

## Unit 5

### Social issues and Environmental Education

In recent time, awareness about environment protection is increasing day by day. Environmental legislation has attained great importance for solving many environmental problems. At the international level, many conferences, workshops are being held for these purposes. **Stockholm conference in 1972** (the United Nations Conference on Human Environment), **Earth Summit in 1992** (the United Nations Conference on Environment and Development) also known as **Rio de Janeiro or Rio Conference**, **Johannesburg Conference in 2002** (the World Summit on Sustainable Development) are some steps taken by the world towards sustainable development.

India was the first nation in the world to have made protection and conservation of environment in its constitution in **1976**. In India, several acts were passed from 1972 to 1986 and various amendments thereafter. These acts were passed to protect the environment, regulate resource use, protect biodiversity, pollution control, conserve forest etc.

Many important legislative provisions for environmental conservation are as follows:

1. Environment (Protection) Act, 1986.
2. Air (Prevention and Control of Pollution) Act, 1981.
3. Water (Prevention and Control of Pollution) Act, 1974.
4. Wildlife (Protection) Act, 1972.
5. Forest (Conservation) Act, 1980.

The Ministry of Environment and Forest (MoEF) is the nodal agency in the administrative structure of the Central Government for planning, promotion, co-ordination and overseeing the implementation of India's environmental and forestry policies and programmes. Along with MoEF the Central and State Pollution Control Boards have been constituted to provide technical support to MoEF in its functioning.

#### **Article 48-A and Article 51-A (g) of Indian Constitution Regarding Environment**

- **Article 48-A**, deals specially with the conservation and improvement of the environment.
- **The State shall endeavour to protect and improve the environment and to safeguard the forests and wild life of the country.**
- **Article 51-A** of constitution enlists 11 fundamental duties. This part was added on the recommendations of the Swarn Singh Committee bringing the constitution of India in line with Article 29 (1) of the Universal Declaration of Human Rights.
- **Article 51-A (g), specially deals with the fundamental duty with respect to environment. It provides: it shall be the duty of every citizen of India to protect and**

**improve the natural environment including the forests, lakes, rivers and wildlife and also to have compassion for living creatures.**

- The fundamental duty of every citizen is not only to protect the environment from any kind of pollution but also to improve the environmental quality if has been polluted.
- **Article 51-A (j)**, further provides it shall be duty of every citizen of india to strive towards excellence in all spheres of individual and collective activity, so that the nation constantly rises to higher level of endeavor and achievement.
- However, in due course of time, the judicial activism provides an impetus to achieve the underlined objectives of the fundamental duties, particularly, interrelationship between Articles 48, 48 –A and 51-A (g) of the constitution has been explained by the Supreme Court.

**Central Pollution control board:**

The **Central Pollution Control Board (CPCB)** of India is a statutory organisation under the Ministry of Environment, Forest and Climate Change(Mo.E.F.C). It was established in 1974 under the Water (Prevention and Control of Pollution) Act, 1974. The CPCB is also entrusted with the powers and functions under the Air (Prevention and Control of Pollution) Act, 1981. It serves as a field formation and also provides technical services to the Ministry of Environment and Forests under the provisions of the Environment (Protection) Act, 1986. It Co-ordinates the activities of the State Pollution Control Boards by providing technical assistance and guidance and also resolves disputes among them. It is the apex organisation in country in the field of pollution control, as a technical wing of MoEF. The CPCB promote cleanliness of stream and wells in different areas of the states by preventions, control and abatement of water pollution and to improve the quality of air and to prevent, control or abate air pollution in thecountry.

