# ENVIRONMENTAL EDUCATION (533)

**Aims:**

**The learner**

- To develop an in-depth understanding of various environmental issues and concerns of national and global importance.
- To develop a balanced view of the relationship between environment and development.
- To understand basic concepts related to sustainable development vis-à-vis improvement of quality of life.
- To develop a deeper concern for the environment and a sense of commitment andresponsibility to take proactive action.
- To appreciate the variety in living organisms and recognize India as a mega- diversity nation.
- To appreciate the role of the individual, community, national and international agencies in resolving environmental problems.
- To practice ways of bringing about qualitative improvement in the environment by assuming leadership role.
- To identify self with one's environment with an attitude to personally contribute towards its improvement.
- To respect customs and traditions related to local conservation practices and accept indigenous eco-friendly technologies.
- To develop skills to undertake and participate in investigative studies on various environmental issues; and
- To motivate others and participate in social and community activities in dealing with environmental problems.

## CLASS XII

*There will be two papers in the subject:*

***Paper I:*** *Theory – 3 hours …70 marks*

***Paper II:*** *Practical/Project Work – … 30 marks*

### PAPER I - THEORY

*There will be one paper of three hours duration carrying 70 marks.*

*The paper will have two Sections:*

***Section A*** *(Compulsory) will contain short answer questions covering the entire syllabus.*

***Section B*** *will consist of questions, which will require detailed answers. There will be a choice of questions in this section.*

**1. Biodiversity**

(i) Concept and value of biodiversity.

*Understanding the concept of biodiversity. To appreciate various reasons for valuing and conserving biodiversity (ethical, moral, economic, aesthetic).*

(ii) Types of biodiversity - species, eco and genetic.

*Understanding each of the above with a few examples of each type.*

(iii) Balance in nature.

*Understanding the criticality of maintaining balance in nature and the consequences of interfering with natural cycles; study of an example where the balance was disturbed due to human interference, e.g. trawling and its impact on marine ecosystems. The self sustaining quality of undisturbed ecosystems.*

(iv) Biodiversity for sustenance of mankind.

*The various roles played by biodiversity in sustaining mankind - as a source of food, medicine, pollution control.*

(v) Resource limitations.

*What are the various factors that are responsible for limiting the resource availability /consumption.*

(vi) Ecological role of biodiversity.

*Understanding that each and every species plays a unique role in the functioning of an ecosystem, the concept of ecological niche (producers, consumers in the food chain and food web).*

(vii) Interdependence between different species.

*A basic understanding of different kinds of relationships – predation, competition, symbiosis, mutualism, commensalism, parasitism.*

(viii) India as a mega diversity nation.

*Appreciating that India with its varied climate and landscape is home to a variety of unique ecosystems and endemic species e.g. thelargest mangrove forest in the world - theSundarbans, vast mountain forests in the Himalayas, tropical evergreen forests in the western ghats and the north east region, desert vegetation in Rajasthan, thorn and scrub forests in the plateaus, etc.*

(ix) Economic potential of biodiversity.

*Evaluating the economic potential of biodiversity from several view points such as food, medicine, clean air, water, etc.*

(x) Loss of biodiversity - threatened, endangered and extinct species.

*Understanding the implications of loss of biodiversity.*

*Categorizing species in different groups like - threatened, endangered and extinct. Examples of plants and animals.*

(xi) Strategies for conservation of biodiversity - insitu and exsitu.

*Looking at various in-situ and ex-situ strategies for their efficacy and viability. In-situ - protected areas (biosphere reserves, national parks, wildlife sanctuaries).*
*Ex-situ - captive breeding, zoo, botanical garden, gene banks.*

(xii) Mitigating people- wild life conflict.

*Evolving strategies to mitigate people-wildlife conflict, especially for the communities staying close to forests or even within forests - fences or trenches around communities, building waterholes within forests, providing food for animals during times of drought to prevent them from straying outside the forest areas, maintaining a buffer zone between forest and human habitation, preventing human encroachment into forests. Preventing poaching by creating or increasing livelihood opportunities, involving local people in conservation by providing suitable incentives.*

**2. Environmental Management**

(i) Need for environmental management vis-à-vis development.

*Understanding that from the development point of view, environment may mistakenly be seen as a 'resource' to be exploited, whereas, environment needs to be viewed as a 'capital' that needs to be managed carefully.*

(ii) Aspects of environmental management - ethical, economic, technological and social.

*Understanding different aspects of environmental management as mentioned above.*

*Ethical - e.g. ensuring inter and intra generational equity, gender equity, etc.*

*Economic - e.g. Extended Producer Responsibility [EPR] taken up by companies in several countries - the producer of a product takes responsibility for the productafter its life is over e.g. battery companies taking back batteries after its life.*

*Technological - developing technologies that do not harm the environment - alternate technology products like solar cooker, solar car, biogas, etc.*

*Social - processes and policies that ensure social equity - use of commons and forests, urban land use, equitable representation and participation in local governing bodies.*

(iii) Legal provisions for environmental management.

