

Unit 3

- Q) Write a Short Notes on
- a) Sustainable Development :- Define, Measures / Strategies
 - b) Wasteland Reclamation :- Definition, Types of waste land, Reclamation Process.
 - c) Consumerism & waste Product :- Definition, Positive & Negative impact of consumerism
 - d) Nuclear Accident :- Causes & impact of Nuclear accidents, Case study (2)

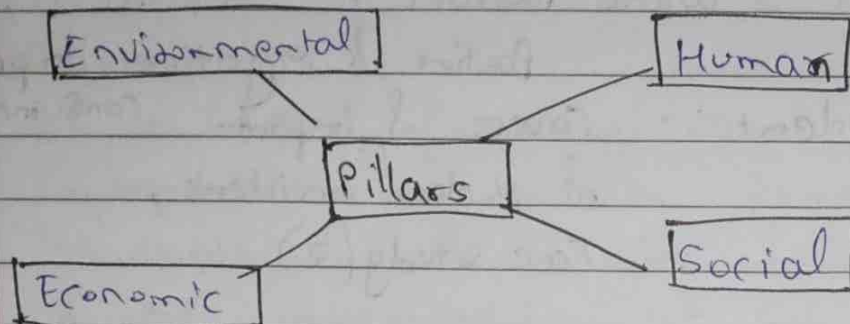
Ans

a) Sustainable Development → Sustainable development is a development that meet the needs of the present without compromising the ability of future generation to meet their own needs. Some of the important measure for sustainable development are as follows:-

- i) Technology → Using appropriate technology is one which is locally adaptable, eco friendly, resource efficient and culturally suitable.
- ii) Reduce, Reuse and Recycle approach The 3-R approach advocating minimization of resource use, using them again and again.
- iii) Promoting Environmental Education and Awareness Making environmental education the centre of all learning process will greatly help in changing the thinking pattern.
- iv) Resource Utilization as per carrying capacity We have to use the Resource in the required amount when which we want.

- v) Improving quality of life including social, cultural and economic dimensions.

Development should not focus just on one section. Rather than it should include sharing of benefits b/w the rich and poor. The tribal, ethnic people and their cultural heritage should also be conserved.



Wasteland Reclamation

Wasteland → The land which is unfit for cultivation, grazing, productivity and other uses is called wasteland.

Types of wasteland

- 1) Cultivable wasteland These are cultivable but not cultivated for several years.
- 2) ~~use~~ Uncultivable wasteland The land cannot be brought under cultivation.
Ex → Desert

Causes of wasteland formation

- 1) Soil erosion
- 2) deforestation
- 3) Waste from domestic, industries
- 4) Developmental activities
- 5) Mining for Metals, minerals, fossil fuel

Wasteland reclamation It means reclaiming wasteland or to use it for wasteland for productive purpose. Wasteland reclamation is the process of turning barren sterile wasteland into something that is fertile and suitable for habitation and cultivation.

Types of Wastelands

- 1) Easily reclaimable
- 2) Reclaimable with some difficulty
- 3) Reclaimable with extreme difficulty

1) Easily Reclaimable Easily reclaimable wasteland can be used for agricultural purposes. Wasteland can be reclaimed for agriculture by reducing the salt content which can be done by leaching etc. Gypsum, urea, potash are added before planting crops in such areas.

2) Reclaimable with some difficulty
These wasteland can be utilized for agro forestry. Agro forestry involves putting land to multiple uses. Its main purpose is to have tree and crop which are planted to form an integrated system of biological production within a certain area. Thus, agro forestry implies integration of trees with agricultural crops or livestock management simultaneously.

3) Reclaimed with ~~some~~ extreme difficulty

Wasteland that are reclaimed with extreme difficulty can be used for forestry or to recreate natural ecosystem.

Attempts to grow tree in highly non alkaline

Saline soils have been largely unsuccessful studies have shown that if tree seedlings are planted with a mixture of original soil, gypsum and manure, a better growth can be achieved. It is however important to use indigenous species of tree so that the program recreates the local ecosystem with all its species.

Methods of wasteland reclamation

- 1) Afforestation \rightarrow It means growing the forest over cultivable wasteland.
- 2) Reforestation \rightarrow Growing the forest again over the lands where they were existing and was destroyed due to fires, overgrazing and excessive cutting. Reforestation checks water logging, floods, soil erosion and increase productivity of land.
- 3) Providing surface cover \rightarrow The easiest way to protect the land surface from soil erosion is to leave crop residue on the land after harvesting.
- 4) Mulching \rightarrow Mulch is a layer of material applied to the surface of an area of soil. In this protective cover of organic matter and plants like stalks, cotton stalks, tobacco stalks etc. are used which reduce evaporation, help in retaining soil moisture and reduce soil erosion.
- 5) Changing ground topography on down hills. Running water erodes the hill soil and carries the soil along with it. This can be minimized by following alternation in ground topography.
 - a) Strip farming. Different kinds of crops are planted in alternate strip along the contour.
 - b) Terracing \rightarrow In this arrangement, the earth is

shaped in the form of leveled terraces to hold soil and water. The terrace edges are planted with such plant species which anchor the soil.

