

## Projects and Activities

In addition to this class-room teaching emphasising a systems perspective, the students should engage in first hand investigation in the form of projects. To permit students to undertake an in-depth study, it is proposed that the students undertake a single environment oriented project over the two-year period of Classes XI and XII. This project, to be internally evaluated, should carry substantial marks, such as 25 or 50; and these marks should be indicated on the marks card. Apart from submission of the project to the school in written form, attempts should be made to upload these projects, along with names of students and teachers involved and the marks given, on a website. Many schools now have their own websites and these could serve as vehicles for building up our knowledge resources on environment. Additionally, special portals may be developed to facilitate access to such material. Such public exposure would promote higher quality of projects as well as more effective evaluation. In the long run, the data so uploaded should be pooled together to create a public, transparent database on India's environment, which would become an important resource for creating environmental awareness, as well as to promote further projects involving an in-depth analysis of the data.

The student projects may include one or more of the following components (a) primary collection of data, (b) analysis of secondary data, and (c) mathematical modelling. The students should have the option of undertaking either individual or group projects. The group projects may involve institutional level activities such as recycling of waste paper or water conservation. They should be encouraged to devise projects that would involve collaboration across different subjects such as biology and mathematics, or better still build bridges between social and natural sciences. The projects could even involve collaboration between students from different schools.

We list below a series of exemplar projects that are appropriate to students with a diversity of interests ranging over mathematics, natural sciences, social sciences, humanities, and arts. The students can choose any project of their interest irrespective of their subjects of study. Of course, teachers and students may plan and design projects and activities appropriate to the

local situations, available resources, and environmental issues of concern.

## List of Exemplar Project

The student projects may involve primary collection of data, analysis of secondary data, and/or mathematical modelling. These projects should enable students not only to go in depth into some specific issue, but also to better appreciate the overall context in a holistic perspective. Thus, a project may involve (a) collection of primary data on underground water table, rock types, and densities of bore wells, (b) collation of this data to reveal spatial — temporal patterns, and (c) relating this information to hydrological models to generate new knowledge. However, in addition to undertaking a specific project, such as on lowering of underground water table, the students should be strongly encouraged to situate the specific investigation in the context of the broader systems perspective. For instance, the level of underground water table may be influenced by growth of urban settlements, by policies such as free supply of electricity for irrigation pump sets, by technologies permitting lifting of water table from great depths, by destruction of natural vegetation impacting percolation to ground water, and so on. Thus, projects should serve not only to generate some in depth understanding of specific issues, but also to better appreciate the overall context in a holistic perspective.

Almost all project suggested can be used to generate data for the region/state/India therefore, wherever possible the projects done in the students' locality can be pooled to generate data for the whole district/city. If possible such data can be further pooled to generate data for the state/country.

The projects and activities given below are only suggestive and not prescriptive. The transaction module for environmental education for higher secondary stage gives full details of all aspects of this syllabus.

# Projects

## 1. People and Environment

### 1.1 Humans as an Integral Part of Environment

- 1.1.1 Interdependence of humans and their environment make an inventory of all the food, clothing, energy, air, water and other material resources (such as ingredients of buildings, household goods, transport vehicles), as well as non-material resources (such as open spaces, parks, entertainment obtained from television, movie, sports and other outdoor activities) utilised by people of the study locality.

Find out which all localities, near and far, serve as sources of these resources, the biological species and ecosystems that contribute to these resources, how human use of these resources impact them. Assess how far it would be possible to sustain lives of people of your locality without these components. What happens if plants disappear, birds vanish, soil erodes?

### 1.2 Growth in Human Numbers over Historical Times

- 1.2.1 Study of changes in population patterns and their impact on natural resources

Find out how the place where you live now was classified earlier (village, town, city)? What was the population then and now? Is this town or city an ancient, medieval, or modern town? Explore the history of the place; speak to elders of your locality. Explore the changes in its land use, water bodies, and forest.

### 1.3 Migrations of People

- 1.3.1 Study of migrants and their impact on the environment

Collect information on number, sex, age of family members (including domestic workers, and service providers such as vegetable and fruit sellers, etc.) in your locality. Find out the place of origin of the men and women in each family, the reasons for migration. Were they attracted by high levels of some natural resources of their destination? Did they leave because of natural resource degradation in their original place? Analyse the data to see their impacts on the local environment.

### 1.3.2 Colonisation of Andaman and Nicobar Islands

Reconstruct the history of colonisation of some of the Andaman and Nicobar Islands from interviews of old inhabitants and trace the course of environmental changes. Did this colonisation involve some degradation of environment and adverse impact on the original inhabitants that could have been avoided?

## 1.4 Dispersion of Human Populations

### 1.4.1 Study of topography and making maps of the region.

Compare maps for the town/city, including air photos and satellite imagery where available, from the earliest to the latest available. What are the changes—in water bodies, in land use, etc.? What could be the reasons for the changes? Identify commercial areas, residential areas, recreational areas, slums, industrial areas. Do distinct patterns emerge? (e.g., location of slums in low-lying areas). What could be the reasons?

## 1.5 Rural and Urban Settlements

### 1.5.1 Correlation between population and water use pattern

Find out the correlation between population, economic status and water use pattern in your locality by collecting data.

#### 1.5.2 Assessment of alternative building material

Study the use of various building materials, e.g., thatched, bamboo, mud, stone, reinforced cement concrete (RCC), brick/mortar, aluminium steel and glass. Try to find out the impact of these materials on the environment.

#### 1.5.3 Documentation of local biodiversity.

Study bats, birds, snakes, lizards, amphibians, mammals by looking into their nesting and roosting locations, types of preferred trees, buildings, sites etc.

#### 1.5.4 Influence of architecture on wildlife

Study the nesting places for birds or rock bees as a result of architectural features, overhangs and niches.

#### 1.5.5 Study of the change in architecture on bird life

Study the changes in the building architecture and the nesting places of birds. Find out the impact of the changes in the architectural features on the nesting habits of birds.

## 1.6 Environment and Health

#### 1.6.1 Study of natural drainage patterns in your locality with respect to flooding.

Study how the obstruction or alteration of the natural drainage patterns in urban areas leads to inundation and creates conditions for epidemics. Observe where flooding happens, assess where the water came from, and what were the changes



that caused this, such as paving, filling of ponds, reclamation of low-lying areas for real estate, etc. Collect information from local health authorities on the cases of various epidemics and see whether there is any correspondence between the two.

#### 1.6.2 Study of different herbs and shrubs used in treating the diseases of cattle

Interview the local veterinary doctor/traditional healer and record the type of cattle disease that are prevalent in the locality and the type of medicines that are used to treat the disease.