*Understanding the role of legal provisions like – The Environment Impact Assessment [EIA] Notification; The Hazardous Waste (Management and Handling) Rules (1989), The Hazardous Bio-medical Waste (Management and Handling) Rules (1998), the Recycled Plastic Manufacture and Usage Rules (1999), The Ozone Depleting Substances (Regulations) Rules 2000. Ecomark scheme, Bharat standard for vehicular emissions.*

*Students are expected to be aware of existence of these Rules and the role they play in environmental management. They are not required to go into details of the Rules.*

(iv) Approaches for environmental management - economic policies, environmental indicators, setting of standards, information exchange and surveillance.

*Emphasis on ENVIS, ISO14000 and Environmental Indicators. Economic policies implemented by the government of India such as, penalties and subsidies.*

**3. Sustainable Development**

(i) Concept of sustainable development.

*Understanding the concept of sustainable development.*

(ii) Concept of sustainable consumption.

*Understanding the concept of sustainable consumption.*

(iii) Need for sustainable development for improving quality of life for the present and future.

*Developing an understanding of the need for sustainable development - looking at the deteriorating quality of air, water, food over time, developing an appreciation to sustain at least what exists for the generations to come.*

(iv) Challenges for sustainable development - social, political and economic considerations.

*Listing and understanding the challenges in each of the areas mentioned above, e.g. social - having to overcome resistance among people in the society to bring about changes in lifestyle (that will be needed for sustainable development to happen); political - to convince the Government to take hard unpopular decisions; economic - need for a change in economic viewpoint in order to implement sustainable development.*

(v) Support base for sustainable development - political and administrative will, dynamic and flexible policies, appropriate technologies, comprehensive review and revision mechanism, humane approach.

*Understanding the need for a support base. Study a few noteworthy examples of sustainable development e.g.- BarefootCollege in Tilonia, the work of NGOs like DDS in Andhra Pradesh in promoting self-sustenance in rural communities through developing seed banks, cultivation of millets and through promoting microfinance in theGrameen bank model.*

(vi) Developing skilled manpower.

*Understanding that there is a need for skilled manpower in the fields of agriculture and industry in order to carry out sustainable development.*

(vii) Role of individual and community.

*Self explanatory. An example from the local community to be studied along with an inspiring story from across the country.* ***(only for the purpose of discussion and not for testing).***

(viii) Role of national and international agencies. (both governmental and non-governmental).

*Understanding the role of agencies in creating awareness, framing policies, implementing laws and mobilising people.*

**4. Sustainable Agriculture**

(i) Need for sustainable agriculture.

*Understanding that modern agriculture is causing increasing amounts of land to be desertified, through the need to produce ever increasing quantities of food to feed the growing population.*

*To understand that on the one hand the demand for food is increasing due to population growth and on the other hand the land available is decreasing due to the impact of modern chemical farming.*

(ii) Green revolution - impact on environment.

*Introduction to Green revolution - Development of High Yielding Varieties (HYV); introduction of fertilizers and pesticides; consequences of using fertilizers; consequences of using pesticides on population of living organisms;contamination of soil, water, food, impact on human health; long term effects - increased incidence of cancer, malfunctioning of endocrine system, etc. Study of the impact of DDT.*

(iii) Importance of soil for crops.

*Role of soil biota in maintaining health ofsoil.*

(iv) Irrigation systems, use of manure and fertilizers.

*The role of irrigation in traditional agriculture. Traditional irrigation systems (micro, indigenous systems) vs. modern systems like large dams with their vast canal systems. Advantages of such macro systems, (like larger areas of cultivation) and disadvantages (like water logging).*

(v) Crop protection - measures for control of pests– agrochemicals.

*Study of a few traditional methods of pest deterrence vis a vis modern methods of pest control - viability of traditional methods in today's scenario and limitations and dangers of modern methods.*

*Role of agrochemicals in increasing food production.*

(vi) Impact of agrochemicals on environment.

*Study of a few commonly used agrochemicals and their impact on soil, water and air.*

(vii) Elements of sustainable agriculture -mixed farming, mixed cropping, crop rotation, biological and economic consideration, use of

bio-fertilizers and bio-pesticides, biological pest control, integrated pest management.

*Self-explanatory.*

(viii) Application of biotechnology in crop improvement.

*The scope biotechnology offers in developing favourable traits in crops, like pest resistance, drought resistance, salinity resistance.*

(ix) Management of agricultural produce - storage, preservation, transportation and processing.

*Understanding the dynamic of movement of agricultural goods from producers to consumers - understanding that tremendous amount of grain is lost to rats and spoilage due to poor storage facilities; food processing increasingly seen as a favourable option as it has a larger shelf life and brings about more revenue.*

## PAPER II – PRACTICAL/PROJECT WORK

### Classes XI and XII

The practical/project work carrying 30 marks needs to be undertaken under the guidance of the teacher. The project will be evaluated by a Visiting Examiner (who has specific expertise in the content of the projectwork) appointed locally and approved by the Council.(For Class XI, Project Work may be evaluated by the teacher).