**Functions and powers of central board at the national level:**

- Advise the Central Government on any matter concerning prevention and control of water and air pollution and improvement of the quality of air.
- Plan and cause to be executed a nation-wide programm for the prevention, control or abatement of water and air pollution;
- Co-ordinate the activities of the State Board and resolve disputes among them;
- Provide technical assistance and guidance to the State Boards, carry out and sponsor investigation and research relating to problems of water and air pollution, and for their prevention, control or abatement;
- Plan and organise training of persons engaged in programme on the prevention, control or abatement of water and air pollution;
- Organise through mass media, a comprehensive mass awareness programme on the prevention, control or abatement of water and air pollution;
- Collect, compile and publish technical and statistical data relating to water and air pollution and the measures devised for their effective prevention, control or abatement;

- Prepare manuals, codes and guidelines relating to treatment and disposal of sewage and trade effluents as well as for stack gas cleaning devices, stacks and ducts;
- Disseminate information in respect of matters relating to water and air pollution and their prevention and control;
- Lay down, modify or annul, in consultation with the State Governments concerned, the standards for stream or well, and lay down standards for the quality of air; and
- Perform such other function as may be prescribed by the Government of India.

#### **Functions of the Central Board as State Boards for the Union Territories**

- Advise the Governments of Union Territories with respect to the suitability of any premises or location for carrying on any industry which is likely to pollute a stream or well or cause air pollution; Lay down standards for treatment of sewage and trade effluents and for emissions from automobiles, industrial plants, and any other polluting source; Evolve efficient methods for disposal of sewage and trade effluents on land; develop reliable and economically viable methods of treatment of sewage, trade effluent and air pollution control equipment; Identify any area or areas within Union Territories as air pollution control area or areas to be notified under the Air (Prevention and Control of Pollution) Act, 1981; Assess the quality of ambient water and air, and inspect wastewater treatment installations, air pollution control equipment, industrial plants or manufacturing process to evaluate their performance and to take steps for the prevention, control and abatement of air and water pollution. As per the policy decision of the Government of India, the CPCB has delegated its powers and functions under the Water (Prevention and Control of Pollution) Act, 1974, the Water (Prevention and Control of Pollution) Cess Act, 1977 and the Air (Prevention and Control of Pollution) Act, 1981 with respect to Union Territories to respective local administrations. CPCB along with its counterparts State Pollution Control Boards (SPCBs) are responsible for implementation of legislations relating to prevention and control of environmental pollution.

#### **Maharashtra pollution control board Norms and responsibilities:**

- Maharashtra Pollution Control Board (MPCB) is implementing various environmental legislations in the state of Maharashtra, mainly including Water (Prevention and Control of Pollution) Act, 1974, Air (Prevention and Control of Pollution) Act, 1981, Water (Cess) Act, 1977 and some of the provisions under Environmental (Protection) Act, 1986 and the rules framed there under like, Biomedical Waste (M&H) Rules, 1998, Hazardous Waste (M&H) Rules, 2000, Municipal Solid Waste Rules, 2000 etc. MPCB is functioning under the administrative control of Environment Department of Government of Maharashtra.

Some of the important functions of MPCB are:

- To plan comprehensive program for the prevention, control or abatement of pollution and secure executions thereof,
- To collect and disseminate information relating to pollution and the prevention, control or abatement thereof,
- To inspect sewage or trade effluent treatment and disposal facilities, and air pollution control systems and to review plans, specification or any other data relating to the treatment plants, disposal systems and air pollution control systems in connection with the consent granted,

- Supporting and encouraging the developments in the fields of pollution control, waste recycle reuse, eco-friendly practices etc.
- To educate and guide the entrepreneurs in improving environment by suggesting appropriate pollution control technologies and techniques
- Creation of public awareness about the clean and healthy environment and attending the public complaints regarding pollution.

### **Environmental Clearance:**

- Environmental clearance (EC) for certain developmental projects has been made mandatory by the MoEF through its Notification issued on 27.01.1994 under the provisions of Environment (Protection) Act, 1986, revised notification on EC process in September 2006 and amended it in December 2009.
- The projects have been divided into two category i.e.
- Category A (central list)
  1. Offshore and onshore oil and gas exploration and production.
  2. Nuclear power projects and processing of nuclear fuel
  3. Petroleum refining industry
  4. Soda ash industry
  5. Asbestos mining and based projects
  6. Chemical fertilizers
  7. Pesticide
  8. Petrochemical complexes
  9. Oil and gas transportation pipelines
  10. Primary metallurgical industry
  11. All molasses based distilleries
  12. Pulp manufacturing and pulp and paper
  13. New national highway
- Category B (State list):
  1. Integrated paint industry
  2. Induction/arc furnaces/cupola furnaces 5 TPH or more
  3. Isolated storage and handling hazardous chemicals
  4. Aerial ropeways
  5. Common effluent treatment plant (CETP)
  6. Common municipal solid waste management facility
  7. Building and construction projects
  8. Township and area developmental projects
  9. New state highways