#### 1.6.3 Drugs and decline of vultures

Interview the local veterinary doctors, dairy proprietors and cattle owners, NGOs and individuals in your locality and find out the drugs that are used to treat various diseases in the cattle. Find out if there is a decline in the numbers of scavenging birds, particularly vultures in the locality and outside. Is there a relationship between the drugs administered to the cattle and the number of vultures? Find out the drug, which is responsible for the decline of vultures.

#### 1.6.4 Study of environmental degradation on the health of people

Interview women/men, doctors/health workers in your locality and find out the types of diseases (age and sex wise), the frequency of their occurrence. Relate this data with that of environmental quality of water and air (pollution in particular). Also, relate this information with that of work pattern (cooking, washing, harvesting, etc.) of both women and men.

## 1.7 Gender and Environment

- 1.7.1 Study the roles of men and women in crop production  
Find out the type of work done by women and men in the crop production and the duration, starting from the land preparation to marketing of crops. What is the type of technology used in each of the crop production process?
- 1.7.2 Study the perceptions of women and men with reference to the trees  
Find out the trees species which women and men prefer and the reasons for it.
- 1.7.3 Study the harvest pattern of Non Timber Forest Produce (NTFP) by women and men  
Find out the types and the quantity of NTFPs harvested by women and men, methods of harvesting and the end use. In which seasons do they harvest?

## 2. Institutions (Social, Economic, Political, Legal, Cultural) and Environment

### 2.1 Evolution of Technology, Social, Economic and Political Organisation and Growing Resource Demands

- 2.1.1 Study of influence of media on learning environmentally conscious behaviour  
Examine a set of randomly selected television advertisements on three different channels of your choice. Analyse the messages that are being communicated. How does this relate to promotion of consumerism, conspicuous consumption versus environmental conservation. Interview as many friends and relatives as you can, and ask them the same question. How do all these media mould your behaviour?

- 2.1.2 Study the trend in the use of natural/ synthetic fibres in your locality.

Prepare a folio of the various types of natural and synthetic fibres and fabrics used in your locality by collecting materials from the local garment shops and tailors. From various sources of information including the Internet, find out when a particular fibre/fabric first came into use. Trace the history of these fibre/fabrics and study how their usage has changed over time and highlight their impact on the environment.

## 2.2 Impact of Economic Growth on Environment

- 2.2.1 Study of the impacts in terms of benefits and losses for any developmental project in your area.

Choose any developmental project in your area (e.g., projects related to roads, power, irrigation, watershed, social forestry etc.); study the economic, social and environmental dimensions of the project.

- 2.2.2 Study the impact of the implementation of any component of 5 year plan for your State.

Review the 5 year plan of any one sector (e.g., forest, water, health, sanitation, ecotourism, etc.) of the State. Study the implications from economic, environmental, and societal points of view.

- 2.2.3 Study the impact of on tourism and environment

Visit any region/area of tourism (health tourism, sports tourism, ecotourism, pilgrimage) and analyse the impacts on environment using appropriate data and methods of analysis.



#### 2.2.4 Computerised Database Management and public amenities

Select a few public amenities and Civic Bodies who have got external fund support for any environmental project. Study and analyse the current accounting pattern. Prepare a dummy account for the development activity and study its impact on environment

### 2.3 Inequitable Economic Growth, Poverty and Environment

#### 2.3.1 Study of Poverty reduction programmes of the country and their success.

List various poverty reduction programmes of the country, document the salient features. Select the programmes that were implemented in your region /state and analyse each programme in terms of its environmental implications. How can these programmes perform better in terms of their environmental impacts?

#### 2.3.2 Study of pattern of subsidy on any natural resource and its impact on the environment

Study the pattern of subsidy on any natural resource, such as urban water supply, or supply of pesticides to farmers, in your region/state with special reference to your locality and analyse the impact on environment.

#### 2.3.3 Study of equity and natural resource use

Study how one may move towards an equitable distribution of available natural resources. Consider different communities in your area and analyse them for different modes, levels and ethics of resources use. Try to evolve a mechanism by which you feel, balanced and equitable distribution of available natural resources can be achieved.

## 2.4 India as a Country Where many Different Modes of Resource use Co-exist

### 2.4.1 Study of livelihood strategies of different communities

Study the livelihood strategies of a cross-section of people from the poorest and least educated to wealthiest and most highly educated in your locality and analyse how they relate to the local base of natural resources.

### 2.4.2 Study of the attributes of members of different eco-resource user groups:

Assign people of your locality to different eco-resource user groups on the basis of their relationship with different natural resources. Compare input from the representatives of different groups with respect to attributes such as number of life forms known to them, levels of use of water, levels of use of different ecological habitats, levels of use of different bio-resources for various purposes like cooking, house construction, medicines, and religious observances.

## 2.5 Open Access, community controlled, Private and State Management of Resources

### 2.5.1 Study of common property resources and values of people across various stages of life.

Visit any open, environmentally satisfying place of your choice (park, lake, hill top) for at least two weeks, devote a few hours at a particular time of the day to observe the comings and goings of people in the area. Interview them to find their ages, sex, means of livelihood activity and the psychological need that the place seems to satisfy for them.

2.5.2 Study of importance of common property resource.

Organise debates on topics like “Village, forests/ grazing lands are important to protect as a Common Property Resource”. Analyse the different views and draw conclusions.

2.5.3 Study of impact of under priced/free environmental goods on the environment.

Survey your locality and identify under priced or free environmental goods (air, water, fire wood etc.). Analyse consumer pattern and behaviour with respect to these goods.

## 2.6 Evolution of Environmental Concerns in Different Societies over the Course of History

2.6.1 Study of pressure groups in policy making.

Study the role and leverage of various pressure groups (NGOs, Trade Unions, Farmer’s groups, corporate houses, industrial associations–CII, FICCI, etc.) in formulation and implementation of policies of environmental significance at levels local, district, state and central Government.

2.6.2 Study of environmental impact of elections

Study of impact of conducting election on the environment in terms of extra resource consumption, migrant population, etc. by doing case studies, collecting information from media.

2.6.3 Study of the political parties and the green manifesto

Find out the regional and the national parties having manifestoes related to environmental conservation. Analyse how they are being implemented?

#### 2.6.4 Study of the programmes related to environment

Interview Corporate or Panchayat president of your area and find out the type and number of programmes directly related to environment and also the programmes, which have environmental concerns. Analyse how they are being implemented?

