings and to cook food. They are therefore called energy resources. Uranium and Thorium are nuclear fuels. In fact, modern manufacturing is impossible without power. Energy resources are therefore vital for our economic growth.

Mineral are distributed unevenly over the earth. Some countries are rich in one mineral but may be deficient in another. For eg. countries like Africa are rich in gold and cobalt but poor in Tungston. Hence no nation is self sufficient in all the minerals.

Minerals have been used by human beings since the inception of civilisation. The industrial revolution accelerated the rate of their utilisation. The world trend in the consumption is rising.

It is not really possible to stop using natural resources because it would mean stopping our developmental activities but we can definitely check the rate of consumption.

#### ACTIVITY 1

List out the mineral resources available in your state and classify them into categories of metallic, non-metallic and fuel.

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Name of the state	Metallic minerals	Non-metallic minerals	Fuel
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#### ACTIVITY 2

There are utensils in your house. Some of them may be metallic. What metals are used in their production ?

#### ACTIVITY 3

Prepare a chart showing the quantity of available fuel resources in your state and also average quantity of various fuels consumed in your state.

#### ACTIVITY 4

Conduct a debate session on which type of fuel is economical and less polluting and suitable for your locality.

#### CONSERVATION AND PRODUCTIVITY OF MINERAL RESOURCES

We can conserve mineral resources by discouraging wasteful designs of production and reducing per capita use. This means that we should improve production techniques as well as present wastage at all levels. For example, houses in our climatic conditions should be constructed to provide adequate sunlight and air. This would minimise the use of electricity.

Efforts are being made to substitute some of the fast exhausting non-renewable, easily available and renewable resources, eg. substituting metal by synthetic material in the manufacture of water tanks.

#### SOLAR ENERGY

Energy produced from sun rays is known as solar energy. In spite of its advantages such as limitless supply, free from pollution, in large scale production is not economically viable it is not yet in common use. It is estimated that the solar energy incident on the earth for every 17 minutes is sufficient to meet the human energy needs for a year at the consumption level of 1975. Solar collectors for heating water and solar cookers for cooking

food solar cells and furnaces to produce electricity have been developed over the year.

#### **TIDAL ENERGY**

The source of the tides have been considered as an important source of power. A turbine may be immersed in the seashore. Electricity will be produced as the tides would turn the turbine blades. But the output from a single generator would be quite small. Therefore, a better method could be adopted to build a tidal dam across a bay where there is a large rise and fall of tides. However, this may endanger aquatic life. As such this source has not been used very much so far. There are only a few tidal generating plants in the world.

#### **WIND ENERGY**

It has been used for a long time, however when there is wind, it is therefore necessary that this energy should be stored in some way so that it can be made available during crisis.

#### **BIOGAS ENERGY**

Biogas energy is produced almost all over India. It is produced out of cow dung and waste materials. It is very safe to use. The raw material used for this source of energy is available in all the villages. But in the cities, it is not advisable because of the non-availability and lack of

proper space. Our government is given much encouragement to erect biogas plants.

**ACTIVITY 1**

Collect the statistical data of the production and consumption of hydro-electric energy of your state for the last five years.

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Year	Units of power produced (MW)	Power consumed (MW)
1990		
1991		
1992		
1993		
1994		
1995		

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**ACTIVITY 2**

Conduct a seminar on the conservation and productivity of electricity based on the existing resources in your state.

**ACTIVITY 3**

Conduct a debate on the power crisis and to find out new power resources such as thermal power and nuclear power.

**ACTIVITY 4**

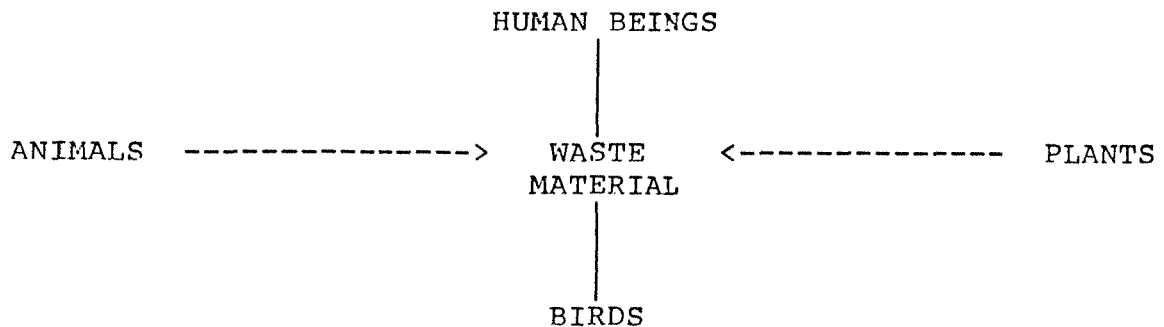
Write a few points on how to reduce the consumption of power in your house.