**Environmental impact Assessment:** Environmental Impact Assessment (EIA) is a process of evaluating the likely environmental impacts of a proposed project or development, taking into account inter-related socio-economic, cultural and human-health impacts, both beneficial and adverse.

Objectives of EIA:

- To formulate a transparent, decentralized and efficient regulatory mechanism.
- To incorporate necessary environmental safe guards at planning stages.
- To involve stakeholders in the public consultation process
- Identify developmental projects based on impact potential instead of the investment criteria.

## **Stages of Environmental Clearance:**

### **Stage 1: Screening**

- Screening means scrutiny of category B projects seeking prior environmental clearance made by the concerned State level expert appraisal committee (SEAC).
- Screening determines whether or not the project requires further environmental studies for preparation of EIA for its appraisal depending upon the nature and location specificity of the project.
- MoEF constitute EAC (Expert appraisal committee) at Central level for scoping and appraisal of projects. MoEF also notify SEAC at state level on receiving nominations from state government.
- As per new notification no screening required for Category A projects. Category B projects will be further screened at the state level for categorization into either B1 or B2
- Category B1 required EIA and PH (Public hearing) but B2 doesn't require EIA and PH.

### **Stage 2: Scoping**

- Scoping refers to the process by which the EAC in the case of Category A projects and SEAC in the case of Category B1 projects determines detailed and comprehensive TORs (term of reference) addressing all the relevant environmental concerns for preparation of EIA report.

### **Stage 3: Public Hearing or Public consultation (PH)**

- Public consultation refers to the process by which the concerns of local affected persons and other who have plausible stake in the environmental impacts of the project or activity are ascertained. It can be direct hearing at site or close proximity for local affected persons or direct responses (written) i.e. through different modes of communication.
- Following routine is adopted for PH:
  - DM to preside over the PH process.
  - Alternate public authority/agency to be engaged by MoEF in case SPCB fails to comply with time limit.
  - Incorporation of public concerns in EIA reports
  - Videography of proceedings must and to be enclosed with application for EC.
  - Display of PH proceeding in web site and other Govt offices.

### **Stages 4: Appraisal**

- Appraisal means the detailed scrutiny by the Expert Appraisal Committee of the application and other documents submitted by the applicant for grant of environmental clearance. MoEF has so far constituted 25 State Level Expert Appraisal Committee to appraise category B project.

## **Concept of sustainable development**

“Sustainable development is development that meets the needs of the present, without compromising the ability of future generations to meet their own needs.”

## **Green building**

The ideal green building would be a building project that would allow you to preserve most of the natural environment around the project site, while still being able to produce a building that is going to serve a purpose. The construction and operation will promote a healthy environment for all involved, and it will not disrupt the land, water, resources and energy in and around the building. This is the actual definition of a green building.

The U.S. EPA says “*Green building is the practice of creating structures and using processes that are environmentally responsible and resource-efficient throughout a building’s life-cycle from siting to design, construction, operation, maintenance, renovation and deconstruction. This practice expands and complements the classical building design concerns of economy, utility, durability, and comfort. Green building is also known as a sustainable or high performance building.*”

Green buildings are designed in such a way to reduce overall impact on environment and human health by:

- i. Reducing trash, pollution and degradation of environment.
- ii. Efficiently using energy, water and other resources.
- iii. Protecting occupant health and improving productivity.