#### 2.6.5 Study of initiatives of local-self governments in planning

Choose a village/block, carry out a survey to understand the environmental issues and concerns of the area. Interview concerned elected representatives and administrative personnel to understand how the Panchayati Raj Institutions are implementing measures to protect the environment.

#### 2.6.6 Study of informal institutions/local panchayats on environmental management in your locality

Chose a village/hamlet (including tribal and fishing villages) and find out the informal institutions/local panchayats working for environmental conservation and management. How long have these institutions/ local panchayats been existing? How do these institutions/ local panchayats work?

### 2.7 India's Manifold Traditions of Conservation and Sustainable Use

#### 2.7.1 Study of folksongs related to the environment in your locality

Visit any village of your locality and identify the folk songs: when they are sung and their significance as far as the environment is concerned

#### 2.7.2 Study of the indigenous musical instruments of India



Prepare an inventory of indigenous musical instruments in India, according to geographic region, materials used across geographical regions e.g., Shagun and bamboo from North East, gourds from Bengal, and find out whether there has been a change in the material used and what could be the reasons for this. Analyse the environmental implications of the change in the use of materials.

2.7.3 Study of variety of dance in your locality and the materials used during dances

Some of the dance forms such as the Kathakali, Yakshagana, Chhau, Nukkad-natak use masks. Find out how these are made, what material do they use, what kinds of colours are used – whether the colours are natural or not. Has there been any change in tradition over time. Analyse the environmental implications of the change in the use of colouring materials.

2.7.4 Study of the socio-political and cultural contexts of composition of folk songs of your region

Learn about association of folk songs of your region with nature. Understand the socio-political and cultural contexts of the period when the songs were composed and rendered.

2.7.5 Study of puppetry

For your region find out about types of puppetry and materials used for telling stories relating to environment.

2.7.6 Study of folk culture

Identify traditional poems, folk songs, proverbs in the language of your region conveying environmental associations, knowledge, and wisdom.

### 2.7.7 Study of temple structure from the point of view of environmental influence

Visit a site in your region, which has temple sculpture; understand the choice of material, what influenced the use of this material and the form of the sculptures etc. Was environmental iconography used in these? Is there any conservation effort and what is the process?

### 2.7.8 Study of festivals related to harvesting

Observe rituals and festivals and their significance at the time of tilling, sowing and harvesting; type of food prepared; their ingredients; plants/and their types (grass/flowers/grains/fruits) that are used in these rituals and festivals.

### 2.7.9 Study of village or locality for cultural practices

Identify three communities; write about their 'culture' in terms of what is most evident to you. Explore their food habit, festivals observed, clothes worn, prevalent folklore, etc. Also document tree/plant species available in their houses and find if any pattern emerges.

### 2.7.10 Study of local rituals

Study a local ritual such as the marriage ceremony in your community and document various rituals and ceremonies and their relationship if any with associated natural and domesticated biodiversities of the region.

### 2.7.11 Study of local festivals and their impact on environment

Study a local festival such as Ganesh Chaturthi, Durga Pooja, Ramzan, Christmas, Guruparv, Buddha Purnima

and Mahveer Jayanti, etc., or even a local temple festival. Observe the rituals and their impact on the environment ( Idol immersion in the tank, waste disposal etc.). Plan an environmentally friendly way of dealing with the situation without compromising on the religious principles/belief.

## 2.8 Growth of Environmental Regulation From Nature Worship, Customary Law to Wildlife Act, Forest Conservation Act, Environmental Impact Assessment, Biological Diversity Act, etc.

### 2.8.1 Study of traditional practices of nature conservation

Document the extent of protection extended to different species of trees (e.g., peepal), animals (e.g., monkeys, nilgai or peafowl), or habitats such as sacred groves and river pools on the basis of religious beliefs in your locality.

### 2.8.2 Study of what constitutional principles mean to a common man

Looking around you, try to find out what constitutional principles relating to care of the environment mean to a common man.

### 2.8.3 Study of the Indian constitution with respect to environmental conservation principles

Study the Indian constitution and find out the principles with respect to environment and conservation. Study some of the constitutions of other countries and find out how many of them have environmental conservation principles in their constitution.

### 2.8.4 Study of the Earth Charter

Study the Earth Charter. How many of the principles given in the Earth Charter are implemented in your locality by the local government, NGOs and individuals? How

would you redraft the earth charter if you were asked to do so?

#### 2.8.5 Implications of environment related laws

Collect information from books/other sources including the internet/Visiting State Pollution Control Boards and Effluent Treatment Plants, the various laws related to air, water and soil pollution. Selecting any two fabrics/materials find out the various pollutants produced during their manufacture and production. Correlate the industrial processes with the environment related laws.

#### 2.8.6 Study of Wildlife Act and the implications of this Act

Make a list of the wildlife products (e.g., fur, feather, wool, hide, etc.) used in the fashion industry. Consult the Wildlife Act and see the implications of this Act for these products. Communicate your learning by designing a campaign.

#### 2.8.7 Study of environment and the Right to Information Act

Apply for some environment related information, under the Right to Information Act and document the experience and the outcome.

### 2.9 Tools of Environmental Management, Efficiency of Resource Use, Sustaining Harvests, Pollution Control

#### 2.9.1 Forest working plans and sustainable yields

Examine the working plans of some particular Forest Division in conjunction with annual administrative reports and assess the extent to which the objective of deriving sustainable yields was achieved.



### 2.9.2 Forest based industry project reports

Examine the project reports of some particular Forest based industry and assess the extent to which the objective of conserving the watershed was achieved. Compare the projected with the realised siltation rates.

### 2.9.3 Detailed Project Report (DPR) of river valley projects

Examine the detailed project reports of some particular river valley project and assess the extent to which the objective of conserving the watershed was achieved. Compare the projected with the realised siltation rates.

### 2.9.4 Study of the resource use pattern in an industry in your locality

Choose any industry in your locality (including the small scale and the cottage industries) and find out the product that they manufacture and the rate of production per day. Which are the resources used in the manufacturing process and quantity used per day including type and quantity of energy used ? What technologies are used in the manufacturing process ? How efficient are they ?

### 2.9.5 Study of waste management in an industry

Choose any industry in your locality (including the small scale and the cottage industries) and find out the product that they manufacture and raw materials used. Study the waste (solid and liquid) management system including the reduction of waste.

## 2.10 Concept of Sustainable Development

### 2.10.1 Analysis of Five Year Plans

Analyse the last two Five Year Plans of your state for some selected sector such as water resources or fisheries or any other

sector and assess the extent to which these address the objective of sustainable use and development.