### RECYCLING OF WASTE MATERIALS

With the advancement of modern science and technology, man began to make use of many materials for his day-to-day life. Along with this a lot of waste was being disposed off in the surroundings causing much damage to our environment. So we are compelled to make use of this waste materials in one way or other way to get rid off from this environmental danger.

As far as our domestic waste is concerned, we can make use of this waste materials as manure for plants and trees after composting, from this we can prepare a compost pit. In this case of industrial area the wastes coming out of the industries like, metals can be melted and recycled into solid metal once again. The recycling of plastic materials also can be taken up and they can be reused.

In nature itself there is a tendency of recycling natural wastages, eg. the wastages coming out of animals and plants and other decomposers and sent back to the soil for reuse.



### NATURAL WAY OF RECYCLING OF WASTE MATERIALS

[Plastic - Non-biodegradable accumulation as a solid waste using Technology Recycle plastic also]

### **PROJECT**

Prepare a compost pit in the school compound and fill it with organic waste materials of the school. Follow the procedures to get the compost manure. Participation of all the students must be ensured.

### **ACTIVITY**

Prepare a list of waste materials that can be used for making low cost learning materials.

### **EVALUATION**

1. Prepare a report of the statewise distribution of agricultural lands, forest area based on the last five census report.

2. Prepare chart or a map showing the percentage of rainfall in a year, monthwise for the last five years.

3. List out the various crops cultivated in your village. Have a discussion with your parents and prepare a list of crops cultivated in last five years. Have a discussion in the class about the productivity and necessary help required by the villagers.

4. Find out the natural water resources in your village and assess how far it satisfies the present needs of the village. What are the other sources of water being used in your village/town ?

5. List out the names of birds that are seen in your surroundings. Prepare another list of birds that were found in your village five years ago. Make a comparative study and find out the percentage of different species.

6. Count the number of bricks and tile factories in your village and assess the quantity of fertile soil consumed by each of these factories in a year. Make a discussion on the environmental consequences that may arise and take appropriate action to prevent it.

7. Conduct a survey about the quantity of sand collected from your village river for different purposes. Make a discussion in the classroom about the environmental consequences. How to prevent it ?

8. Discuss which is the most suitable system of electricity production for your village and list out the reasons. Wind, hydro-electrical, solar, tidal, thermal or nuclear, electricity.

9. How can you minimise the electricity consumption of your house ?

10. Which products in your house are made of minerals. Classify them into different groups and find out which are the minerals obtained in your state.

11. Which are the fuels consumed in your village for domestic purposes ? Which is the most suitable for your village ?



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## MODULE IX

### QUALITY OF LIFE (ETHICS VALUES, ROLE OF CHILDREN, WOMEN, COMMUNITY AND LEGISLATION)

#### INTRODUCTION

One of the most significant aspects of human life is values and ethics. Values and ethics decide the quality of life. Degeneration of values in the contemporary world has vitiated our social environment. Education plays a vital role in moulding a life of sublime quality. A pound of knowledge is worth an ounce of practice. Therefore, knowledge acquired is futile unless practiced in daily life. The minds of the younger generation have to be moulded to meet national goals and aspirations. Education should enable learners to lead a higher standard of life.

A module that directs both the trainers and teachers to a new dimension has been evolved. In this section an attempt is made to suggest activities which can be of some help to the teacher trainers. Various components of qualities of a 'balanced personality' are listed out and activities related to each component are given.

#### OBJECTIVES

##### I. QUALITY OF LIFE - ETHICS AND VALUES

1. To develop in children socially desirable qualities such as showing love towards their fellow beings, birds and animals, and nature and to bring out an attitudinal change in them.

2. To develop in them the qualities like good behaviour and habits, self discipline, concern for others, respect for elders, cooperation, tolerance co-existence, etc.

3. To inculcate in them the qualities like patriotism, national feeling, showing respect to all religions, customs, institutions, etc.

## II. QUALITY OF LIFE - FAMILY, SOCIETY AND NATION

1. To make them recognise the need and importance of small family for better quality of life, for good society and in turn for the development of the nation.

2. To make them realise the importance of equality, undesirability of superstitions, caste-class (racial) discrimination and customs like untouchability.

3. To create an understanding of harmful effects of discrimination with regard to language, culture, customs and rituals for the development of society and nation.

4. To enable them to realise the need for unity in diversity.

5. To develop in them an awareness about the need for observing a small family norm.

6. To make them understand the importance of the concept of equality in one's life and progress of the nation.

### III. QUALITY OF LIFE - DUTIES AND RESPONSIBILITIES

1. To enable them to realise the duties and responsibilities of a good citizen.

2. To develop in them the habit of obeying the rules and regulations, and work for common welfare.

3. To make them realise the need to protect public properties.

### IV. QUALITY OF LIFE - CONSERVATION OF NATURAL RESOURCES

1. To enable them to recognise the importance of natural resources like water, soil, oceans, minerals, etc. and their judicious use for improving and maintaining the quality of life.