- c) contour ploughing In this arrangement the ploughing of land is done across the hill and not in up and down style. (To prevent soil erosion) (absorb rain and retain top soil)
- d) Leachings In salt affected land the salinity can be minimized by leaching them with more water (Applying excess amount of water to wash down the salt from soil)
- e) changing agricultural practices like mixed cropping, crop rotation and cropping of plants are adopted to improve soil fertility.
- f) Ecological Succession This refers to the natural development or redevelopment of an ecosystem which helps in reclaiming the mineral deficient soil of wasteland.

Case Study

Jatropha curcas plantation is a unique case of wasteland reclamation, which produce oil rich seeds and their tree grow in uncultivable wasteland and also yield vegetable oil that is suitable for conversion into biodiesel.

Land degradation causes

- 1) Over grazing
- 2) Deforestation
- 3) Over cultivation
- 4) Improper irrigation practices

Urban Problem Related to Energy

In developed countries the amount of energy used is much more compared to under developed countries

In Modern life style Electrical gadgets in houses, offices & business establishments

Urban problem related to energy

Urbanisation → Movement of Human population from rural areas to urban areas for the want of better education, communication, health & environment.

Energy demanding activities

- 1) Residential and commercial lightings
- 2) Transportation needs petrol & diesel as energy source
- 3) Industrial works need energy
- 4) Modern lifestyle consumes energy
- 5) Control of pollution need energy dependent technologies

Solution for urban energy problems

- 1) Usage of public transport
- 2) Minimising energy consumption
- 3) Increasing production capacity
- 4) Use of energy efficient technologies
- 5) Renewable source usage
- 6) strict law and penalty.

6.2 Urban Problems Related to Energy

Energy is one of the major pillars of economic development of the society. Economic growth along with a growing population will obviously consume a lot of energy.

Houses in urban areas are now made of more heat sensitive materials such as metals (iron, steel and aluminium) glass and concrete instead of heat insensitive substances such as wood and brick. To make these houses comfortable, we use air conditioners or room heaters run by electricity. High rise buildings need energy to operate lifts and electrical energy for lighting. Most urban people use their individual transport rather than a public one. Similarly, each and every step in an urban centre needs energy in some form or the other. To meet the enormous energy needs and for long term sustainability we should be more specific about the most efficient and cost-effective manner of energy use.

This can be achieved through the use of more renewable energy resources than non-renewable energy resources in addition to steps such as:

- (i) Urban planning for more efficient energy utilization.
- (ii) Change of lifestyle to increase community involvement, which means using car pools.
- (iii) In India, the importance of the development of renewable energy sources as an alternative to fossil fuels for a sustainable energy base has been recognized since 1970. Since then, considerable effort has gone into the development, trial and introduction of a variety of non-conventional energy technologies in the industry and for domestic use.

The Ministry of Non-Conventional Energy Sources, Government of India is involved in the implementation of these programmes for the development, demonstration and utilization of renewable energy-based technologies such as solar and thermal, and green technologies such as:

- (i) Solar photovoltaic.
- (ii) Wind power generation and water pumping.
- (iii) Solar power.
- (iv) Geothermal energy.
- (v) Energy recovery from municipal and industrial waste.
- (vi) Chemical source of energy.
- (vii) Fuel cell.
- (viii) Alternative fuel for transportation.
- (ix) Biomass combustion.
- (x) Hydroelectricity.

Laws Related to environment

- 1) The EPA (Environmental Protection Act) 1986
- a) It came into force soon after the Bhopal gas tragedy happened.
- b) It is enacted under article 253 of Indian Constitution
- c) To protect and improve environment quality, control and reduce pollution from all sources
- d) EPA establishes the framework for studying, planning and implementing long-term requirements of environmental safety.
- e) It is an umbrella legislation
- f) Under this act government take some measures necessary to protect and improve the quality of environment by setting standards for emissions and discharges of pollution in the atmosphere by any person carrying on an industry, regulating the location of industries

6.9 Laws Relating to Environment, Pollution, Forest and Wildlife

Numerous laws have been enacted at the international, national, state and municipal levels. The following national acts provide environmental legislation:

- (i) The Factories Act, 1948.
- (ii) The Insecticides Act, 1968.
- (iii) The Water (Prevention and Control of Pollution) Act, 1974.
- (iv) The Air (Prevention and Control of Pollution) Act, 1981.
- (v) The Forest (Conservation) Act, 1980.
- (vi) The Wildlife (Protection) Act, 1972.
- (vii) The Environment (Protection) Act, 1986.