## 2.11 Concept of Sustainable Consumption

### 2.11.1 Economic growth and demands for water, energy

Assess how the per capita demands for water and energy have been changing in your locality from records of electrical and water meters. Is such consumption sustainable?

### 2.11.2 Study of compliance of pollution control measures in industry

In a manufacturing industry in your area, study the amount of natural resources including water consumed and the amount of effluent or solid waste produced. Study the methods of their disposal and find out how far the disposal adheres to the legal provisions in the pollution control act.

## 2.12 International Economic Regimes, Forces of Globalisation

### 2.12.1 Study of impact of globally consumed consumer goods on the environment.

Select any consumer good of a global brand (coca cola, sports shoe, etc.). Compile information on the range of social and environmental issues associated with their production. Analyse the impacts on the environment.

### 2.12.2 Study of globalisation and its impact on biodiversity.

Select case studies on globalisation and its impact on biodiversity, e.g., herbal medicines. Analyse the impacts from the economic and environmental point of view.

## 2.13 International Regimes of Environmental Regulation, Law of Sea, Transboundary Movement of Hazardous Wastes, etc.

### 2.13.1 Study of Carbon credits

Examine an Indian project formulated with the objective of claiming carbon credits as visualised in the Kyoto Protocol.

## 3. Knowledge, Science, Technology and Environment

### 3.1 Growth of Knowledge and Human Colonisation of New Environments

#### 3.1.1 Study of how permanent camps at Siachen glacier are maintained

Find out the technological measures deployed to enable maintenance of permanent camps at the Siachen Glacier, various research laboratories e.g., CFTRI (Mysore), have developed various technologies to support this.

### 3.2 Growth of Knowledge and Use of Newer Resources

#### 3.2.1 Study of the products and services based on traditional knowledge

Make an inventory of products and services based on traditional knowledge, such as herbal home remedies and botanical extracts for crop management, which may have economic value and study the markets. Gather information about these products. How can these be produced, and

value addition, if any, which could be done. Compare these from the sustainable point of view with modern products.

### 3.2.2 Study of technologies in deep sea oil drilling

Reconstruct the history of deployment of modern technologies to use newer resources such as oil from Bombay High and other offshore fields and impact of deep sea oil drilling on environment.

## 3.3 Growth of Knowledge, Control of Diseases and Population Growth

### 3.3.1 Control of malaria and agricultural colonisation

Reconstruct the history of agricultural colonisation on erstwhile endemic malarial areas such as Bastar, Terai, and Wynaad.

## 3.4 Implications of Intellectual Property Rights for Environment

### 3.4.1 Case study related to Intellectual Property Rights

Conduct a series of interviews to assess people's perceptions of Intellectual Property Rights over living organisms, in particular, how this relates to management of neem trees, haldi, basmati etc.

## 3.5 Biotechnology, Agriculture, Health and Environment

### 3.5.1 Case study related to Biodiesel projects

Examine the implications of on-going biodiesel projects such as Jatropha plantations programmes for biodiversity, as



well as availability of fuel, fodder and other biomass resources for local people.

### 3.6 Intellectual Property Rights Over Living Organisms

#### 3.6.1 Study of Convention on Biological Diversity (CBD) and Biological Diversity Act

Examine the provisions of sovereign rights over biodiversity resources for country of origin India's biological diversity act and the on-going process of implementation of the relevant provisions by the National Biodiversity Authority with benefit sharing to indigenous knowledge.

## 4. Human-made Artefacts and Environment

### 4.1 Technological Advances and Ever Accelerating pace of Manufacture of Artefacts

#### 4.1.1 Study of the disposal of mobile phones

Estimate the growth in numbers of mobile phones in use in your city, their obsolescence and practices of disposal. What are the environmental implications?

#### 4.1.2 Study of the disposal of electronic waste in your locality

Choose an industry that produces electronic products or a shopping complex where electronic waste is high. Study the disposal mechanisms such as recovery of metals, reusing discs as reflectors and so on.

## 4.2 Impact of Agriculture, Horticulture, Animal Husbandry, Aquaculture

### 4.2.1 Study of the implication of use of fertilisers and pesticides

Compile data from a large agricultural area on the type, quantity, and frequency of fertilisers and pesticides applied in the fields and make an assessment of their implications for water and soil pollution.

### 4.2.2 Study of role of insects and birds.

Identify and determine role of insect and bird pollinators in and around the school. Document and monitor useful insects such as natural enemies of crop pests, decomposers, scavengers, etc., in cultivated patches around the school.

### 4.2.3 Study of inorganic and organic farming

Compare between inorganic and organic farming done in your neighbourhood from biodiversity and productivity points of view.

### 4.2.4 Study of impact of organic produces.

Gather information on organic produce that are available in your area/region and study the markets and incentives for such produces. Survey consumer awareness regarding these produces and the growth of green consumerism.

## 4.3 Impact of Agrochemicals on Environment

### 4.3.1 Study of the reduction in populations of non-target organisms

Survey the literature to identify which non-target organisms, such as insectivorous

birds and lizards, grainivorous birds and may have declined due to use of pesticides. Interview knowledgeable people and amateur bird-watchers to find out if they report such decline.

## 4.4 Impact of Industry, Mining, Transport

- 4.4.1 Explore an enterprise involving products and services so as to ensure sustainability using life cycle assessment method

Identify a particular enterprise to study the enterprise for products, services and the process. Develop resource-audit of the enterprise to understand inefficiency in resources consumption, if any. Develop a plan to ensure efficient resource consumption including points of improvement.

- 4.4.2 Study of environment friendly products or environment friendly services:

Document case studies of an entrepreneur producing environment friendly products/ providing environmental services or of entrepreneur activity group such as eco-housing construction, organic farming etc.

- 4.4.3 Study of impact of an enterprise on local environment

Identify a particular category of enterprise present locally. Study the benefits (job, availability of products, per capita income) and harm (pollution over consumption etc.), if any, to the locally available resources. Analyse different enterprises in terms of benefits and harm. Link with local Chambers of Commerce and Industry, Asia Productivity Organisation and the Greening the Industry Network to obtain their inputs for such a study.

#### 4.4.4 Study of the impact of mining activity on the local environment

Study the benefits of the mining activity (jobs: gender-wise, products, per capita income, infrastructure) in your locality. Find out the problems (pollution of air, water, deforestation, resource availability for day-to-day survival, health hazards). Compare the benefits and problems and find out if the activity is sustainable over the long term.

#### 4.4.5 Study of the impact of quarrying on the local environment

Study the benefits of quarrying (jobs: gender-wise, products, per capita income, infrastructure) for the local community. Find out the problems (pollution of air, deforestation, resource availability for day-to-day survival, health hazards). Compare the benefits and problems and find out if the activity is sustainable over the long term.