### V. QUALITY OF LIFE - UNIVERSAL BROTHERHOOD

To create an awareness of the need for universal brotherhood which would cater to national development and international understanding.

### VI. QUALITY OF LIFE - DIGNITY OF LABOUR

1. To enable them to realise the various types of labour and the concept of dignity of labour.

2. To enable them to understand the need of social services for national reconstruction.

### VII. QUALITY OF LIFE - MODERN WORLD

1. To enable them to cope with the modern world sustaining our own culture and tradition.

2. To make them realise the influence of other cultures, development of science and technology and at the same time judicious acceptance of the best.

**VIII. QUALITY OF LIFE - ROLE OF CHILDREN, WOMEN, COMMUNITY AND LEGISLATION**

1. To make them realise their role in the society such as keeping the surroundings clean, promoting literacy programmes, helping the disabled and participating actively in national festivals.

2. To make them recognise the important role of women in national development and the need for women's education.

3. To create an understanding of values like social justice, democratic and socialistic values, constitution, judiciary and legislation and the concept of equality irrespective of caste, creed and colour.

**IX. QUALITY OF LIFE - ETHICS AND VALUES**

To bring about desirable attitudinal changes among children in the need for recognizing the importance of love and empathy towards their fellow beings.

Deprivation of love and concern produce culprits and imbalanced personalities in a society. Children should be made to inculcate these qualities from the beginning of their life itself.

Variety is the dominant feature of nature. Human beings, birds, animals, trees, plants, and many other living beings co-exist in this world with mutual inter-respondence and co-operation. Even the existence of nature depends on a particular eco-system. Destruction of any one of these components causes imbalance in the environment.

The quality of life is decided by a set of values, beliefs and environmental ethics that are in practice among the members of a society. Values and beliefs form an integral part of social environment.

The family which is one of the earliest social institutions, subsists and grows on a number of values and beliefs. Morality is the rational acceptance and conformity to the best social standards of living. It may differ from place to place even though we are not able to clearly make a distinction between right and wrong. However, some standards of acceptable behavioural patterns can be identified. Good behaviour, good habits, self-discipline, concern for others, respect for rational values and patriotic feelings, respecting all religions and religious institutions, and bequeathing the good in our culture to the next generation, are some of the good qualities of life that one should develop. All those values are to be inculcated in our children.

Man is a social animal. Values and ethics play an important role in bringing about a desirable attitudinal change in an individual.

Several factors influence the behavioural patterns in a family. Values and beliefs along with environmental ethics constitute one of the major categories. These behavioural patterns project the image of that family.

Values and beliefs are influenced through interactions with various facets of societal environment - neighbourhood, peer-groups, educational, religious, cultural, economic and political institutions and mass media. Values undergo modifications according to needs of the time and are often consistent with the changing social environment. But they continue to be behavioural standards that discriminate good from bad.

#### **ACTIVITY 1**

List some of the values of your society. Discuss how they influence human behaviour.

There is no one definition which does complete justice to the full range of diversity of the value phenomena. Values are generally regarded as standards, criteria or rules that determine how individuals act upon available choices. The preferences and selections are invariably influenced by the values one holds.

## ACTIVITY 2

Saraswathi and Sathyawathi are class mates. Before Saraswathi leaves for taking her examination, she touches the feet of her parents to get their blessings because she believes it will ensure her success. Sathyawathi on the other hand is confident about her success in the examination, therefore she simply takes leave of her parents. Discuss on these two 'values' or behavioural patterns. Hints: Saraswathi's actions are based on the values of showing respect to elders. Sathyawathi's actions are based on the values that labour never goes unrewarded. Discuss similar instances.

## ACTIVITY 3

Conduct a group discussion by forming the following groups:

1. Behaviour patterns are influenced by values and beliefs.
2. Behaviour patterns are developed over a period of time.
3. The values and beliefs need modifications to suit new needs and situations.
4. Values are standards and criteria that determine human behaviour. Beliefs are indicators.

## ACTIVITY 4

All the age old beliefs and values are not major obstacles in the path of our development.



Critically comment on this statement.

Why do you accept or discard such beliefs ?

How do they affect the environment ?

#### ACTIVITY 5

Organise a group discussion on "Erosion of values" with the help of several illustrations.

#### ACTIVITY 6

Arrange study tours to wild life sanctuaries, bird sanctuaries and agricultural farms.

#### ACTIVITY 7

Arrange a lecture by a prominent environmentalist on activities related to the protection of environment.

#### ACTIVITY 8

How do you treat domestic birds and animals ?

Do you take part in feeding them ?

Group discussion on different ways of showing love towards birds, animals and nature.