### **Benefits of green building include:**

#### **Environmental Benefits:**

- Reduce wastage of water
- Conserve natural resources
- Improve air and water quality
- Protect biodiversity and ecosystems

### **Economic Benefits:**

- Reduce operating costs
- Improve occupant productivity
- Create market for green product and services

### **Social Benefits:**

- Improve quality of life
- Minimize strain on local infrastructure
- Improve occupant health and comfort

The technological principles used and implemented with the green building involve measures like,

- To prevent erosion of soil
- Rainwater harvesting
- Use of solar energy
- Preparation of landscapes to reduce heat
- Reduction in usage of water
- Recycling of waste water
- Use of world class energy efficient practice

Goals of green building:

- Siting and structure design efficiency
- Energy efficiency
- Water efficiency
- Material efficiency
- Indoor environmental quality enhancement
- Operations and maintenance optimization and
- Waste and toxic reduction

### **Example: ITC centre Gurgaon**

ITC is one of the corporate giants of India with a diversified business ranging from agro products to hotels, and from FMCG to paperboards and specialty papers etc. The ITC Green Center, located in Gurgaon, houses the headquarters of ITC's hotel business. The company's endeavor has always been to minimize the direct and indirect environmental impact of its business operations. It had already been producing environment-friendly office buildings, most of which had gold LEED rating, but it went a step ahead with the ITC Green Center to bag the highest platinum rating for the building. It was the first corporate building in India to have this distinction and was *the biggest platinum rated green building in the world* (a floor area of 170,000 SF) in 2004 when it was certified.

The architects and developers wanted to use building materials with low environmental impact; and they succeeded in their endeavor through a lot of research and effort.

- **Glass**– Glass is the main material used in the building as it helped the architects achieve several purposes. The glass used here has 19% recycled content.
- **Fly ash based concrete**- The building has used many recycled and recyclable materials like fly ash based concrete etc. In fact, more than 10% of building's total material is recycled, refurbished or salvaged from other sites.
- **Local material**– It was a conscious effort to procure as much building material as possible from the nearby sources to reduce the impact of material transportation on the environment. More than 40% of the material was procured from within 500 miles of the site.
- **Low emitting materials**– Low VOC levels of adhesives and sealants are used for carpets, composite woods and paints.

## **Management measures**

### **Watershed Management**

A watershed is an area of land and water bounded by a drainage divide within which the surface runoff collects and flows out of the watershed through a single outlet into a larger river or lake. Watershed technology is used in Rainfed areas.

- a. Macro watershed: 1000 -10,000 ha
- b. Micro watershed: 100 -1000 ha
- c. Mini watershed: 10 -100 ha
- d. Mille watershed: 1 -10 ha

#### **Objectives of watershed:**

- a. Production of food, fodder, fuel.
- b. Pollution control
- c. Over exploitation of resources should be minimized
- d. Water storage, flood control, checking sedimentation.
- e. Wild life preservation
- f. Erosion control and prevention of soil, degradation and conservation of soil and water.
- g. Employment generation through industrial development dairy fishery production.



h. Recharging of ground water to provide regular water supply for consumption and industry as well as irrigation.

i. Recreational facility.

### **Main Components of Watershed:**

a. Soil and water conservation,

b. Water harvesting and water management,

c. Alternate land use system.

The following parameters govern effectiveness of watershed,

- Shape: it depends upon morphology of land area where WSM is to be developed. E.g. may be pear shaped or elongated
- Size/length/total area
- Slope: controlling factor of rainfall distribution and flow direction.
- Physiography: altitude of land and physical aspects on rock/surface etc.
- Climate: it decides/governs the overall maintenance of project.
- Drainage: depends upon slope, flow of water and absorption of soil in surrounding area.

### **Rain water harvesting**

When rainfall is more in monsoon season, the situation of flood also is reached and if less, leads to draught. Such situation can be controlled by Rain Water Harvesting.

Rain water harvesting is a method to collect, store and conserve runoff water from surface.