#### 4.4.6 Study of impact of development of an industry on environment

Identify a particular business in an area with a view to find out the impact of the business on the environment, by studying the resource dependency and over consumption and their impact on the immediate environment.

#### 4.4.7 Study of waste generated by a local enterprise (hotel/tourism/production unit)

Visit any local enterprise collect information on types and amounts of waste generated and their disposal.

#### 4.4.8 Study of services with environmental impact and entrepreneurship

Explore the services that have an environmental impact and can also lead to entrepreneurship. Identify a particular



service that has an adverse environmental impact. Study the service. Develop a plan to reduce the environmental impact of the service. (Example: in waste management through reducing, reusing, recycling). Develop a business plan incorporating plans to reduce the bad environmental impacts.

## 4.5 Generation and Provision of Energy, Water and Other Natural Resources

### 4.5.1 Study of air pollution due to thermal power stations

Study the emissions from a thermal power plant and how these affect air quality. How is flyash disposed? Is it being put to uses such as production of bricks?

### 4.5.2 Study of Pumping ground water for urban settlements

How much ground water is being pumped out to support demands of housing societies in your city? Is it leading to a fall in ground water level? If so, at what rate?

### 4.5.3 Study of pumping of water for irrigation

How much ground water is being pumped out to support demands of irrigation in your village? Is it leading to fall in ground water level? If yes, at what rate?

## 4.6 Impact of Synthetic Chemicals

### 4.6.1 Study of various preservation practices used for garments

Find out by interviewing people in the locality, as well as from other sources such as books, Internet etc., the various preservation

practices used for garments made out of various fabrics. Classify preservatives into natural (orange peels, neem leaves, etc.) and synthetic (naphthalene balls) ones. Carry out a survey to find out the frequency of their use. Find out their impact on the environment.

#### 4.6.2 Study of natural dyes used in the cottage textile industry

List various types of natural dyes that are used at household levels in dyeing textiles. List the plants, minerals from which they are derived and discuss the process involved.

#### 4.6.3 Study of environmental impact of fibres

Collect cloth from the local tailor. Choose one synthetic and one natural fabric. Find out the environmental impacts of each these fabrics in terms of choice of raw material/resources used as a source of cultivation/production of the fibres for the fabrics (plant, animal, petroleum, pesticides, etc.); the various chemicals used as part of the production process (energy – electricity, fuels, water, etc.); the various pollutants produced (air, water and soil). Collect data from primary or secondary sources.

### 4.7 Life Cycle Analysis

#### 4.7.1 Life cycle analysis

Undertake life cycle analysis of items, which are used in your household such as a newspaper, consumable articles some transport vehicles, personal computers, cell phones, etc.

## 5. Geosphere (Atmosphere, Hydrosphere, Lithosphere)

### 5.1 Sustainable and Non-Sustainable Use of Renewable and Non-Renewable Natural Resources, Such as Water and Minerals

#### 5.1.1 Comparative study of traditional water harvesting structures with dams

Undertake a study of advantages/disadvantages of traditional water harvesting structures such as irrigation tanks of Mysore plateau, Tamilnadu plains/Rajasthan State etc., compared to larger scale dams.

#### 5.1.2 Study of relevance of long-range meteorological forecasts

Follow newspaper reports, over a period of a few months, on government plans and preparedness in floods due to monsoon at local, state and national levels.

#### 5.1.3 Fluctuation of water table in the locality.

Collect data on the depth of water from a few bore wells around your school. Do this once a week over a continuous period of time. Draw conclusions on reasons for the water level fluctuations, with time.

#### 5.1.4 Study of cloud pattern and rainfall pattern

Observe, sketch, identify and keep a record of different types of clouds during different seasons formed in the area and identify which of these produced rains.

#### 5.1.5 Estimate of annual rainfall in the region

Collect data on rainfall using rain gauge at the school in the monsoon season. Suggest

methods for rain water harvesting. Relate it to per unit area rainfall in the region where the school is located and assess how much rain water may be harvested.

**5.1.6 Study of physical properties of soil and its composition.**

Find the proportions of sand, silt and humus components in different types of soils and determine their physical properties like infiltration rates and densities, try to find if some correlation exists.

**5.1.7 Study the impact of rainfall on water bodies.**

Note the daily rainfall data and water levels of different wells and water bodies in your locality and examine if some correlation exists.

**5.1.8 Study of weather parameters along the coastal area.**

If the school is on the coast make a record of onset time of sea breeze on different days over a period of say 2-6 months. Measure the temperature, relative humidity and wind direction before and after the sea breeze begins. Make a weather chart using these data.

**5.1.9 Establish the flow volume in a stream**

Estimate the velocity of flow of water at a section of a rivulet where the depth is small and is measurable, by timing the movement of a floating object, over a known distance, when there is no appreciable wind. Estimate the average depth at the section by measuring depth at three or four points in the rivulet. With the width compute the area cross-section of flow and calculate the river discharge. Carry out this exercise over three or four different sections and with the

collected data, estimate the average volume of water flowing through the stream over a period of one day and show its variation with time. Plot the variation of flow with time.

Note: (a) This project may be split into a number of components and may be carried out over a period of a few years by different batches of students. (b) As a precaution against accidents, a teacher must always accompany the student-team during visits for data collection.

## 5.2 Changing Patterns of Land Use and Land Cover

### 5.2.1 Impact of industry on local land use

Study of the impact of a business house on local land use

### 5.2.2 Compare erosion patterns

Compare the erosion pattern of local water channels with and without tree cover.

## 5.3 Management of Gaseous, Solid, Liquid and Hazardous Wastes

### 5.3.1 Study of solid waste disposal in your locality

Examine the system of solid waste disposal of your locality. To what extent are biodegradable and non-biodegradable wastes segregated? To what extent are the wastes recycled? Where are the landfills for solid waste disposal? Are there any conflicts with local residents?

### 5.3.2 Study of disposal of biomedical wastes from hospitals

Examine the system of disposal of wastes from health centres/hospitals in your



neighbourhood. How well does it deal with health hazards?

## 5.4 Air, Water (Fresh and Marine), Soil Pollution — Sources and Consequences

### 5.4.1 Study of economic impacts of poor infrastructure facilities

Conduct a survey in a nearby locality with poor water and sanitation infrastructure (for example, a slum, or a village). Find out the number of work days lost because of water-borne diseases (for example, diarrhoea). Convert this into monetary terms (for example, loss of daily wages) and extrapolate to calculate the loss to the district or state.