The main provisions of some of these national acts are:

The Factory (Amendment) Act of 1987

This Act is aimed at declaring the information of hazardous processes taking place inside the factory to its workers, local residents and government officials. This rule also allows the employees to inform the Factory Inspectorate directly regarding violation of safety rules during plant operation. According to the second amendment of the Environment (Protection) Act, 1986 all these industries are covered by Water and Air Pollution Act and also by Hazardous Waste Handling Act. According to this amendment, every industry is to submit an environmental audit report to the State Pollution Control Board on or before May 15 for the financial year ending on March 31. In order to reduce the pollution burden and optimum utilization of natural resources, a comparative statement from the previous year is to be submitted.

The Insecticides Act, 1968

This is one of India's first national environmental laws enacted in 1968 and enforced from 1971 to regulate import, manufacture, sale, transport, distribution and use of insecticides to prevent risk to human beings and animals. Different agencies like the Central Insecticide Board, Pesticide Registration Committee, Pesticide Environment Pollution Advisory Committee, Central Insecticide Laboratory Committee were created for effective enforcement of the Act and to ban or restrict the use of pesticides.

The Water (Prevention and Control of Pollution) Act (1974)

This was the first national law of India on pollution control. This act defines water pollution and determines penalties. The Water Pollution Board at the Central and State levels has been set up for the prevention and control of water pollution in all sources of water under its jurisdiction. They also determine the permissible and impermissible levels of water pollution. This act was amended in 1977 and 1978 to improve the financial condition of the state boards through implementation of a water tax for use of water by industrial and local authorities.

The Air (Prevention and Control of Pollution) Act 1981

This Act regulates and controls emission from automobiles and industrial plants. The Central Board for Prevention and Control of Water Pollution is authorized to implement and enforce this act also. This body determines the standards of air quality. The Central Board is empowered to coordinate the activities of the State Boards. After consultation with the State Board, the state government may declare an area within the state as:

- (i) Air pollution control area.
- (ii) Prohibit the use of any fuel other than the approved one in the area of air pollution.
- (iii) Nobody can operate any industrial plant in air pollution control area without the consent of the State Board.

The Forest (Conservation) Act, 1980

The India Forest Act of 1927 was amended in 1980 to prohibit the state governments from declaring any reserve forest as non-reserve without prior approval of the central authority. This amendment has restricted the efforts of the state governments to use forest land for non-forest purposes.

The Wildlife (Protection) Act, 1972

This Act was enacted in 1972 to provide necessary protection against serious threats to wildlife by the expansion and advancement of agriculture, industry and urbanization. The Indian Board of Wildlife was set up in 1952 to protect the wildlife resources and prevent gene erosion. Various wildlife parks and sanctuaries were created; projects were launched to save endangered species such as lions (1972), tigers (1973), crocodiles (1974) and brown antlered deer (1981). India became a party to the Convention of International Trade in Endangered Species of Fauna and Flora (CITES) in 1976 and started a national component of the UNESCO's Man and the Biosphere Programme (1971).

The Wildlife Protection Act, (1972), was enacted to provide protection to wild animals and birds by:

- (i) Constitution of wildlife advisory board in each state.
- (ii) Regulating the hunting of wild animals and birds.
- (iii) Specifying the procedures for declaring areas of sanctuaries and national park.
- (iv) Regulating the possession, acquisition and trade of wild animals as well as animal products.

The Environment (Protection) Act, 1986

After the Bhopal gas tragedy in 1984, a series of new environmental laws were enacted. Through the Environmental (Protection) Act 1986, the Central Government has acquired the following powers:

- (i) Laying down standards for emission or discharge of pollutants from various sources and for environmental quality.
- (ii) Restricting area in which industries operation may or may not be carried out subject to certain safeguards.
- (iii) Laying down safeguards for the prevention of accidents and remedial measures in case of accidents.
- (iv) Procedures and protection for hazardous substance handling.
- (v) Issuing directions to any person, officer or authorities for closure, prohibition or regulation in electricity or water supply or any other services.

This act also empowers a person to complain to the court regarding violation of the provisions of the Act after having given a notice of 60 days to the prescribed authorities.

A violator of the Environmental Protection Act can face imprisonment up to five years and a fine of up to Rs one lakh.

Role of the Judiciary: Issues Involved in Enforcement of Environmental Legislation

Regulatory measures in the form of legislation check the degradation of the environment and lead to the enacting of laws at the national or international levels to prevent pollution. The role of the judiciary

in protecting the environment lies in formulation and enforcement of effective laws to protect the environment.

