

1. Environment and Sustainable Development

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1.1 Interdisciplinary nature of Environment.

“Environmental studies deal with every issue that affects living organisms. It is essentially a multidisciplinary approach that brings about an appreciation of our natural world and human impact on its integrity.”

The word environment is derived from the French word “*Environ*” meaning “Surroundings” i.e. everything around us is environment.

Do you know?

World Environment Day is celebrated on 5th June every year.

The Stockholm Conference:

United Nations International Conference on Human Environment, was held at Stockholm, Sweden, from 5th June to 16th June 1972. It was attended by representatives of 114 nations. For the first time respective governments at the highest level came together to take note of how mankind had misused our environment of which we are an integral part. 150 Action plans and 20 principles were approved to protect the delicate balance of ecosystems and to preserve them for the coming generation. The conference adopted the motto “Only one earth” for the entire humanity. The conference declared 5th June as World Environment Day.

Environment provides us with a basic life support system through air, water and food. We can not continue to survive without protecting the earth's environmental resources.

Basic terms related to the environment:

1. **Environment** : It includes all aspects of the world around us in which humans, animals and plants live with non-living things.
2. **Ecology** : The science that studies the relationships between living organism and non-living things. It studies the structure and function of nature.
3. **Environmental Science** : It is the systematic and scientific study of our environment. It integrates knowledge from the pure sciences, ecology, engineering, management, social sciences and other aspects.
4. **Environment Education** : A subject concerned with learning on all environmental issues. It has a wider coverage than environmental science or ecology. It also includes the social aspects of the environment.
5. **Environmental Degradation** : It is the damage caused to the environment due to various human activities which harm our surrounding. For example: Deforestation, pollution of water, air, soil etc.
6. **Environmental Conservation**: It includes ways in which to protect nature and control the damage caused to our natural environment. For example when we prevent the killing of wildlife, or we turn a barren land into a forest, we are conserving the environment.

The environment consist of four segments. These are 1. Atmosphere 2. Hydrosphere 3. Lithosphere 4. Biosphere

1. Atmosphere

About 99% of the total earth's atmospheric mass is concentrated in the first 30 km above Earth's surface. Based on characteristics such as temperature and composition, the earth's atmosphere can be divisible into following layers –Troposphere, Stratosphere, Ionosphere, Exosphere.

Layers of Atmosphere;

1) Troposphere : Troposphere is at about 12 km from Earth's surface. The lowest layer from the surface of the earth is known as "Troposphere". The temperature decreases according to the height at this level. The drop of temperature rate at every 160 m height is about 10°C. The temperature differs at different heights and at different layers. Although this layer is smaller than the other layers, it is important as regards the weight of the air and it covers 80% of the atmospheric air. Other elements of the air are vapour, water molecules, dust and microscopic organisms are found in this layer. This layer is very important and useful for the life of living beings. In which rain, wind, storm, hail, snow, clouds etc. exist.

Tropopause the layer that separates troposphere and stratosphere layers is called as tropopause which is at 2 to 3 km above the troposphere. It is umbrella like coat of air which has stable air. Rain, wind, lightning, clouds, storm, etc., do not exist in this layer. The tropopause has a width of 1.5 km, and temperature of this layer is about - 53° C. It also contains high amount dry ozone.

2) Stratosphere : Stratosphere is a layer between tropopause and stratopause. The height of this layer keeps changing according to seasons. Temperatures remain constant for certain height of the layer. But beyond 32 Km of height, the temperature increases. This layer is called 'Isothermal Zone'. The heat from the sun is absorbed in this layer hence temperature is retained. The extension of this layer is much higher in the summer than in the winter. The air in this part of the atmosphere is sparse. Humidity, dust, clouds, etc. are not exactly the same.

Ozonosphere is a layer of Ozone which covers at a height of about 20 to 35 km from the surface of the earth. When the ultraviolet radiation from sunlight comes in contact with oxygen, they are processed and ozone (O₃) gas is produced. Ozone layer absorbs the harmful ultraviolet rays radiated from Sun, hence the temperature of Ozone layer increases. This layer protects life on Earth. Hence ozone layer is called "Protective umbrella of earth". Today, due to increasing pollution, the layer of ozone is becoming weak, that results in increase in global temperature, (Global Warming). This has become a serious matter in terms of survival of living organisms.