#### ACTIVITY 9

Make a list of actions of kindness performed or witnessed by you, your friends and relatives, eg. helping a blind man to cross the road, giving alms to beggars. Undesirable cruel actions can also be written.

The children discuss 'why' and 'how' they have reactions with other friends. They find out the desirability

of the actions themselves. Each child should be given opportunity to present his experiences. Let them discuss every activity in detail. Teachers call tell some moral stories. Let there be a series of sessions. It may extend upto one month or more. This period also can be made use of for noting down their experiences.

#### **ACTIVITY 10**

Your dear brother (neighbour or close relative) asks you to give him shelter for a day. He is a criminal wanted by the police.

What will you do ?

Justify your action - Discuss individually.

#### **ACTIVITY 11**

Write moral stories -

Poems - Plays - The students take up the above assignment in leisure hours by narrating them to their friends.

Note: Environmental ethics must be stressed in each and every activity.

#### **ACTIVITY 12**

"Criminals are not born but made". Find out the basic reasons for individuals committing crimes. It may be because of some social situations or it may be due to some bad habits.

Discuss the following statements in groups from the environmental point of view, environment affect the

mentality of an individual, good behaviour and good habits herald peace of mind and harmony in society which in turn promotes national unity.

### **ACTIVITY 13**

"Sound mind in a sound body"

Bad habits like drinking alcohol, smoking, etc. are "social evils ..."

As far as an individual is concerned he loses his health. An unhealthy body makes him inactive. He keep away from his responsibilities. 'Social evils' create social imbalances and problems in a society. These disturbances create utter chaos. Personal habits therefore also affects the society.

How do these bad habits disturb the environment ?

Discuss in groups.

(This activity can be serialised).

### **ACTIVITY 14**

Make children plant trees on the wayside and ask them to look after those trees. Distribute different responsibilities to children.

### **ACTIVITY 15**

Ask students to cultivate a garden in front of their classrooms. Each one should plant at least one plant and looks after it.

**ACTIVITY 16**

Arrange a group discussion on the inter-dependence of plants and animals.

**ACTIVITY 17**

Imitate the sounds of birds and animals.

Sing songs related to birds and animals.

**ACTIVITY 18**

Write names of different birds and animals. Each pupil acts as one bird or animal. Form the food cycle by interlinking the names with the string. Stretch or cut the string anywhere and observe how the whole system is disrupted.

**FAMILY**

Family is a basic functional unit of a society. The standards set by the family determines the standards of society. Young minds get their first lessons of life in the family. Cultivation of environmental ethics and values influences the quality and size of a family.

**ACTIVITY 1**

In the format given below list the merits and demerits a big family.

Discuss: What type of family is desirable ? Why ?

**ACTIVITY 2**

Birth of a girl in a family is considered to be inauspicious in some regions.

- Group discussion and presentation

**ACTIVITY 3**

In Indian society a male child is preferred to a girl child. Based on the concept of equality discuss the erosion of values regarding the existing ethics of male vs. female child.

**ACTIVITY 4**

In a family consisting of disabled old parents and three girls, a ten year old boy works hard to make both ends meet. Discuss the ethics of such a situation and its repercussion on the child.

Discuss the values - Pros and Cons of child labour and the laws which are framed against it.

**ACTIVITY 5**

List out some of the superstitious of your religion. Are they based on some values ? What is the rationale behind each one ? Discuss in groups. Present the desirable and undesirable values that hinder national development. Discuss.

**ACTIVITY 6**

Identify and compile a list of values and beliefs in different religions.

**ACTIVITY 7**

1. There should be a son to perform the funeral rites for his parents.

2. Women are not permitted to enter certain temples (eg. Sabarimala Temple at Kerala). Discuss its rightness or wrongness.

#### ACTIVITY 8

We have varied cultures, languages, religions, customs and rituals. In this diversity, unity is inevitable for national reconstruction.

Discuss the varied features of our nation.

What is the need for unity ?

Discuss in groups.

#### ACTIVITY 9

Visit various religious institutions.

Let the children see the rituals and prayers.

or

The rituals and prayers of different religions could be observed in the school on different days.

#### ACTIVITY 10

Conduct symposiums and seminars on the importance of national festivals for national integration.

#### ACTIVITY 11

Write down the pledge Sabbhavana Day in bold letters. Analyse and interpret each sentence.

Make a retreat into our own minds.

Are we sincere to the words ... ?

Discuss in groups.

### ACTIVITY 12

Collect pictures of national leader, national symbols and emblems.

Try to draw them.

Paint them.

Why do we have these emblems ?

Discuss their importance ?

### ACTIVITY 13

Collect songs of other states - Folk songs and songs of national integration.

Sing them together.

Try to learn the meaning.

### ACTIVITY 14

Make pen friends from other states. Try to learn as many words of their language. Exchange views and ideas. Invite your friends to your place.