The Supreme Court of India's judgment sanctioning US\$ 470 million towards compensation by the Union Carbide to the victims of the Bhopal gas tragedy is an example of what the judiciary can do to protect the environment.

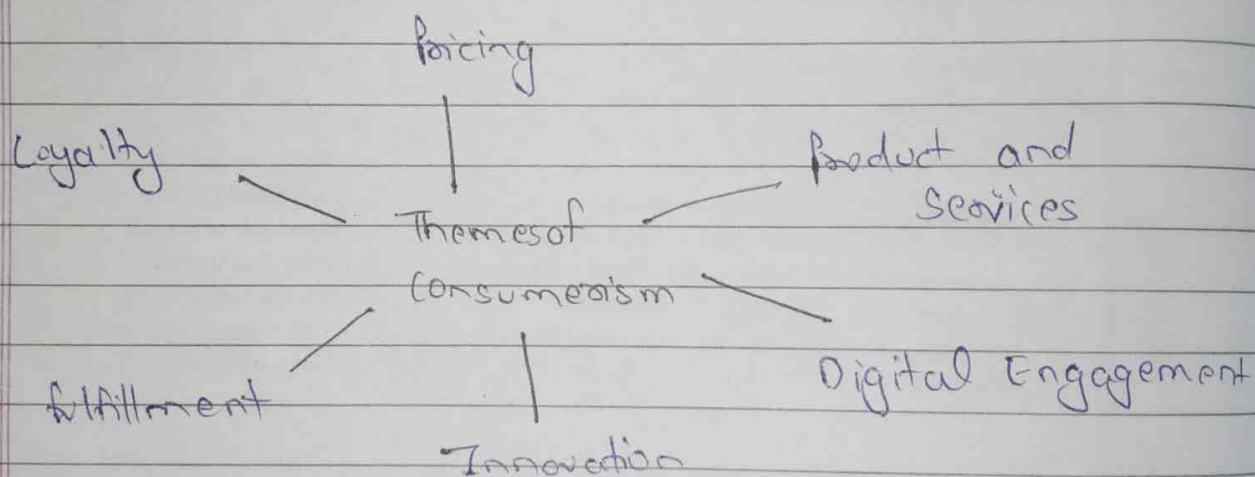
The Constitution of India has provisions to make environmental legislation. Many legislations have already been enacted to protect the environment. Judiciaries with their limited resources, try to enforce such laws. But the judiciary alone cannot improve the environment unless the states and citizens do their duties and obligations to protect and improve the environment.

For successful implementation of an environmental legislation, collection of relevant data, its processing and final submission to the enforcement agency has to be done honestly and effectively. Violation of any law or rule by an individual or institution has to be punished legally. Information must reach the law enforcement officials from the concerned person or people. If no cognizance is taken, the affected or interested person must file a Public Interest Litigation (PIL) for the protection of the environment. Thus, the general public must be careful of any irregular practice that is likely to have an adverse effect on our national environment.

Consumerism and waste product

Consumerism

- consumption of resources by the people at a higher rate
- Efficient Consumerism is the Most essential element to ~~minis~~ minimize waste and to promote the ~~econ~~ economy of a nation.
- With the increase in consumerism, the amount of waste generation will increase.
- Consumerism is related to the constant purchasing of new goods, with little attention to their true need, durability, product origin, or the environmental consequences of their Manufacture and disposal.



Positive consumerism effects

- More industrial products
- More employment opportunities
- High growth rate economy
- More goods and services available
- Comfortable and better life style

Negative consumerism effect

- Craving for goods is high
- Crime rate increases as wants to possess

- expensive gadgets
- 3) Theft become common and daylight robberies take place
 - 4) Imbalance the ecological system.

Waste products

When we consume ~~the~~ something ~~that~~ ~~the~~ ^{then it is not} fully amount of Material is not

When we consume any product / Material then it is not fully consumed. Some amount of Material are left as a waste product.

If we consume only 80% of a Material then the rest 20% are as waste product.

Result of consumerism is to produce waste product as industrial waste, agriculture waste, bio medical waste etc.

Mostly waste are Non-biodegradable in Nature leading to increased land fills and dumping in rivers and oceans.

The waste disposal create serious problem to our environment.

Sources of waste product

Households

Commerce and industry

Conversion of waste product Material into useful products by RRR → Reuse, Reduce, Recycle.

Environmental Impact Assessment (EIA)

Environmental impact Assessment is a tool used to identify the environmental, social and economic impacts of a project prior to decision making.

It aims to predict environmental impacts at an early stage in project planning and design, find ways and means to reduce adverse impacts, shape projects to suit the local environment and present the predictions and options to decision makers.