3) Ionosphere: Ionosphere is a layer found beyond the stratosphere, around 360 to 400 km from the surface of the earth, which is until the end of atmosphere. It extends from 104 to 112 km from the surface of the earth. The radio waves travel from this layer to the Earth, because of which we can listen to

the radio. Only 1% of the air is present in this layer of the total atmospheric air.

The mesosphere extends upto 85 km from stratosphere. The top of the mesosphere, called mesopause, is the coldest part of Earth's atmosphere with temperatures averaging about -130°F (-90°C). Jets and balloons don't go high enough in this layer.

4) Exosphere :

Exosphere extends from 500 to 750 km from the surface of the earth. At a height of about 490 km radio waves of a temperature of 1700°C has been detected through rocket and radio waves. This layer contains neutral atoms of Oxygen, Helium and Hydrogen. At a height of about 2000 km, the Neutral atoms have an effect called a magnetic circle.

Role of atmosphere in climate :

Earth is able to support a wide variety of living beings because of its diverse regional climate, that ranges from extreme cold at the poles to tropical heat at the Equator. A region's climate is often described, for example, as sunny, windy, dry or humid, but while the weather can change in just a few hours, climate changes over a longer span of time.

Earth's global climate is an average of regional climates. Today, we are experiencing unusually rapid warming. The scientific consensus is that, the greenhouse gases are increasing because of human activities and trapped heat in the atmosphere.

2. Hydrosphere: Hydrosphere covers more

than 71% of the earth's surface either as oceans (salt water) or as fresh water. Hydrosphere includes (both surface and underground water) sea, rivers, oceans, lakes, ponds, streams and wetlands.

3. **Lithosphere:** It includes the Earth's crust and upper mantle. It contains the fossil fuels and minerals and the soil chemicals (nutrients) needed to support plant life.

4. **Biosphere :** The portion of earth where living (biotic) organisms are found and interact with one another and with their non-living (abiotic) environment. This zone of life includes, plants, animals, and their habitat.

1.2 Scope and Importance

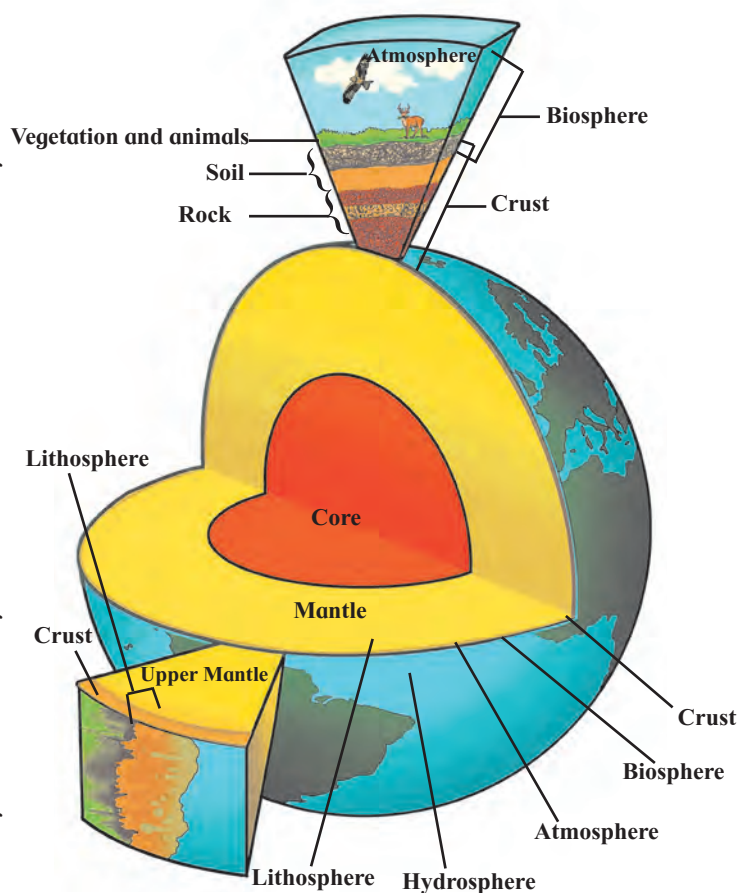


Figure 1.1 : Our life support system: The general structure of the earth

1.2 Scope and Importance

Environment is not a single subject; it is an integration of several subjects that includes both Natural science as well as social science. To understand all the aspects of our environment, we need to know about life sciences, chemistry, physics, geography, resource management, economics, and engineering and social science, population, issues of poverty, resource use and allied issues. Thus the scope of environment education is extremely wide and covers some aspects of nearly every major discipline.