There are two rainwater harvesting systems:

1. Rainwater harvesting from rooftops into tanks
2. Rainwater harvesting from surface and ground in underground tank.

Stages in rainwater harvesting:

1. Locating catchments
2. Inserting course mesh to trap suspended
3. Transporting water to well/tank
4. Storing water

Benefits of RWH:

1. Increase ground water recharge

2. Reduce soil erosion and flooding
3. Helps to achieve greenery, enhances forestry, horticulture etc.
4. Provide plenty of drinking water and also water for irrigation.

## **Green belt development**

The purpose of a green belt around the industrial site is to capture the fugitive emissions, attenuate the noise generated and improve the aesthetics. The proposed green belt at the project site will form an effective barrier between the plant and the surroundings. Open spaces, where tree plantation may not be possible, will be covered with shrubs and grass to prevent erosion of topsoil. Adequate attention has been paid to plantation of trees, their maintenance and protection based on the geology, soil condition and topography of the site area. Green belt will be developed around the plant site, whatever space is available around the periphery of the plant will be planned to be utilized for green belt. Other open spaces within the factory will be converted to green areas in the form of lawns or flowering plants. A wide range of plant species will be planted in and around the premises to help capture the fugitive emissions and noise levels from the plant premises. This wide range covers plants of fast growing type with thick canopy cover, perennial green nature, native origin and a large leaf area index. A specialist in horticulture may be appointed to identify any other native species and also supervise greenbelt development.

Characteristics of plants for Green belt:

- The plants for green belt development should be fast growing
- Thick canopy cover
- Perennial green nature
- Easy available i.e. native origin
- Large leaf area index

Advantages of Green belt development:

- Trees can act as efficient biological filters, removing significant amounts of particulate pollution from urban atmosphere
- It improve quality of air
- Dust capturing plants species can act as efficient biological filters, removing significant amount of particulate pollution.
- Reduce noise pollution.

## **Interlinking of rivers**

- 1972: Ganga Cauvery link proposed by Dr. K. L. Rao.
- 1974: garland canal proposed by captain Dastur.
- 1980: ministry of water resources frames the national perspective plan (NPP)
- 1982: the national water development agency (NWDA) set up to carry prefeasibility studies

- 1999: a national commission set up to review NWDA reports
- Aug. 15 2002: president Abdul Kalam mentions the need for river linking in his independence day speech.
- Oct. 2002: supreme court recommends that the government formulate a plan to link the major Indian rivers by the year 2012.
- Dec. 2002: govt. appointed a task force on interlinking of 37 rivers led by Mr. Suresh Prabhu. The deadline was revised to 2016.

Benefits:

- Alleviating droughts and flood control
- Cheap water for irrigation
- Availability of drinking water
- Generating of hydroelectric power
- Employment generation

## **Groundwater Recharge**

Groundwater is the water in aquifers below the surface of earth which one is the most important natural resource for every nation.

**Groundwater recharge** or **deep drainage** or **deep percolation** is a hydrologic process, where water moves downward from surface water to groundwater. Recharge is the primary method through which water enters an aquifer. This process usually occurs in the vadose zone below plant roots and, is often expressed as a flux to the water table surface.

- Natural recharge: wetlands allow the flow of water between the ground water system and surface water system. It is controlled by hydrological cycle, area of wetlands, soil quality and absorbance etc.
- Artificial recharge: is the process of spreading or imputing water on land to increase the infiltration through soil and percolation to the aquifers.
- Induced recharge: the recharge to an aquifers that occurs when a pumping well creates a cone of depression that lowers an adjacent water table below the level of a stream or lake, causing the stream or lake to lose water to the adjacent groundwater aquifers.

## **Role of Information Technology in Environment and Human health**

Information technology has spread its horizon very usefully in various areas in our lives. IT can also have a significant hand in improving the status in the fields of environmental education and human health. The emerging growth of the internet services and facilities, geographic information system (GIS) and the data that gets transmitted through satellite etc. have generated a higher affluence of the updated information on several aspects of the environment as well as health.

**Database on the Environmental System:** the meaning of database, “it is a collection of connected data on some subjects”. It comes in a computerized form, can be retrieved whenever needed. The information of database can be easily extracted in a computer. E.g. database such as, wildlife, conservation, malaria, fluorosis, HIV/AIDS.