EIA was introduced in India in 1978 with respect to river valley projects.

Environmental components of EIA

- 1) Air environment → In this, we can check the present quality of air and determine the quality of air after the implementation of project.
- 2) Noise
- 3) Water environment
- 4) Biological environment
Flora and fauna are checked in this parameter.
We cannot lose the flora & fauna.
- 5) Land environment
Study of soil characteristics, land use, and drainage pattern & the likely adverse impact of the project.

EIA process

EIA Process

An EIA neither solves problems in itself nor substitutes for the formulation and implementation of appropriate policies. However, the overall process ensures that developments cause minimal environmental damage, do not unnecessarily reduce the productivity of the natural systems and do not impose unwanted costs on other development activities.

EIA consists of the following stages:

- (i) Identifications of goals and objectives.
- (ii) Survey, forecast and analysis.
- (iii) Formulation and evaluation of alternative plans.
- (iv) Decision, implementation and monitoring.
- (v) Consultation and public participation.

Stage I: Identification of Goals and Objectives

Generally, environmental objectives are not comprehensive mainly due to the absence of clear environmental quality standards. However, as industries have been increasingly adopting ISO 14001 Environmental Management System, the situation has been fast changing and one must clearly identify and formulate goals and objectives of the EIA process.

Stage II: Survey, Forecast and Analysis

Requirement of data with respect to significant parameters of existing environmental conditions is to be identified by using checklists, environmental matrices and other tools. The data obtained through surveys is to be reviewed and monitored continuously. The accuracy of forecasting future environmental conditions is dependent on the quality of population and economic forecasts and other assumptions of impacting parameters. The following actions are to be taken in this stage:

- (i) To develop environmental quality standards or targets.
- (ii) To predict expected environmental impacts based on available surveys and data.
- (iii) To analyse and assess the expected or planned development in terms of likely environmental damage to proceed, modify, change or cancel the project.

Stage III: Formation and Evaluation of Alternative Plans

Alternative plans which satisfy environmental goals and objectives need formulation and critical assessment with respect to ranking of their relative usefulness. Evaluating the environmental impact of each alternative plan involves determining the likely economic, demographic and environmental consequences that would result from their implementation.

Stage IV: Decision, Implementation and Follow-up.

After an environmental plan is chosen, it needs to be implemented and followed up. If evaluation of alternative plans is correct and the right plan is chosen, then there should be no technical problem in implementation and follow-up. However, some times certain deficiencies crop up in implementation and follow-up. Thus environmental impacts of plan implementation should be audited.

Stage V: Public Participation, Consultation and Communication

The content of planning reports, including estimates of environmental impacts should be communicated to the public in a sufficiently clear and comprehensive manner. This is required to get a reliable and representative community assessment of probable impacts.

Environmental Impact Statement (EIS)

It is prepared with the following elements:

- (i) Preliminary discussion.
- (ii) Writing of EIS.
- (iii) Consultation.

- (iv) Public participation.
- (v) Reviewing.
- (vi) Decision.
- (vii) Appeal.

Cost-Benefit Analysis

The viability of every project is judged by a single yardstick, a cost-benefit analysis. Cost-benefit analysis is also required for a reliable and representative EIA. Improved communication and timely dissemination of information among the concerned agencies improves cost-effectiveness. The improvement of cost-effectiveness also needs the following:

- (i) A close integration of EIA and development planning.
- (ii) Clarity of responsibility and continuity of the presence of a responsible person throughout the project.
- (iii) Reduction and if possible elimination of overlapping responsibilities and simplification of administrative procedures.
- (iv) Laying down an improved system of defining and accounting for environmental costs.

Environmental Risk Assessment (ERA)

ERA begins at the fact-finding/preparation stage when the environmental examination (EIA) indicates a potential hazard. It suggests risk reduction and risk management measures to be incorporated. A typical flowchart highlighting the major components of risk audit management is shown in the Figure 6.8.

Risk Audit/Risk Management Hierarchy

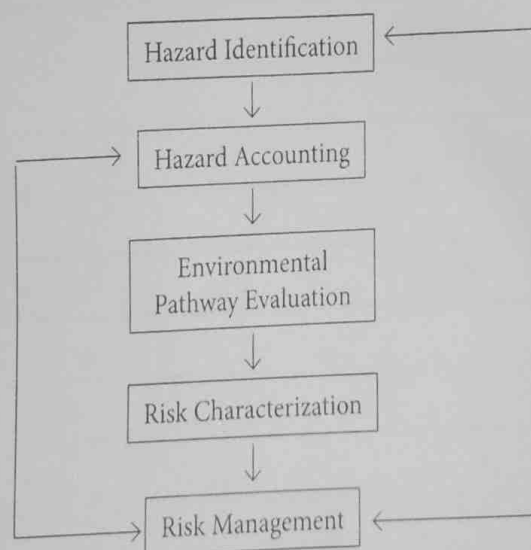


Figure 6.5 Current Status of EIA in India, Other Industrialized and Developing Countries