### QUALITY OF LIFE - DUTIES AND RESPONSIBILITIES

Ours is a democratic country. Rights and duties are the two sides of the same coin. Every citizen is required to perform his/her duties and discharge the responsibilities assigned to each one of them. A good citizen should act according to environmental ethics.

## DUTIES AND RESPONSIBILITIES

### ACTIVITY 1

What are the rules and regulations of a school ? List them out, like coming to class at 10 am. How many of your friends obey these rules strictly ? Why Discuss.

Do we follow any rule in our houses ?

### ACTIVITY 2

Arrange visits to police stations, panchayat offices, zilla parishad offices, village offices, sales-tax offices, etc. to know about their roles in society. Listen to talks given by concerned officers.

### ACTIVITY 3

Draw and prepare a chart of the traffic signals. What happens if we do not obey traffic rules ?

Group discussion.

### ACTIVITY 4

Collect newspaper cuttings highlighting the effects of political and communal problems. Enlist the duties and responsibilities of citizens in case of such problems.

## ENVIRONMENTAL ETHICS - NATIONAL RESOURCES

The materials present in the environment that can be used by humanbeings for some purpose or the other are called natural resources. Unless these resources are used judiciously, the dearth of materials for our survival will



bring forth disasters. Moreover, to improve the quality of life certain values and ethics related to environment are inevitable. Training for this should begin at an early age to bring about a positive change in the individuals behaviour pattern.

Human life is inextricably linked to nature. Natural resources are the chief means of our livelihood. Man in olden times was more conscious about the importance of nature. They used to worship plants and animals. They managed to use the natural resources without disturbing the equilibrium. Aboriginal (Tribals) who even today live in forests with nature without causing any environmental problems. They protect forests also.

Nature provides many resources like water, air, soil, sunlight, plants, animals, minerals, fuels, etc. Which are basic for our existence. It should become our moral responsibility to conserve natural resources. The modern world is much more complicated than before. The rate of population growth and the availability of natural resources are no longer in harmony with each other. Uncontrolled growth of population affects the development of a nation. This is one of the reasons for the erosion of values and ethics related to environment.

Exploration of natural resources is generally done only for improving the physical comforts of life. When

demand increases exploitation of the environment takes place leading to its disintegration. It is true that scientific and technological advancement has helped human development, but at the same time pollution has become a dreadful threat. Water resources have become polluted. Forest resources have diminished. This has created many environmental problems. Extinction of some of the species of animals has affected the eco-system. Man has lost the power to foresee what will happen in future due to his ruthless plunder of nature. Should we not leave something for the coming generation? Just and right environmental ethical standards should be evolved.

#### **QUALITY OF LIFE - UNIVERSAL BROTHERHOOD**

Scientific and technological advancement has brought a lot of changes in our society. Though the quality of life has improved and life span has increased in most of the countries (the developed one), some nations are still in poverty and antiquity. Those social and economic disparities still prevail but not within a nation but in the international community. Developed countries are still involved in proliferating arms. Another world war in the distant future is not ruled out. The panacea for preventing such ills is nothing but the promotion of the idea of universal brotherhood.

World has become more intricate. Human life irrespective of nations should have some common values to

improve the quality of life. We must be able to remove the word "war" from our dictionary. International understanding among the countries and a feeling of brotherhood and co-operation can cure the disease.

#### **ACTIVITY 1**

Discuss the cause and after-effects of the two world wars. What is U.N.O. ? What are its functions ? Discuss.

#### **ACTIVITY 2**

What are the following ?

UNICEF, WHO, ILO, UNESCO, etc.

Discuss in groups their functions and aims.

Collect pictures of the world leaders.

#### **ACTIVITY 3**

List out the names of the developed, developing and under-developed countries.

#### **ACTIVITY 4**

Industrialisation - Science, Technology, Nuclear Age;  
Multinationals - developed countries, war, poverty;  
Exploitation - Consumerism.

Form a net connect these using arrow marks.

Discuss each point how they are interlinked and their impact on quality of life.

#### **ACTIVITY 5**

How can we promote international relationship and universal brotherhood ? Discuss

**ACTIVITY 6**

Cold war - Existed once is no more.

Discuss the merits/demerits of cold war.

**ACTIVITY 7**

Bring pictures and newspaper cuttings of the followings:

Mother Theresa

Abraham Lincoln

M.K. Gandhi

Mao

What did they do in order to promote universal brotherhood ?

**ACTIVITY 8**

"Modern World is becoming smaller and smaller"

Comment on the basis of Science, Technology and Community.