### 5.4.2 Study of the waste disposal pattern of the Indian railway network

Document waste disposal into the environment by the Indian railway network: types of waste and its disposal and impact on environment.

### 5.4.3 Study of pathogens in mineral water bottles available at railway station, bus station etc.

Test water samples for pathogens of different makes of mineral water bottles at railway stations and bus stands. Compare your data with tap water of the area.

### 5.4.4 Study of impact of fuel use on environment

Collect information on the amount of fuel used (petrol, diesel, wood, kerosene, cooking gas, etc.) in the last one year in your household. Estimate the amount of carbon monoxide and carbon dioxide released to the atmosphere.

### 5.4.5 Study If the school is in a city with chemical industries, visit the industry

and collect information on the amount of resources consumed and the waste products produced during the last one year. How are the different effluents disposed off ?

5.4.6 Study of impact of household chemicals on the environment

List out twenty chemicals and chemical materials that you use in your house. (Soap, cosmetics, phenyl, iodized salt, etc.) Survey and find out their impact on the environment. Devise a programme to create awareness in the locality about the impact of any one of these.

5.4.7 Study of the impact of use of scientific/ engineering goods in day-to-day life on the environment

Identify various scientific/engineering appliances you use for daily use (mixer, water heater, solar cooker, radio, TV, remote control, mobile phone etc.) Select any two and study their impact on the physical and social environment.

5.4.8 Study of impact of different colouring materials on the environment

What are all the colours you come across in day to day life? What impact do the various colouring agents/materials have on the immediate and distant environment?

5.4.9 Study of the impact of fruit juice vendors on the environment

Observe a fruit juice vendor's activity for two hours. List all that impresses you and all that you did not appreciate from the health point of the user. Advise the vendor about environmental impact of the different activities involved.

#### 5.4.10 Study of the relation of pollution at a traffic signal with weather

Choose appropriate variables to see relation between pollution and weather at a traffic signal.

#### 5.4.11 Study of life cycle of certain chemicals

Visit any local automobile service station or machine shop and find out the ways in which different type of lubricants, oils are put to use including their recycling and disposal. Based on this data draw life cycles of such chemicals.

#### 5.4.12 Impact of plastic bags on health of urban/rural cattle

Consult veterinarians of your locality to find out about morbidity and mortality of cattle of your area due to plastic bag and garbage ingestion.

#### 5.4.13 Study of quality of water of your locality

Measure the quality of water in your locality by selecting any definite parameter. Measure this parameter over a period of time and find out the changes in water quality of your locality.

### 5.5 Noise and Radiation Pollution — Sources and Consequences

#### 5.5.1 Study of relation between traffic density and seasons

Choose a parameter such as time taken to travel a definite distance for a defined place at different times of the day and at different seasons of the year. Analyse the data and draw relationship between traffic density (congestion) and extent of noise pollution with time of the day and season of the year.

### 5.5.2 Study of noise pollution at an industrial location

Collect data on sound using a standard sound level meter for 15 days from an industrial location near your school. Compare the observations with information on permissible noise level. Draw conclusions based on your observation.

### 5.5.3 Study of Disposal of radioactive wastes from nuclear plants

Examine the documented system of disposal of radio-active wastes from India's nuclear plants. How well does it deal with potential hazards to human health?

## 5.6 Ozone Layer Depletion and Its Effect

### 5.6.1 System perspective on refrigeration

Explore the linkages of refrigeration to the many different components of the physical-biological-social-economic-political-technological system: consumers who enjoy the benefits of refrigeration, industry involved in production of refrigeration, businesses engaged in distribution and marketing, raw materials and energy that go into refrigeration processes, by-products and solid, liquid, and gaseous wastes generated in manufacture, distribution and use of refrigeration, impacts of the wastes on the biosphere, atmosphere (including the ozone layer), hydrosphere and solid earth, and on energy and material cycles and so on.

## 5.7 Greenhouse Effect; Global Warming and Climatic Change and its Effects

### 5.7.1 Methane production by cattle

Estimate through field measurements the amount of methane produced by cattle



of your locality. Extrapolate this to the country as a whole and assess its role as a greenhouse gas.

## 5.8 Disasters–Natural(Earthquakes,Droughts, Floods, Cyclones, Landslides) and Man-made (Technological and Industrial); Their Impact on the Environment; Prevention, Control and Mitigation

### 5.8.1 Study of Landslides

Map landslide prone areas, note their attributes, and assess the social-economic-political-technological-environmental consequences of the landslides.

### 5.8.2 Study of the impact of natural disasters on the environment

Find out the impact of natural disasters such as earthquake, storms and cyclones, floods, droughts (whichever is applicable to your locality) on the natural resource (forest produce, agricultural produce, aquatic produce such as fish, mollusks) availability, accessibility and use. How does this impact the livelihood of people?

### 5.8.3 Study of the impact of human-made disasters on health

Find out the impact of human-made disasters such as gas leaks, oil leaks, nuclear accidents (whichever is applicable to your locality) on the health of people, plants and animals and environment (soil, water, air).

### 5.8.4 Study of aid/resource management after disaster

If your area suffered any disaster in recent past, analyse the aid management and the resource use efficiency.



## 5.9 Strategies for Reducing Pollution and Improving the Environment

### 5.9.1 Study of CNG fuel for vehicles

Assess the environmental, economic, and social impact of switch from petrol-diesel to CNG for buses, taxis, and autorikshaws.

## 6. Biosphere (Ecosystems and Biological Populations)

### 6.1 Sustainable and Non-sustainable Use of Biological Populations

#### 6.1.1 Study of impact of non-marketed medicinal herb/product.

Devise a method to cost a non-marketed medicinal herb/product (such as tulsi) and analyse the impact of its consumption on the environment.

#### 6.1.2 Study of Non-timber Forest Produce (NTFP) marketing and their impact on environment.

Select five Non-timber Forest Produce such as wild honey, mahua, tendu patta, amla, shikakai that are collected in your locality or nearby locality. Find out the quantity produced (if possible), quantity collected season-wise. Trace the path of these NTFPs from the collection point to the market and economics of it.

#### 6.1.3 Study of the traditional/indigenous practices of NTFP harvesting

Document the traditional practices of NTFP harvesting and its impact on the sustainable production. Also study the traditional system of benefit sharing.

## 6.2 Sustainable Agriculture

### 6.2.1 Use of biological control agents against crop pests and diseases

In consultation with technical experts, identify the most promising biological control agents against common crop pests and diseases of your locality, and methods of their mass multiplication. Organise a programme of the mass multiplication of some of these agents in your school. Release these agents on fields of interested farmers and monitor their efficacy.