Sustainable development with minimum environmental impact on natural resources and the world has become an urgent issue in every level and process. Government and non-government environmental groups and associations have actively started putting pressure on the concerned authorities for regulations and enforcement of appropriate actions so as to prevent long-term environmental deterioration. The USA enforced

These examples illustrate the validity of BPP as a method of financing environmental improvement in the context of a developing country. The choice among these payment methods depends on considerations of fairness and social justice. There is no readymade formula to dictate which principle should be adopted.

Emissions Trading (Cap and Trade)

This is an administrative approach to promote and control pollution by providing financial incentives for achieving reduction in the emission of pollutants. Here, an administrative body or a central governing body takes the administrative approach. It may be an international body, the Central Pollution Control Board (CPCB) or even the State Pollution Control Board (SPCB). The maximum amount of pollutants that a company or a group can emit has a limit or cap set by a governing body. The company or the group is then issued an emission permit and is required to hold an equivalent number of allowances or credits basing on this cap. At no given time can the cap be less than the total amount of allowances and credits. It is also called 'cap and trade' because emission trading involves both cap and trade. The underlying principle of emission trading is that a company or a group must pay a charge for polluting and this charge is proportional to the quantum of pollution that they emit into the environment.

Several pollutants such as Greenhouse gases and nitrous oxide (that cause acid rain), have active trading programs.

Carbon Trading

The idea of carbon trade watch came into force in 2002. The inclusion of pollution trading policy in the Kyoto Protocol signals a historical proliferation of the free market principle into the environmental sphere. With a focus on emerging Greenhouse gases, carbon trading watch monitors the impact of pollution trading upon environmental, social and economic justice.

CASE STUDY

Powerguda village in Adilabad district of Andhra Pradesh had sold 147 tonnes equivalent of saved carbon credits to the World Bank for US\$ 645. According to villagers of Powerguda and Emmanuel D'Silva a farmer, the World Bank staff who are working in the area for creating awareness about their trade have extracted biodiesel from 4,500 Pongamia trees in their village. By using

biodiesel instead of petroleum they were able to save 147 MT of CO₂ and were also able to enhance the air quality. The World Bank was buying the carbon credits to balance the aviation fuel burnt by aircrafts carrying bank officials. At present, many other villages of India are following Powerguda and making carbon credit sales.

According to the Kyoto Protocol of 1997, all the countries are required to reduce their Greenhouse gas emission by five per cent from the 1990 levels in the next 10 years or pay a price to those that do. That means if a country is a consumer of any environmental value (clean air) it must pay a producer an equivalent value.

ISO 14000

ISO 14000 is a series of international standards on environmental management tools and systems introduced in 1996 by the International Standards Organization (ISO). The ISO is an apex body on standardizations in the world, formed in 1946 with the national bodies of most of the countries as its members; it has mostly developed technical standards to facilitate international exchange of goods and services. In 1987, it introduced ISO 9000 — the quality management system with emphasis on continual improvement of the process and the quality of goods and services. After the success of ISO 9000 quality management system, the ISO introduced the ISO 14000 series of environmental management system in 1996.

Polluter Pays Principle (PPP)

This as the name suggests is based on a simple principle that those who pollute the environment must also pay for the damages caused by them. This idea originated in the 1970s when the members of the Organization for Economic Cooperation and Development (OECD) introduced a payment method where pollution control costs are to be financed by polluters alone and not the public in general. Hence, this method of environmental financing gets its name Polluter Pays Principle. Later in 1985, economic instruments such as pollution taxes, user charges and subsidies were also added to OECD environmental guidelines.

Water Conservation

Water Conservation and Management

- i) Avoid polluting
- ii) Dispose off properly
- iii) Install conservation practices
- iv) Efficient use of water

A little water conservation Methods that can be apply by individuals to reduce the wastage of water are

- i) Taking bucket - baths instead of showers
- ii) Turning off the tap while shaving or brushing teeth

One of the strategies in water conservation is rain water harvesting.

Rainwater harvesting is the simple process or technology used to conserve Rainwater by collecting, storing, conveying and purifying of Rainwater that runs off from rooftops, parks, roads, open grounds etc

How to Harvest the Rainwater

- 1) Catchment → used to collect and store the captured Rainwater
- 2) Conveyance System → It is used to transport the harvested water from the catchment to the recharge zone.
- 3) Flush → It is used to flush out the first spell of rain
- 4) Filter → used for filtering the collected Rainwater and remove pollutants
- 5) Tank and the recharge structure → used to store the filtered water which is ready to use.