**DIGNITY OF LABOUR**

Labour is inevitable for livelihood and survival of man. In olden times he made use of natural resources for dwelling permanently in a place. In due course, he used to engage in agriculture, handicrafts, business, etc. He had to work hard physically for his survival. In the next developmental stages he began to produce many things he needed for improving his quality of life. The products were the results of his physical work. In the process of production to satisfy the social needs various classes like farmers, craftsmen and traders took birth. The craftsmen produced handicrafts and tools for working. Businessman

traded in the various products. In this respect all types of work were equally important as far as the society was concerned. Thus, we could see that each region of our country was self-sufficient and they were mutually dependent. Time flew. Situations changed. The respect and honour that various jobs got began to diminish. Those who work in the field of medicine and engineering, received more respect. Occupation needing intellectual ability became superior. Agriculture and other labours were looked down upon by the people. Man aimed at the mercenary value of all jobs. He ran after money. The result was the erosion of values and restlessness. Most of the money-minded politicians and businessman polluted their minds as well as their followers.

All those, who are engaged in jobs, contribute something to the society and the nation for their development. All those jobs should be given due respect. No job is inferior and no job is superior. The monetary benefits may vary but the services that individuals in different positions render to our nation are equally important. If we can inculcate this vision in the young minds, the quality of life increases otherwise devastation will occur.

#### **ACTIVITY 1**

Make a list of various types of professions. What are the different types of tools used for doing these work.

Discuss and find out how does each job contribute to the society and nation.

Name of profession

Tools

Which one do you like best ?

Which one do you dislike ?

What are your reasons for that ?

#### **ACTIVITY 2**

Apart from the activities related to the textual material, do role-play on work related to agriculture customs at the time of sowing seeds and harvest and how they contribute to joy

Collect folk songs related with agriculture.

#### **ACTIVITY 3**

Read books about great men like M.K. Gandhi compare and contrast the present day world and that of the past.

Group work and presentation.

#### **ACTIVITY 4**

An industrialist does not obey the rules to purify the waste materials that are harmful to the society (Rayon's factory, Mavoor, Kerala). If the river or the air of a region is polluted, do you think he is aware of the values related to environmental ethics ? What will you do if a similar thing happens in your place ?

**ACTIVITY 5**

"Consumerism, multinationals, blind acceptance of western culture affect the attitude towards various jobs".  
Comment.

**ACTIVITY 6**

"Child labour" is prohibited in our country. But in Sivakashi (Tamil Nadu) the children are forced to work in factories to make crackers, match boxes, etc. Big people exploit them. Discuss the various aspects in groups.

"Children at Kutti Japan".

A famous documentary film in Tamil. Conduct a discussion based on the film.

**ACTIVITY 7**

Make a list of the merits and demerits of rural life and city life - compare and construct.

Which is preferred by you ? and Why ?

**ACTIVITY 8**

What are the steps that we can take to promote rural reconstruction - upliftment ? Are Government policies being implemented effectively. If not, why ?

**ACTIVITY 9**

"Unemployment is not a problem". Discuss with pros and cons.

## **MODERN WORLD**

One of the most dominating features of the contemporary world is the intense cultivation of the scientific and technological revolution. Changes occur in every walk of life. Even the accepted values need modifications. Change is the only thing that never changes. One should be able to contrast and compare the old world with the new. Children are to be taught to cope with the modern world.

The life of our nation rests in the villages. National reconstruction can only be done through the upliftment of rural areas. It can be achieved only through eradicating illiteracy. Education is the panacea for all these problems.

The mass media have a crucial effect on the new generation. The pros and cons of the impact are to be discussed.

### **ACTIVITY 1**

Discuss the environmental problems/issues of the modern world.

### **ACTIVITY 2**

How can we preserve our tradition and culture amidst the impact of other cultures ? Discuss.



**ACTIVITY 3**

Discuss the influence of mass media on the quality of life.

**ACTIVITY 4**

"Present day children know more". Discuss.

**ACTIVITY 5**

List out the problems of rural-urban areas due to migration. Discuss. What are the practical solutions ?

**ROLE OF CHILDREN**

Children are the wealth of a nation. It may be felt that in the process of production of national reconstruction, they contribute nothing. But the prospect of our nation rests on the present day children. So they should grow on a strong foundation of values of life and culture. To get the maximum output of services the education imparted to them should be environmentally oriented.

Bookish knowledge which they mainly get through examination are of little use. On the other hand, they must be taught to acquire competencies to lead a better life which is of good quality. They must know their surroundings. Environmental issues need to be balanced. They must have a thorough knowledge of this aspect. An attitude of translating knowledge into practice should be developed. They should know various life situations, develop rational

thinking and should have confidence to act rightly in any situation.