If we study the natural history of the areas in which we live, we would see that our surroundings were originally a natural landscape such as forest, river, mountain, desert, marine environment or a combination of these elements. Most of us live on landscapes that have been profoundly modified by human beings into villages towns or cities. We get our food supply from surrounding villages which in turn, are dependent on natural landscapes such

as forests, grasslands and rivers for resources.

The industrial development and intensive agricultural practices that provide the goods for our increasing consumer oriented society uses up a large amount of natural resources. Consequently, these will get exhausted in the near future. If we continue to extract them. There will be nothing left for the next generations. Rapid economic growth and unplanned development has inevitably led to environmental degradation.

The environment affects us in many ways due to weather changes and quality of air and water. We in turn affect the natural environment often negatively. We cut trees or throw away our garbage, which has an adverse effect on the environment.

In the industrialized era that we live in today, every component of our environment such as air, water or food are impacted by industrial activities, infrastructure development, population explosion and pollution.

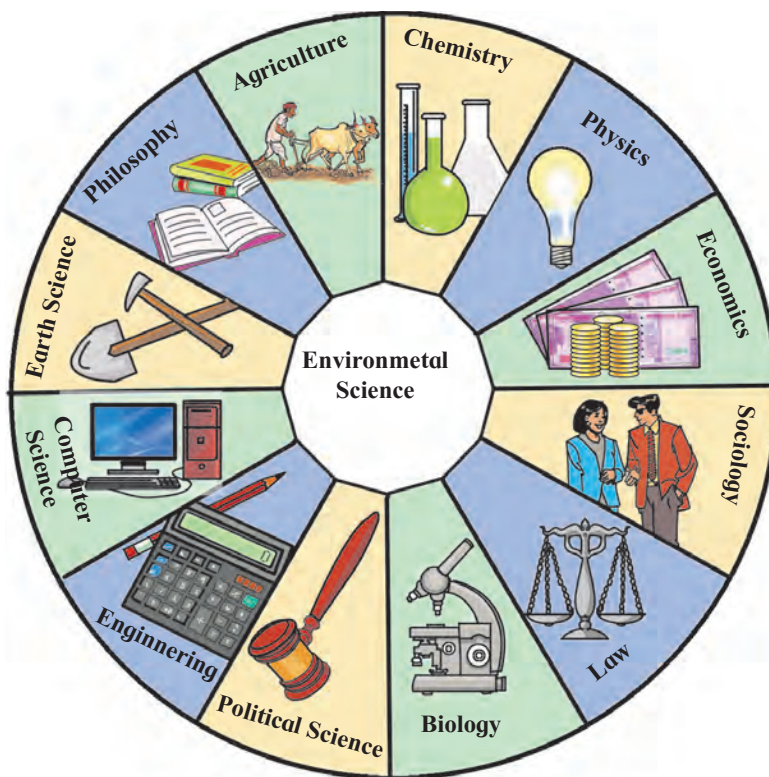


Figure 1.2: Interdisciplinary nature of Environment

How can you contribute to our Environment

1. Gain knowledge about various types of environmental problems and different environmental hazards.
2. By creating a concern and respect for the environment.
3. Begin to appreciate and adopt the ideas of development without destruction of the environment.
4. Play an effective role in protecting the environment by understanding and following environmental laws.

Learning by doing can be achieved in the environment by doing experiments at micro and macro levels with air, water, soil, plants, animals and their interactions with each other.

Environment Education and Awareness:

Since 1970, many National and International Conferences have been held, to enhance environmental awareness. However, most people recognize the urgent need for more information and action through environmental education. India is one of the major countries having large number of NGO's working on environmental awareness campaigns.

The role of mass media and various public institutions that furthered environment awareness is a key to better environmental management. This will need to integrate economic long term growth with the needs of environmental conservation.

Increasing population, urbanization and poverty have generated pressure on natural resources and led to environmental degradation. To prevent the environment from further degradation, Hon'ble Supreme Court of India has ordered and initiated environmental protection awareness programs through government and non government agencies who

must take part in protecting our environment .

Environmental pollution cannot be prevented by laws alone. Public participation is equally important for environmental protection.

Environment education is a process of learning by imparting an overall perspective of knowledge and awareness of the environment. It sensitizes the society about environmental issues and challenges. Individuals must develop relevant skills, expertise and must be able to provide appropriate solutions.