Advantages of Rainwater Harvesting

- i) Helps in reducing the water bill
- ii) Reduces the need for imported water
- iii) Decrease the demand for water

Methods of Rainwater harvesting

1) Surface runoff harvesting

In urban areas rainwater flow away as surface runoff. This runoff can be caught and used for recharging aquifers by adopting appropriate Methods.

2) Rooftop Rainwater Harvesting

It is a system of catching rainwater where it falls. In rooftop harvesting the roof becomes the catchment and the rainwater is collected from the roof of the house/building.

It can either be stored in a tank or directed to an artificial recharge system. This Method is less expensive and very useful and if implemented correctly helps in augmenting the groundwater level of the area.

Components of ~~Re~~ Rooftop Rainwater Harvesting

1) Catchment

The surface that receives rainfall directly is the catchment of rainwater ~~here~~ harvesting system. It may be a terrace, courtyard or paved or unpaved open ground.

2) Transportation → Rainwater from the rooftop should be carried through down to take water pipes or drains to the storage/harvesting system. Water pipe should be UV resistant of the required capacity.

3) First Flush → It is a device used to flush off the water received in the first shower. The first shower of rains need to be flushed off to avoid contaminating storable / exchangeable water by the probable contaminants of the atmosphere and the catchment roof.

It will also help in cleaning of slit and other material deposited on the roof during dry seasons. Provisions of first rain separators should be made at the outlet of each downpipe.

4) filter

- Sand & Gravel filter
- charcoal filter
- PVC - pipe filter

Climate change Resettlement and Rehabilitation

Resettlement

It is the process of moving people to a different place to live, because they are no longer allowed to stay in the area where they used to live.

Rehabilitation

- It is the act of restoring something to its original state, like the rehabilitation of the forest that had once been cleared for use of area for the construction of dams.
- The construction of the dam has major environmental implications on the surrounding areas, because it requires large amount of land to be cleared to provide the space for building.

Case studies

Sardar Sarovar Dam

- Over 53,000 hectares of forest area was decimated including deciduous forest that are valuable for firewood and forest byproducts.
- The habitat of endangered species such as the tiger and wolf were destroyed.
- The surrounding area faced risks of water logging and salinization which can decimate agricultural crops.
- 32,684 project-affected families (PAFs) have been resettled in the three states → Gujarat, Maharashtra, & Madhya Pradesh. affected by the project

6.5 Resettlement and Rehabilitation

Across the globe nearly 10 million people per annum are affected by forced displacement due to infrastructural projects such as dams, mines, roads, industries and power plants. They lose their shelter and livelihood and some of them die due to hunger and poverty. In India, planned development in growth sectors such as power, mining, heavy industry and irrigation, immediately after Independence had already displaced about 30 to 50 million persons. Only about 25 per cent of this number was resettled.

Uprooting people is a serious issue. The rights of the tribal people are also threatened with displacement. The developmental projects come into existence after a fairly long period of planning and awareness of displacement caused by such projects. Despite awareness about issues relating to the resettlement and rehabilitation of the displaced persons, very little attention is paid to them. Rather these projects focus on the economic efficiency and not on the person to be displaced from their land, livelihood and their socio-cultural life. Under the new economic policy, expecting large scale displacement, the Committee of Secretaries, Ministry of Rural Areas and Employment drafted the Land Acquisition Bill in 1998 for the rehabilitation of displaced persons. According to this Bill, people eligible for rehabilitation should apply to claim it. However, following a number of revisions, finally a National Policy of Resettlement and Rehabilitation on Project-Affected Families 2003 was gazetted on February 17, 2004 by the Ministry of Rural Development. In spite of this, resettlement and rehabilitation for development work in India is not adequate, uniform and consistent. Resettlement and rehabilitation, as per the Indian Constitution, is the responsibility of the individual states concerned. But only three states — Karnataka, Maharashtra and Madhya Pradesh have separate laws and only two public sector undertakings, the National Thermal Power Corporation (NTPC) and Coal India Ltd have separate policies for rehabilitation. No development work can be justified if a section of the society is pampered. Often, rehabilitation benefits are also discriminating. For example, a person displaced by canal or irrigation work gets lesser benefits than those affected by the construction of a dam.

Environmental Ethics

Ethics deal with moral duty and obligations and gives rise to a set of values, which in turn are used to judge the appropriateness of a particular conduct or behaviour. These are the basic principles by which a society should be guided in its decision making and activities. The entire world is laying greater emphasis on responsibilities to the environment. The basis of ethics is truth, honesty, justice, trustworthiness, competence and accountability.

climate change

Weather → It is atmosphere at a particular place and time. like we can determine the ~~the~~ atmosphere of present, morning, evening or more than 1 or 2 day are known as weather.