#### **ROLE OF WOMEN**

It is said that women are the preservers of all cultures. Generally all learn and practice the first lessons of life and values from them. Therefore, in improving the quality of life and in moulding the values of a society, the role of women is inexplicable. The intricacies of modern world cause erosion of values. Even human relations have become a part of consumerism and commercialisation. This causes value depreciation and degeneration of quality of life. In this context women can do a lot to a society. Where there is a domination of male, the women are confined to kitchens. They cannot simply say that all disasters are made by men. They should know the real facts. They can help the children. Organisations like women's liberation moment, women activists forum can make the society conscious of various problems. They can contribute much to make the family life peaceful. Women can work along with men and make others conscious about environmental issues.

#### **ROLE OF COMMUNITY**

Community has a major role to play in improving the quality of life. In the reformation movement in various states including Kerala, community has played an important role. The result was a change in the then prevailing situations.

Even the government had to change the policies once formed as per the demands raised by the communities, eg. implementation of thermal power projects, construction of dams, etc. Industrialisation in one way is helpful for creating more employment opportunities and increasing productivity. But the environmental problems created by these industries can also become a threat to the existence of man. Community should therefore deal with these problems in an adequate manner.

Do we need industrialisation which pollutes the human environment and is hazardous to health ?

Conscious efforts must be made by members of a community to check undesirable changes in society.

#### **LEGISLATION**

In a democratic country the Government acts for the welfare of the people based on the rules and regulations keeping common interests in mind. But, at times these measures become harmful to the common man. Therefore, Government should consider public opinion before taking any decision like Silent Valley project in Kerala and Narmada Sarovar in Gujarat.

#### **ACTIVITY 1**

Play games that help develop team spirit, cooperation, leadership qualities, etc. Children should be taught to develop these qualities.

**ACTIVITY 2**

Participate in social services like cleaning the surroundings and public places.

**ACTIVITY 3**

Collect all the waste materials and garbage from the surroundings. Supply a gunny bag to each class. Sell the materials after six months. Use the money for buying books or something like that.

**ACTIVITY 4**

Savings deposit scheme can be implemented like "Sanchayika".

**ACTIVITY 5**

Observe and record the changes that occur in school surroundings and home premises.

**ACTIVITY 6**

MPTA in schools plays an important role in the educational growth of children. Discuss its role and importance. How can the MPTA promote learning ?

**ACTIVITY 7**

How can women save energy ?

- while cooking
- while doing household work
- while using biogas plants

**ACTIVITY 8**

Collect information about the work of women activists in your city.

Discuss each piece of information.

**ACTIVITY 9**

Gwalior Rayons Factory in Kerala gives employment to thousands of people. The products contribute much towards the economic development of the country.

The raw materials needed for the functioning of the factory are the bamboos of Wynad forests and other softwood. The excessive consumption of these gives rise to many environmental problems. Those, who are earning their livelihood with the handicrafts made out of those materials, are deprived of their means of earning their livelihood. The industry causes air and water pollution. Discuss the value conflict here.

**ACTIVITY 10**

Form Pupils Consumer Forums.

Record the activities.

**ACTIVITY 11**

Collect materials of historical importance.

**ACTIVITY 12**

Tourism promotion affects us positively and negatively.

Discuss in groups.

**ACTIVITY 13**

Conduct a mock Parliament session.

**ACTIVITY 14**

Arrange visits to factories. Conduct discussions on various problems related to them.

Pollution - Garbage purification.

**EVALUATION**

1. Teacher should keep an anecdotal record of each and every child. Most of the evaluation can be done after keen observations.
2. Check the kind of actions children indulged in with their fellow beings.
3. Conduct quiz competitions regarding:
  - a. Values and Ethics
  - b. Beliefs and Traditions
  - c. Tradition and Culture
  - d. Family, Society and Nation
  - e. National Integration
  - f. Natural Resources
  - g. Dignity of Labour
  - h. Legislation and Environment
  - i. Role of Children and Environment.
4. Conduct essay writing competitions about the topics mentioned in 3 above.

5. Conduct elocution competitions on the topics selected.
  6. Narration of various experiences related to quality of life.
  7. Role play, singing of songs, miing, etc. can be arranged.
  8. Describe different life styles of your region/District/State/Nation.
  9. Define values, morality and ethics.
  10. How do the celebration of festivals improve the quality of life ?
  11. Conduct discussions on the following topics:
    - a. Industrialisation and pollution
    - b. Evils of drinking alcohol
    - c. Drip irrigation and conservation of water
    - d. Sound mind in a sound body
    - e. Drinking water problem
    - f. Population growth
    - g. Sustaining our culture.
- All the above topics are to be discussed with respect to environment and quality of life.
12. "We want to imitate Western culture". Discuss with respect to the impact of Western culture and mass media.
  13. How do films (different types) affect the quality of life ?
  14. "Education in primary classes should be in mother tongue, otherwise the quality of life is affected". How ? Discuss.

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ANNEXURE-I

LIST OF PARTICIPANTS

Workshop On Environmental Orientation to School Education of all subjects from Classes I to VII related to environmental components held from 1st to 10th December, 1995 at Regional Institute of Education, Mysore-570 005.