### 6.2.2 Study of water harvesting and management in agricultural farms

Study the different types of traditional water harvesting structures in the agriculture farms and their management by collecting information from the farmers/parents or the elders from the village by visiting them if possible.

### 6.2.3 Study of insects in the agricultural field

Observe different types of insects in the agriculture fields of your region, and classify them according to whether they are prey or predators and their association with the food plants. Meet the farmers and agriculture officers and find out how the multi-cropping systems of agriculture serve to reduce the incidence of pests and insects.

### 6.2.4 Study of common weeds

Visit the agricultural field of your region; collect information about the common weeds prevalent there. Collect more information from books, teachers and other sources about the weeds, especially with respect to de-weeding pattern and health hazards. Are some of these weeds used as green leafy vegetables? Organise club or group activities to help in eradication of undesirable weeds.

#### 6.2.5 Study of pollination

Determine the identity of pollinators of common trees, shrubs and herbs, and crops in your area. Investigate their ecology and behaviour.

#### 6.2.6 Study of shifting cultivation

Estimate the area under shifting cultivation in your locality. Select one village and document management practices, crops grown, and its impact on soil erosion and wild biodiversity.

### 6.3 Impact of Genetically Modified Organisms

#### 6.3.1 Study of growing of Bt-cotton

Study the experience of growing of Bt-cotton in your area. Did it lead to much lower use of insecticides, how good were the yields, what were the profit/loss achieved by the farmers?

### 6.4 Deforestation, Over-grazing, Over-fishing

#### 6.4.1 Study of changes in the forest cover

Collect data at certain time intervals on Forest cover of your district, state and India. Organise and analyse this data and find out the qualitative and quantitative changes in the forest cover.

#### 6.4.2 Study of fishing practice of your region

Interview fishermen, preferably those using non-mechanised crafts, on the changing scenario of availability of fish over the years. Identify the causes and consequences of these changes.

## 6.5 Concept and Value of Biodiversity

### 6.5.1 People's perceptions of value of biodiversity

Interview a cross-section of people of your region, following a diversity of livelihood strategies, regarding the value they assign to different elements of biodiversity such as tulsi, banyan, amla, tendu monkey, pigs, tiger and nilgai etc. Interpret the emerging patterns.

## 6.6 Components of Biodiversity—Genes, Species, and Ecosystems

### 6.6.1 Listing of life forms known to people

Make a list of life forms known to people, with their names in both local language, taxonomic categories and size ranges. Study the distribution of this knowledge of life forms in relation to people's livelihood strategies, age, gender, and education. Verify how many of the names they report are recorded in the standard dictionaries of the concerned language.

### 6.6.2 Study of biodiversity during different seasons

Select a nearby agricultural field, observe and document the behaviour and the activities of different insects, birds, snakes and frogs visiting the field during different seasons. Draw a food chain using the record.

### 6.6.3 Study of biodiversity elements in school.

Document and develop inventory of selected biodiversity elements in the school campus or in surrounding areas.

#### 6.6.4 Study of growth of plants

Simulate a simple phenomenon like plant growth by assuming very simple functional relationship of growth and time and compare it with actual growth. Determine dry mass of different components of plants such as roots, stems, leaves, fruits at its different stages for different species and compare. Draw some relationship if possible.

### 6.7 Landscape Ecology

#### 6.7.1 Plotting of tree covers

Using Google Earth images of urban/semi-urban landscapes, plot tree cover and its decline with various land use practices.

#### 6.7.2 Study of local landscape

Make a list of landscape element (LSE) types and sub types occurring in your locality. Prepare a topological, (not necessarily geometric and to scale), participatory map of current landscape and that of ten years ago. Compare these and prepare a matrix of LSE type transformations. Rank LSE types and individual landscape elements in terms of values assigned by people.

### 6.8 India as a Mega Diversity Nation

#### 6.8.1 Richness of India's biodiversity

Compare the number of species found in your locality. From lists of birds compiled by amateur bird watchers with similar lists for some European cities, explore the reasons behind this high level of biodiversity in India.



### 6.8.2 Study of economic impact of home garden

List the number of home gardens in your locality and document plant diversity, the nature and extent of biomass harvested and its contribution in the annual income of the households.

## 6.9 Economic Potential of Biodiversity

### 6.9.1 Study of medicinal plant trade

Compile information on transported out of medicinal plants from forested/rural areas and their import and processing in towns and cities. How many species are involved? How many of these are cultivated, and how many collected from the natural populations? On the basis of interviews of knowledgeable individuals of your locality, record how the availability of various species has changed over time. As far as possible find out end uses of these species.

### 6.9.2 Study of role of forests in livelihood

Document the practice of supply from forest and safety of forests in your locality and examine the role they play in livelihood of the people and conservation of biodiversity.

### 6.9.3 Study of economic impact of bamboo

Document the species of bamboo grown in your locality. List various usages of each of them and estimate the annual income derived by households from various products.

### 6.9.4 Study of the eco-tourism aspects in a natural habitat

List the indicators of a good eco-tourism. Select a wild life sanctuary/bird sanctuary/national park/wetland area/river valley

near your locality. Collect information on the type of tourism that operates there which may include the type of accommodation (concrete structure, local materials), use of facilities (TV, radio), energy use (renewable/non-renewable), awareness and education, conduct of the tourists, benefits to local communities and so on. Find out if the tourism is environmentally friendly based on the indicators of eco-tourism.

## 6.10 Loss of Biodiversity—Threatened, Endangered and Extinct Species

### 6.10.1 Study of rare, endangered and threatened bird species

Obtain lists of rare, endangered and threatened bird species of your area. On the basis of interviews of knowledgeable bird-watchers of your locality, record what is known of changes in the occurrence and abundance of various bird species. Find out the preferred habitats of these species and try to observe at first hand some of the concerned species.

### 6.10.2 Study of rare, endangered and threatened species of medicinal plants

Obtain lists of rare, endangered and threatened medicinal plant species of your region. On the basis of interviews of knowledgeable botanists, and traders and manufacturers of Ayurvedic medicines, find out which of these species are found in your area in the wild, cultivated by farmers or are brought to your area from outside by traders and manufacturers of Ayurvedic medicines into your area. Find out the preferred habitats of the species occurring in the wild and try to observe at first hand some of the concerned species. Try to obtain samples of cultivated and traded species.

## 6.11 Strategies for Conservation of Biodiversity – *in situ* and *Ex situ*

### 6.11.1 Study of the socio-economic and conservation impact of centrally sponsored scheme

Study the socio-economic and conservation impacts of various centrally sponsored plantations undertaken in your locality.