Climate is the long term pattern of weather in a particular area.

Climate change is the global phenomenon of climate transformation characterized by the changes in the usual climate of the planet that are especially caused by human activities.

The global climate is the connected system of Sun, earth and oceans, wind, rain and snow, forest, desert and savannas and everything people do, too.

Global warming is now one of the most important environmental issues. Our every day activities are leading to changes in the earth's atmosphere that significantly alter the planet's heat and radiation balance and warmer climate. International efforts to address this problem have been on since the 1980s. The Earth Summit in 1992 was an important launching point.

The knowledge that CO_2 in the atmosphere was a Greenhouse gas dates back to the 19th century. Not only CO_2 but other Greenhouse gases such as methane, nitrous oxide and water vapour too help to retain the incoming heat energy from the sun, thereby increasing the earth's surface temperature. However, CO_2 is the most important Greenhouse gas that is being affected by human activities ranging from burning any kind of fuel containing carbon to human respiration. The concentration of CO_2 in the earth's atmosphere was 280 ppmv and 358 ppmv (parts per million by volume) in 1750 and 1994, respectively and is steadily increasing at a rate of 1.5 ppmv per year. The concentration of other Greenhouse gases such as methane and nitrous oxide has also been rising at a fairly rapid rate. Earth has warmed an average 0.3 to 0.6°C since the late 19th century and temperatures would rise by 1 to 3.5°C by the year 2100 and global mean sea levels by about 15 to 95 cm. It is likely that changes of this magnitude and rapidity could pose severe problems for many natural and man-made ecosystems as well as important economic sectors such as agriculture and water resources. These changes also threaten extinction of habitation in many low-lying areas.

Most of the ill-effects of climate change are linked to extreme weather events such as hot and cold spells of temperature or wet or dry spells of rainfall or cyclones or floods. Prediction of nature and distribution of such events in a changed climate may not be accurate also resulting in the intensification of the ill-effects. Global warming has often been described as one of the most serious environmental problems ever to confront humanity. Its effect covers the entire globe over a time scale of decades or centuries and is inextricably linked with economic development of the nations. Since Greenhouse gases are generated by burning fossil fuel in power plants, factories and automobiles, it is not easy to reduce emissions. Virtually every facet of our life is intimately tied to the consumption of energy and any serious attempt to cut emissions will have clear and immediate consequences.

To respond to climatic changes, negotiations began in 1991 under the United Nations, so as to formulate an international treaty on global climate protection. This was finalized at the Earth Summit at Rio de Janeiro in June 1992. The convention has a few binding requirements and calls for nations to limit carbon dioxide and other Greenhouse emissions by addressing anthropogenic emissions by some and removal through sinks of Greenhouse gases. It does not set out specific targets or time frames for reducing emissions.

The consequences of climate change on the planet ecosystem

An increase in temperature due to global warming it's not only about a heat increase that can be felt by humans or glacial ice melting - it has potential to affect the planet's entire ecosystem

climate change effects

- a) Rising Sea Level
- b) Economic Losses
- c) Rising temperature
- d) More & ~~the~~ worse forest fires
- e) More animal extinctions

Nuclear energy → A renewable energy resource is used in producing electrical energy by fission reaction in nuclear reactors.

Fission reaction not only produce heat energy but also emit harmful radioactive radiation into atmosphere. So any damage to nuclear reactor may cause such nuclear accidents and holocausts

Nuclear accident The most serious hazard to human health and environment which is by the following type of incidents

- 1) Nuclear testing of atom bombs, weapons
- 2) Nuclear power plant accidents
- 3) Improper disposal of Nuclear waste

Effect of Nuclear Radiation

- 1) It breaks chemical bonds of DNA
- 2) Damage cell of human
- 3) At high dose of radiation affect bone marrow

Nuclear Holocaust It Means destruction of biodiversity by failure of nuclear equipment and Nuclear bomb explosion. In holocaust a large number of living beings are totally destroyed.

Case study

- 1) Nuclear war \rightarrow II world war (Hiroshima and Nagasaki, Japan) on 6th and 9th August 1945 due to an atom bomb explosion by USA.
- 2) At Chernobyl Disaster \rightarrow When operators lost the control of water-cooled, graphite moderated reactors during a low power test at Chernobyl in Ukraine, USSR on 26th April 1986.
- 3) At Fukushima Disaster The nuclear reactors got exploded due to failure of heat exchangers on 11th March 2011 due to an earthquake followed by tsunami over the city of Fukushima Daichi.