1. P.K. Ibrahim Kutty  
Lecturer, DIET  
Malappuram, Kerala
2. C.N.V. Ramana Prasad  
Head Master, MPUP School  
Siddipuram-Nellore, Andhra Pradesh
3. S. Sivakumar  
Lecturer, DIET  
Machuvadi-Pudukkotal, Tamil Nadu
4. V. Sugumar  
Lecturer, DIET  
Aduthurai, Thanjavur, Tamil Nadu
5. T.K. Venkataramulu  
Assistant Teacher  
Government Model Basic High School  
Mahbubunara, Andhra Pradesh
6. K. Panduranga Swamy  
Lecturer, DIET  
Kurnool, Andhra Pradesh
7. D. Sambaiah  
Senior Lecturer, DIET  
Kareemnagar, Andhra Pradesh
8. J. Charles William  
Senior Lecturer, DIET  
Namahhal, Andhra Pradesh
9. V. Ramalinga  
Sec. Gr. Teacher  
Government Boys School  
Pondicherry, Tamil Nadu

10. R. Loganathan  
Lecturer, DIET  
Chengal, Tamil Nadu
11. R. Arumagum  
Assistant Professor, DIET  
DPT, Campus, Chennai
12. R. Pushpalatha  
Senior Lecturer, DIET  
Angaluru, Tamil Nadu
13. D. Gopalakrishna  
Professor in Biology  
SCERT, Hyderabad, Andhra Pradesh
14. T. Komalakumari  
Senior Lecturer, DIET  
Chengannur, Kerala
15. S.K. Prabha  
Lecturer, DIET  
Bangalore, Karnataka
16. K.K. Chandini  
Lecturer, DIET  
Kannur, Kerala
17. R.V. .Kunhiranan  
Lecturer, DIET  
Kasargud, Karnataka
18. T.R. Janardanan  
Lecturer, DIET  
Palakkad, Kerala
19. M. Abutty  
Lecturer, DIET  
Palakkad, Kerala
20. V.N. Shaji  
Lecturer, DIET  
Idukki, Kerala
21. P. Sivadasan  
Lecturer, DIET  
Malapparam, Kerala
22. V. Parmeswaran  
Lecturer, DIET  
Malappuram, Kerala

23. K.S. Devaraju  
Senior Lecturer, DIET  
Kulige, Karnataka
24. V. Ramalingam  
Teacher, Government Boys School  
Pondicherry, Union Territory
26. Hasan Mohiddin  
Lecturer, DIET  
Raichur, Karnataka
27. R. Pushpalatha  
Senior Lecturer, DIET  
Angaluru, Andhra Pradesh
28. A.G. Kulkarni  
Lecturer, DIET  
Bidar, Karnataka

**ANNEXURE-II**

**LIST OF RESOURCE PERSONS**

1. Dr. J.S. Gill  
Reader, DESM (NCERT)  
New Delhi
2. Dr. S. Joshi  
Reader, DESM (NCERT)  
New Delhi
3. Dr. Sabita P. Patnaik  
Lecturer, RIE  
Mysore
4. Dr. Geetha G. Nair  
Lecturer, RIE  
Mysore
5. Dr. B.S. Shankar Narayana  
Retd. Prof. of Education  
Mysore
6. Dr. U.S. Madhyastha  
Retd. Field Advisor  
RIE, Mysore
7. Ms. Manjula Saxena  
P.G.T., DMS (Biology)  
RIE, Mysore
8. Dr. M.Z. Siddiqui  
(Academic Coordinator)  
Reader, RIE, Mysore

ANNEXURE-III

LIST OF EDITORS

Workshop to Edit the Final Draft of Training Modules on Environmental Orientation to School Education held from 17th to 21st June 1996 at Regional Institute of Education, Mysore-570 006.

1. Dr. K. Krishnan  
Senior Environmental Education Officer  
CPR Environmental Education Centre  
Chennai
2. Dr. B.S. Shankara Narayana  
Retd. Prof. of Education  
Saraswathipuram, Mysore
3. Dr. U.S. Madhyastha  
Retd. Field Advisor  
Sidharthanagar, Mysore
4. Dr. Geetha G. Nair  
Lecturer in Botany  
RIE, Mysore
5. Ms. Manjula Saxena  
P.G.T. (Biology)  
RIE, Mysore
6. Dr. J.G. Gill  
Prof. Sc. Edn.  
RIE, Mysore
7. Dr. G.V. Gopal  
Lecturer in Botany  
RIE, Mysore
8. Dr. Sudha V. Rao  
Reader in Education  
RIE, Mysore
9. Dr. Manjula P. Rao  
Lecturer in Education  
RIE, Mysore
10. Dr. M.Z. Siddiqui  
(Academic Coordinator)  
Reader, RIE, Mysore