Activity: 1

With the help of your teacher and internet, find out the details of any two international conferences on environment. Write the information related to this and prepare an informative poster for the class.

Steps of Environment Education:

1. **Knowledge:** Provide individuals with information to acquire basic understanding of environment, its associated problems and their solutions.
2. **Awareness:** Help communities to create awareness of their own environmental issues and sensitize them towards environmental problems and solutions.
3. **Attitudes:** Help individuals acquire a set of values and feelings of concern for the environment and motivation for active participation in environmental improvement and protection activities.
4. **Skill :** Develop skills for identification of problems and provide solutions for environmental management.
5. **Values :** Imbibe and inculcate values and the need for conservation of natural resources.

1.3 National and International Organizations

There are several government and non-government organizations (NGOs) that are working towards environmental protection and for conservation of natural resources.

A) Botanical Survey of India (BSI)



BSI was established in 1890 with the objectives of exploring the plant resources of the country and identifying plant species with economic values. Its headquarter is located in Kolkata.

The objectives of BSI are undertaking intensive floristic surveys and collecting accurate and detailed information on the occurrence, distribution, ecology and economic utility of plants in the country.

B) Forest Research Institute (FRI)



FRI was established in 1906 at Dehradun to conduct training research and management of protection of forest.

The institute provides training for forest officers and forest rangers of our country.

C) Zoological Survey of India (ZSI)



ZSI was established on 1st July, 1916 to promote survey, exploration and research leading to the advancement of our

knowledge in various aspects of animal life. Its headquarter is located in Kolkata.

The main objectives of ZSI are exploration, survey, inventorying and monitoring of faunal diversity in various states, ecosystems and protected areas of India.

D) The International Union for Conservation of Nature (IUCN)



IUCN, was established on 5th October 1948. As the first global environmental union, it brought together governments and civil society organizations with a shared goal to protect nature. Its aim is to encourage international cooperation and provide scientific knowledge and tools to guide conservation action. Its headquarter is located in Switzerland.

IUCN played a fundamental role in the creation of key international conventions, including the Ramsar Convention on Wetlands (1971), the World Heritage Convention (1972), the Convention on International Trade in Endangered Species (CITES), (1974) and the Convention on Biological Diversity (CBD), (1992).

In 1980, IUCN in partnership with the United Nations Environment Programme (UNEP) and the World Wildlife Fund (WWF) published the World Conservation Strategy : a ground-breaking document which helped define the concept of 'sustainable development' and shaped the global conservation and sustainable development agenda.

E) National Environmental Engineering Research Institute (NEERI)

NEERI, in Nagpur is a constituent of Council of Scientific & Industrial Research



(CSIR), New Delhi and has a nation-wide presence with its five zonal laboratories at Chennai, Delhi, Hyderabad, Kolkata and Mumbai. The mandate of NEERI is to

conduct research and developmental studies in environmental science and engineering, to render assistance to the industries of the region and local bodies in solving the problems of environmental pollution.

Its vision is to create Leadership in Environmental Science and Engineering for Sustainable Development.

F) World Wildlife Fund for Nature (WWF)



WWF was established in April, 1961 at Switzerland. The Giant Panda became the logo for WWF. WWF's wildlife trade arm, TRAFFIC (Trade Record Analysis of Flora and Fauna In Commerce), launched an extensive publicity

campaign to combat illegal

wildlife trade in 1986. WWF aims to stop the degradation of the planet's natural environment and build a future in which humans live in harmony with nature. It aims in conserving the world's biological diversity, ensuring that the use of renewable natural resources is sustainable, promoting the reduction of pollution and wasteful consumption.

Activity :2

1. Collect Information about wild animals, birds which are reared in your locality.
2. Educate people that it is illegal activity and it is against law to keep wild animals and birds in their houses.

G) United Nations Environment Programme (UNEP)



UNEP was established in 1972, with headquarter at Nairobi, Kenya. It is the leading global environmental authority that sets the global environmental agenda. It also promotes the implementation of environmental dimensions of sustainable development within the United Nations system.

UNEP's mission is "to provide leadership and encourage partnership in caring for the environment by inspiring, informing and enabling nations and people to improve their quality of life without compromising that of future generations."