The useful agencies include,

- National Management Information System (NMIS).
- Environmental Information System (ENVIS)
- Remote sensing and geographical information system (GIS)
- geographical information system (GIS)
- the world wide web (WWW).

**Human health:** the quality of environment and human health are directly related. Poor quality of environment cause effect not only on human being but on animals and vegetation cover also. Polluted air and water are two main factors which affect human health.

Harmful impact of air pollutants:

1. CO: When combined with haemoglobin in RBC forming carboxy-haemoglobin thus reducing oxygen carrying capacity of blood. It causes headache, paralysis and even death.
2. SO<sub>2</sub>: causes respiratory diseases, like asthma, bronchitis, eye irritation, throat trouble in human beings.
3. Oxides of Nitrogen (N<sub>2</sub>O, NO, NO<sub>2</sub>): In high concentration it causes headache, irritation of eyes and respiratory tract, bronchitis, asthma, loss of appetite.
4. O<sub>3</sub>: its concentration above 0.1 ppm is toxic. It causes irritation of eyes, lungs, respiratory tract
5. Hydrocarbons: hydrocarbons alone have no harmful effects. But unburnt hydrocarbons, in presence of sunlight and nitrogen oxide form O<sub>3</sub>, aldehydes, PAN (peroxy acetyl nitrate) and other complex products. They have harmful effects on respiratory system. The cause irritation of eyes, throat, nose.
6. Particulates: dust causes occupational diseases, and it affects respiratory system causing pneumoconiosis where lungs are affected due to fibrosis and pleural calcification and finally lead to lung cancer. When causative agent is **Silica**, the respiratory disease is **Silicosis**. Inhalation of **asbestos** dust or fibers causes lung diseases **Asbestosis**.

**Harmful impact of water pollutants:**

Causes waterborne diseases like polio, cholera, fungal infection, dysentery, typhoid, diarrhea etc. agricultural runoff may contain pesticides, fungicides and insecticides etc. which are toxic and hazardous. Most pesticides are mutagenic and carcinogenic like BHC affects Central nervous system and Dieldrin causes insomnia.

## **Indoor air pollution**

‘Indoor air’ is air within a building such as your home, classroom, office, shopping center, hospital or gym. We say ‘**Indoor Air Pollution**’ if indoor air is contaminated by smoke, chemicals, smells or particles.

Unlike outdoor air pollution, the effect of indoor air pollution is health related and less of an environmental issue. In colder regions, building and heating methods make use of airtight spaces, less ventilation and energy efficient heating. Sometimes synthetic building materials, smells from household care and furnishing chemicals can all be trapped indoors. As less fresh air gets indoors, the concentration of pollutants such as pollen, tobacco smoke, mold, pesticides, radon, asbestos and carbon monoxide trapped inside the building increases and people breathe that in.

- Around 3 billion people cook and heat their homes using open fires and leaky stoves, and burning biomass (wood, animal dung and crop waste) and coal.
- Nearly 2 million people die prematurely from illness attributable to indoor air pollution from household solid fuel use.
- Nearly 50% of pneumonia deaths among children under five are due to particulate matter inhaled from indoor air pollution.
- More than 1 million people a year die from chronic obstructive respiratory disease (COPD) that develop due to exposure to such indoor air pollution.
- Both women and men exposed to heavy indoor smoke are 2-3 times more likely to develop COPD.

#### **Common indoor air pollutants include:**

- Tobacco smoke: This is smoke burning cigarettes or exhaled smoke by people smoking.
- Biological Pollutants: These include allergens such as pollen from plants, hair from pets, fungi and some bacteria.
- Radon: This is a gas that is naturally emitted from the ground. Radon can be trapped in basements of building and homes. The gas is known to cause cancer after exposure over a period.
- Carbon Monoxide:  
This is a poisonous gas with no color or smell. Carbon monoxide is produced when fuels such as gas, oil, coal or wood do not burn fully.