### Exemplar Projects and Activities

It is expected that the students will undertake at least two projects or activities in each year, one of which should be undertaken individually and prepare a report in each case. Projects and activities may be planned and designed depending upon the local situations, available resources and environmental issues of concern. The projects and activities given below are only suggestive and not prescriptive.

1. To study the changes that have taken place in a given land area of a city/village/locality/market during the last five years in respect of at least five parameters like number of houses, residents and families, food habits, number of household goods in a family, consumption of water, electricity and fuels including that for personal vehicles by a family, sources of noise (public address systems being used, television, radio and vehicles on the road), common facilities like number of schools, hospitals, shops, theatres, public convenience, public utilities, public transport; number of' factories, industries and/or the facilities for, production and processing of goods, loss of water bodies, types and quantity of wastes, their disposal and treatment facilities with a view to discussing the patterns of changes and impact on the environment and quality of life. A specific project on these aspects may be:

- To study the changes that have taken place in a given land area during last five years in respect of number of houses, residents and families and prepare a report on their effects on civic amenities like availability of water, electricity and fuels; drainage-system, disposal of wastes including night soil.

2. To study the environmental profile of a town/locality/village in respect of population density, green cover, educational level ofresidents, social problems and sources of pollutionand their effect on air, water and soil.

3. Improvise two models of greenhouses of same dimensions made from low cost / no cost materials. Place them in open under identical conditions and put some potted plants in one of them. Note the temperature inside and outside both the greenhouses every two hours from dawn to dusk for two weeks. Explain the reasons for the differences in temperature, if any, between thetwo green houses.

4. Collect data on monthly consumption of electricity and fuels from at least five families, any two commercial establishments and for publicutilities in a given locality. Plan strategies to educate consumers to economize the consumption of electricity and fuel by reducing their over use, misuse and improper use.

5. To study for a period of one month the status of sanitary conditions and methods of waste disposal of a given locality vis-à-vis the role of Panchayat, Municipality or Corporation and prepare an action plan to make the conditions more environment friendly.

6. To investigate impact of an industry or a large manufacturing unit on local environment. The parameters could be land use, ratio of coveredarea and open space, raw materials used for production, inputs like electricity, water or any

other, types of waste generated and modes of waste disposal, use of environment friendly and efficient technology, types of pollutants emitted or discharged, average health status of the employees and residents in the area.

7. To study the impact of changes in agricultural practices or animal husbandry including poultry, piggery, fishery, apiculture over a period of time in a given locality or village on local environment. The components for analysis may include: types of crops, land area under cultivation, mechanization, use of electricity, mode of irrigation and agrochemicals, agro-wastes and their disposal, types of breeds and animal feed, types of shelter and health care, methods of preservation and processing of products, animal wastes and their disposal. Suggest an action plan to modify the prevailing practices so as to make them environment friendly and sustainable.

8. Collect samples of water from different sources and study their physical characteristics like turbidity, colour, odour; measure of pH, nature of suspended and dissolved impurities and pollutants, presence of toxic materials by testing presence of mercury, lead, arsenic, fluorine and presence of living organisms. Test the presence of toxic materials and living organisms with the help of local laboratory or institution may be taken, if available. Identify the most polluted sample ofwater and locate the sources of its pollution. Devise an action plan to mobilize public opinion for checking the pollution.

9. To study the practices followed in the region for storage, preservation, transportation and processing of perishable or nonperishable farm products and to assess the extent of wastage due to faulty practices.

10. To study the status of an endangered species listed for the region by collecting information through different sources and observation, if possible and to assess the reasons for its diminishing number. Suggest ways and means to protect the species.

11. To prepare a status report on prevalence of child labour in a given area through simple surveys on children engaged as domestic help and as workers in farms, commercial establishments and manufacturing units. The survey may be in respect of age group, education, wages, working hours, working conditions, safety in work place, health, handling hazardous materials and the like. Units dealing with hazardous materials and processes may be identified and an action plan to mobilize public opinion against practice of child labour may be prepared.

12. Conduct a survey of plants and trees in the locality and collect information about their cultural, economic and medicinal values from local people and available literature. Prepare an action plan for the propagation of trees that are most valuable in terms of their cultural,economical and medicinal use.

13. Prepare a flow chart to show different steps involved in the supply of tap water from source (river, bore well) to houses in the locality. Collect information from the concerned authorities about the quantity of water processed and the amount of energy required at each stage. Compute the energy spent for supplying 1 kilolitre of water to the consumer. Plan and execute a campaign to educate the community members about the implications of wastage of water in terms of energy.

14. Make a list of raw materials used by the family for preparing different types of dishes. Identify the plants and animals and their parts from which each food material is obtained. Also make a list of plants on which the animals in the list depend for their food. Name the processes, if any, inwhich action of microorganisms is made use of. Identify those plants and animals, which are foundin the locality. Prepare a report supported with diagrams/photographs/pictures/graphs to focus on the importance of biodiversity in providing food to human population.

**NOTE: No question paper for practical work will be set by the NENBSE.**