H) Central Pollution Control Board (CPCB)



CPCB is a statutory organisation, constituted in 1974 under the Water (Prevention and Control of Pollution) Act, 1974. Further, CPCB was entrusted with the powers and functions under the Air (Prevention and Control of Pollution) Act, 1981.

The functions of the Central Pollution Control Board at the National Level is to advise the Central Government on any matter concerning prevention and control of water and air pollution and improvement of the quality of air.

I) Maharashtra Pollution Control Board (MPCB)



MPCB was established in 1970.

The functions of MPCB includes.

- To collect, plan and

disseminate comprehensive information program for the prevention, control or abatement of pollution.

- To inspect sewage or effluent treatment and disposal facilities, and air pollution control systems.
- Supporting and encouraging the developments in the fields of pollution control, waste recycle-reuse, eco-friendly practices etc.
- Creation of public awareness about the clean and healthy environment.

J) Bombay Natural History Society (BNHS)



BNHS, was the pioneer organisation started for conservation in India. A pan-India wildlife research organization, was initiated in 1883. It is one of the largest non-governmental organizations in India engaged in conservation and biodiversity research. It supports many research efforts through grants and publishes the Journal of the Bombay Natural History Society.

It's mission is conservation of nature, primarily biological diversity through action based research, education and public awareness.

It's vision is to excel in the conservation of threatened species and habitats.

Main activities of BNHS include natural history collection, research on various species and habitat, conservation of landscapes and seascapes, environmental information system, outreach (camps, exhibitions, lectures, and other events), conservation education centres, communications and advocacy, university studies, library, wildlife publications and souvenirs.

Activity : 3

Try to identify the organizations that work for the conservation of forest, birds, wild life, rare plants and animals species.

K) Wildlife Institute of India (WII)



Established in 1982, Wildlife Institute of India (WII) is an internationally acclaimed Institution, which offers training program, academic courses and advisory in wildlife research and management. The Institute is actively engaged in research across the breadth of the country on biodiversity related issues. Its headquarter is located at Deharadun.

The aims and objectives of WII are :

- To build up scientific knowledge on wildlife.
- To train personnel for conservation and management of wildlife and carry out research.
- To collaborate with international organizations and develop as a regional center of international importance.

L) Environmental Information System in India (ENVIS)

In 1982, the Government of India established an Environmental Information System (ENVIS) .that provides environmental information to decision makers, policy planners, scientist, engineers, researchers etc. across the country.

Activity:4

Visit a scientific organization / NGO working in the field of environment and find out the work it does in nearby your locality.

1.4 Contribution of people for environment protection

Dr. Salim Ali was an Indian ornithologist and naturalist, often referred to as the "Birdman of India." He was the first person to introduce systematic ornithology when nobody was aware of distribution of birds in India. Keoladeo National Park (Bharatpur Bird Sanctuary) was established after Dr. Salim Ali's continuous interventions. He fought to save the Silent Valley National Park in Kerala, where the government planned to construct a hydroelectric power project. His research on the habitat of weaver birds was appreciated by ornithologists all over the world. In 1967 he received the J. Paul Wildlife Conservation award, a prestigious award in conservation.

M. C. Mehta undoubtedly India's most famous environmental lawyer since 1984, has filed several Public Interest Litigations (PILs) for supporting the cause of environmental conservation. His most famous and long – drawn battles includes protecting the Taj Mahal, cleaning up the Ganga river, banning intensive shrimp farming on the coast, initiating government to implement environmental education in the schools and colleges and variety of other conservation issues.

Through his work, Mehta has the national agenda in the field of water and air pollution, vehicular pollution control, coastal zone conservation and the translocation of heavy industries from urban areas. He has obtained more than forty landmark judgments and numerous orders from the Honb'le Supreme Court against the polluters.

What do we learn?

It shows that there are adequate environmental laws in India, to further conservation of natural resources and prevent pollution. We can use them, when we wish to take action against the environmental destruction caused by unsustainable development. More importantly, Mehta's work has shown what a single determined individual could do to protect the environment. His story is an inspiration to all of us.

Activity 5 :

1. Find out more about the air pollution on Taj Mahal.
2. Ganga Action Plan.

Sundarlal Bahuguna initiated Chipko movement which became an internationally well-known example of highly successful conservation action programs through the efforts of local people for guarding their forest resources.

His fight to prevent the construction of the Tehri dam in a fragile earthquake – prone setting is a battle that he continued to wage.