## 6.12 Mitigating the People—Wildlife Conflict

### 6.12.1 Wild pigs—people conflict

Interview a cross-section of people of your village as to the population of wild pigs in their locality, the nuisance they may cause, economic losses suffered, people's perception of the legal provisions against their hunting in the wild life act. Control measures and compensation packages in place, their perception of the efficacy of the current management and their prescriptions as to how these conflicts should be resolved.

### 6.12.2 Monkeys — people conflict

Interview a cross-section of people of your village/city as to the population of monkeys in their locality, the nuisance this may cause, economic losses suffered, control measures in place, their perception of the efficacy of the control measures and their prescriptions as to how these conflicts should be resolved.

### 6.12.3 Stray dogs — people conflict

Interview a cross-section of people of your village/city as to the population of stray dogs in their locality, the nuisance this may cause, current practices of managing stray dogs including sterilisation, their perception of the efficacy of the control measures and

their prescriptions as to how the stray dogs problem be managed.

## 7. Energy, Material, Information Flows

### 7.1 Changing Global Patterns of Energy and Water Consumption—from Ancient to Modern Times

#### 7.1.1 Study of history of energy use for cooking

Interview a cross-section of old inhabitants of your area to reconstruct the history of different forms of energy used for household cooking, their sources and costs over the last 50 or more years. Interpret the changing patterns.

#### 7.1.2 Study of history of water use for irrigation

Interview a cross-section of old inhabitants of your locality to reconstruct the history of different sources of water used for crop irrigation, their availability, and costs over the last 50 or more years. Interpret the changing patterns.

### 7.2 Energy and Water Consumption and Quality of Life

#### 7.2.1 Study of domestic water supply and quality of life

Interview a cross-section of people of your area, including those who do not have a water supply tap in their residence, as to the sources of domestic water used, their availability, and their quality. Compute the time spent of different family members in relation to procurement of domestic water and amount of water consumed by the household. Analyse in terms of age and



gender the relative contribution of different family members in this respect. Interpret the emerging patterns.

#### 7.2.2 Study of domestic cooking practices and quality of life

Interview a cross-section of people of your area as to the sources of energy and the devices employed (mud chula, gas stove, microwave oven, etc.) in cooking at home and how this affects the quality of air in the kitchen and rest of house, the amount of time and energy expended of different members of the household in relation to cooking and the overall quality of life.

#### 7.2.3 Study of indoor air pollution on health of women

Find out the level of carbon dioxide, carbon monoxide and the particulate matter around the cooking area (direct measurement using air samplers or indirectly using the available data) in some of the rural households where firewood is used for cooking activity. Interview cooks (mostly women) of the same households to find out their health status. Relate the two information and draw your conclusion.

#### 7.2.4 Assessment of expenditure on energy consumption with the help of monthly tariff

Select any institution or office premise (with a monthly electricity consumption more than 2000 units). Analyse electricity bills of the last 24 month and prepare a comparative statement. Prepare a combined graph. Draw conclusions in terms of rising need from the point of view of impact on the environment. Select premises with varying amenities (at least five). Prepare a computer database about the water usage, energy usage, use of appliances and infrastructure improvement in the last five years. Prepare an annual and



monthly expenditure on water energy and infrastructure maintenance. Based on this draw conclusion from the point of view of impact in the environment.

### 7.3 Rising Demand for Energy and Water, Gap Between Demand and Supply (Indian Context)

#### 7.3.1 Study of History of power cuts

Interview a cross-section of people of your area as to the history of availability of electric power for various purposes (domestic lighting, crop irrigation, industrial production) and the extent power cuts imposed and their impact on quality of life as well as economic productivity. How do people respond to power cuts, e.g., by installing diesel gensets, and what are the environmental consequences?

### 7.4 Conventional and Non-conventional Energy Sources—Potential (Indian Context) and Limitations of Each Source, Methods of Harnessing and Environmental Consequences of Their Use With Special Reference to the Indian Context

#### 7.4.1 Study of impact of a hydroelectric station

If the school is near a hydroelectric station, Visit the station, collect information on resources consumed and amount of electricity produced, the rate of sedimentation during the year etc. Try to estimate how long will the dam last before filled with sediments?

#### 7.4.2 Study of cost of using solar heater

Analyse whether it is economical to use solar heaters, and estimate the payback time, by calculating the initial cost, interest

if any, depreciation of the unit, versus cost of electricity saved.

## 7.5 Energy Conservation—Efficiency in Production, Transportation and Utilisation of Energy

### 7.5.1 To measure the fuel efficiency of different wood burning stoves for cooking.

Measure the fuel efficiency of different wood burning stoves used for cooking. Stoves may include traditional and improved designs such as that of Swosthee, Astra Stove, Sarala Stove (IISc, Bangalore), Nada Stove (Haryana), Priagni ( CPRI), MNES of Govt. of India.

### 7.5.2 Study of energy efficient lamps

Measure the energy use efficiency of different lighting devices in house holds, institutions, industrial units. Interview a cross-section of people using electricity for lighting as to why they use lights of a particular design, and merits/ demerits of the more energy-efficient versions.

## 7.6 Planning and Management of Energy; Future Sources of Energy – Hydrogen, Alcohol, Fuel Cells

### 7.6.1 History of fuel use efficiency of automobiles

On the basis of records available with car manufacturers/workshops/experts document the improvement in kilometres per liter of petroleum consumed by different makes of cars over an extended passage of time. Analyse how the improvements have been achieved and what further improvements are likely over the next decade.

## 7.7 Enhancing Efficiency of Devices and Optimising Energy Utilisation

### 7.7.1 Study of Public versus private transport

Assess the number of person-kilometres covered per day by the population of your area. What are the modes of transport currently used and the energy consumed. Develop alternative scenarios of totally private, totally public, or a mix of private and public transport and their social, economic, technological and environmental implications.

### 7.7.2 Bicycles

Assess the number of person-kilometres covered per day by the population of your village/city. Construct a scenario where the only modes of permissible transport would be either on foot, or by bicycles. Work out the social, economic, technological, and environmental implications of such a scenario.

## 7.8 Modern Information Communication Technology Revolution and the Environment

### 7.8.1 Computers and environment

What are the environmental consequences of enterprises engaged in scavenging usable components from imported obsolescent computers?

### 7.8.2 Web based databases on Indian environment

Review the current status of web-base databases on Indian environment. How good is the quality of the data available? What are the major gaps? How may the gaps be filled?

## Notes