Dr. M. S. Swaminathan is called as the Father of Green Revolution of India. He was one of India's foremost agricultural scientist and has showed concern about various aspects of biodiversity conservation of both traditional crops and wild species. He has founded the Dr. M. S . Swaminathan Research Foundation in Chennai, which works for the conservation of biological diversity.

Activity 6:

Make a list of people who have worked in Maharashtra for environment conservation and document the work done by them.

Do you know?

Story of Bishnois:

The Bishnois of Rajasthan have been known for their concern for trees, birds, and animals. In 1730, Abhaysingh, the king of Jodhpur, wanted large quantities of wood for burning bricks to build his new palace. He sent his minister Giridhardas, with wood cutters to cut the trees in the Bishnois in the Khejarli village.

Amritadevi a local resident of the village wanted to save the tree. She rushed in and hugged the tree to protect them. She told Giridhardas and cutters to stop operations. Her daughters too followed her example. Giridhardas ordered his men to proceed and they cut down the trees and the women. The news spread and more villagers came to the rescue of the trees. But the cutting continued and by nightfall, 363 people had given their lives for the cause of forest protection. When the king heard the news, with remorse, he banned felling of trees in the Bishnoi forest forever.

The Bishnois have religiously followed these ecofriendly rules. Since Khejarli, there have been many incidences of nature protection by this community.

The Government of India has instituted the Amritadevi Wildlife Protection Award to be given to village community that show valour and courage for the forest and wildlife protection.



What we learn from the story?

The Bishnois are an inspiring example of how human society can make environmental conservation a part of its tradition.

1.5 Sustainable Development

India is an emerging economy with diverse communities, cultures and religions. It covers a vast geographical area and long coastline. Topographically the Indian subcontinent is diverse. It has 10 distinctive biogeographic zones. India has been experiencing rapid growth in population which has led to socio-economic inequity and rampant / uncontrolled growth patterns which has led to environmental degradation. All this would obviously have long term negative impacts on the environment and its consequences would be felt particularly by the socio-economically challenged groups and our future generations.

To combat the problems of unsustainable growth patterns, post Stockholm Conference of 1972, India adopted the concept of Sustainable Development (SD). In 1992, during the United Nations Conference on Environment and Development (UNCED); India became a part of the 187 countries pledging their commitment towards achieving Sustainable Development by signing the Rio Declaration.

In 1992 during the Earth Summit of the UNCED, the role of education in achieving Sustainable Development was a major concern (Agenda 21). Education has been considered as one of the basic requirement and tool towards achieving Sustainable Development. Educating people from all walks of life would serve the dual purpose of creating awareness about environment conservation and protection. Thus safeguarding the environment would help to combat and reduce the socio-economic inequity by empowering people through education.

The Government of India later recommended the Ministry of Human Resource Development to integrate environmental concerns, issues and awareness in education at all levels.

In its 57th meeting in December 2002 (UNESCO, 2002), the UN General Assembly

proclaimed the UN Decade of Education for Sustainable Development (DESD), 2005-2015, emphasized that 'education is an indispensable element for achieving sustainable development.

Education is often considered to be done in classrooms. According to UNESCO (2004), Education for Sustainable Development (ESD) is formal education, but it extends to daily social and professional life. ESD can make education 'participatory'. This enhances the problem solving capacities of young people through processes which enable collaboration and dialogue.

Concept of sustainable development

Sustainable Development refers to development which can meet the needs of the present generation without compromising on the ability of the future generations to meet their own needs (Brundtland Report, 1987).

There are three aims of sustainable development

1. **Economic** - to attain balanced growth
2. **Environmental** - to preserve the environment
3. **Social** - to include all human communities to access all resources.

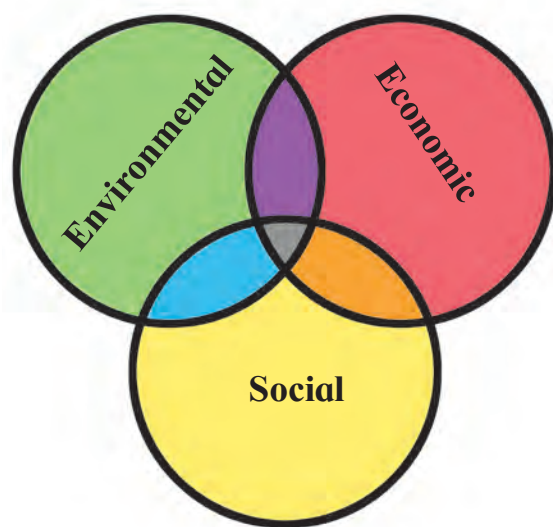


Figure 1.3 : Three aims of sustainable development

The concept of “needs” refers to essential needs of human beings. Millions of people today do not have adequate food, proper house, clean drinking water or basic education. The definition suggest that such essential needs of all people must be met with. But at the same time the pattern of development has to be such that future generations would also be able to meet their own needs from the resources without destroying or degrading nature. This may include water resource, productivity of various ecosystems, quality of air etc.

Development conventionally means enhancing economic well-being and wealth. Well-being of an individual or family and community depends on several factors apart from income levels. Development is more than economic growth. The development achieved in the short term may not continue over time and is unsustainable in the longer term.

Think and Act....

The past and present generations used energy from fossil fuels for domestic and industrial processes. This use in energy has led to the global climate change. How do conserve energy in daily life.

1. Switch off lights and fans in the classroom when it is not necessary.
2. -----.

Concept of sustainable consumption

Development is largely based on the use of resources. Therefore a change in the pattern of development requires a change in the pattern of resource use. The pattern of sustainable consumption relates to use of both renewable and non-renewable resources. For renewable resources the use of a resource should not exceed the capacity of the environment to replenishing the resources. Non-renewable resources should be used with care as they can be totally used up. The natural available resources are shrinking because consumption levels are so high. Current

consumption patterns are responsible for increasing pollution which damages our environment.

There is sufficiency in the world for man's need but not for man's greed.

- Mahatma Gandhi

In the recent past consumerism has become a part of our daily life. There is also inequality in the way, rich and underprivileged groups in the society use resources. Our excessive resource use creates excess amounts of waste. All this requires changes to be made in our lifestyles to prevent the further degradation of our environment. Each one of us is creating a large environment foot print in our resource base. We all need to reduce our environmental foot print and create positive impacts to conserve our environmental resources for the future. This is now referred to as environmental handprint.

In spite of India's rapid population growth, industrialization and consumerism our country still includes a wealth of Natural Resources which requires urgent conservation measures.

Activity 7:

How you will reduce your environment footprint and increase your environmental handprint. Give some actions of your daily life.

Activity 8:

Find out which activities will make water resource unsustainable. What should be done to make it sustainable? List down all activities in school to make sustainable use of water resource. What can you do at home?

Activity 9:

Observe one day in a week as "No Vehicle Day" and educate others to follow this.

Do you know?

- If 50 persons in an office use both sides of just 10 per cent of the paper they use, the company can save ten trees a year.
- The energy saved from recycling one glass bottle will light a 100-watt bulb for four hours.
- Plastic bags and other plastic garbage thrown into the sea kills a million sea creatures every year.

What can you do?

Be a wise consumer. Buy things only when you need it. Do not waste. Develop a habit of using and reusing things and also educate others.

Think on it :

What will you do for sustainable development? Why today environment education is necessary?

Exercise

Q.1. Fill in the blank with the help of correct option.

- 1) is celebrated as World Environment Day.
a) 5th May b) 5th June
c) 16th September d) 21st April
- 2) Environmental science is a:
a) Multidisciplinary science
b) Chemical science
c) Medical science
d) None of these
- 3) FRI was established in 1906 at
a) Dehradun b) Delhi
c) Calcutta d) Mumbai
- 4) led by Chipko movement.
a) Dr.Salim Ali b) M.S.Swaminathan
c) Sundarlal Bahuguna d) Medha Patkar
- 5) ENVIS is established in
a) 1945 b) 1961
c) 1982 d) 1973
- 6) The headquarter of NEERI is located at-
a) Pune b) Nagpur
c) Mumbai d) Kolkata
- 7) The United Nation set up the world commission on Environment and development in
a) 1983 b) 1984
c) 1985 d) 1986

Q.2 Write short answer of the following questions.

- 1) Define the term Environment.
- 2) Explain environmental scope and its significance
- 3) What is the need of environmental education?
- 4) Why is environment awareness necessary?
- 5) What is sustainable consumption?

Q.3. Write the long answer of the following questions.

- 1) Describe briefly the work of the following organization with regard to development and environment issues
a) UNEP b) NEERI
- 2) Give two example of people's movement, and explain it.
- 3) What is your contribution for environmental conservation?
- 4) Describe concept and aims of sustainable development .

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