

AADIL SIR's Material

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Vision

“This course is designed to offer a comprehensive understanding of basic environmental issues, drivers of environmental change and management perspective. Furthermore, this paper will help the students to understand key governance and policy interventions needed to improve the wellbeing of the environment. This course will also highlight the role of citizens and eco-movements to achieve the objectives of sustainability”.

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UNIT I

GLOBAL ENVIRONMENTAL ISSUES

1. 1 Global Warming

Definition

“Global warming is an average increase in the temperature of the atmosphere near the Earth’s surface and in the troposphere, which can contribute to changes in global climate patterns. Global warming can occur from a variety of causes, both natural and human induced. In common usage, “global warming” often refers to the warming that can occur as a result of increased emissions of greenhouse gases from human activities.”

Greenhouse Gases

The phenomenon that worries the environmental scientists is that due to anthropogenic activities there is an increase in the concentration of the greenhouse gases in the air that absorb infrared light containing heat and results in the re-radiation of even more of the outgoing thermal infrared energy, thereby increasing the average surface temperature beyond 15°C. The phenomenon is referred to as the **enhanced greenhouse effect** to distinguish its effect from the one that has been operating naturally for millennia. The greenhouse gases present in the troposphere and resulting in an increase in the temperature of air and the earth are discussed here: Carbon dioxide (CO₂); Chlorofluorocarbons (CFCs); Methane (CH₄) and Nitrous oxide (N₂O).

(i) Carbon dioxide (CO₂)

It contributes about 55% to global warming from greenhouse gases produced by human activity. Industrial countries account for about 76% of annual emissions.

The main sources are fossil fuel burning (67%) and deforestation, other forms of land clearing and burning (33%). CO₂ concentration in the atmosphere was 355 ppm in 1990 that is increasing at a rate of 1.5ppm every year.

(ii) Chlorofluorocarbons (CFCs)

These are believed to be responsible for 24% of the human contribution to greenhouse gases. They also deplete ozone in the stratosphere. The main sources of CFCs include leaking air conditioners and refrigerators, evaporation of industrial solvents, production of plastic foams, aerosols, propellants etc. Atmospheric concentration of CFC is 0.00225 ppm that is increasing at a rate of 0.5% annually.

(iii) Methane (CH₄)

It accounts for 18% of the increased greenhouse gases. Methane is produced when bacteria break down dead organic matter in moist places that lack oxygen such as swamps, natural wetlands, paddy fields, landfills and digestive tracts of cattle, sheep and termites. Atmospheric concentration of methane is 1.675 ppm and it is increasing at a rate of 1% annually.

(iv) Nitrous oxide (N₂O)

It is responsible for 6% of the human input of greenhouse gases. Besides trapping heat in the troposphere it also depletes ozone in the stratosphere. It is released from nylon products, from burning of biomass and nitrogen rich fuels (especially coal) and from the breakdown of nitrogen fertilizers in soil, livestock wastes and nitrate contaminated groundwater. The atmospheric concentration of N₂O is 0.3 ppm and is increasing at a rate of 0.2% annually.

Impacts of Enhanced Greenhouse Effect

The enhanced greenhouse effect will not only cause global warming but will also affect various other climatic and natural processes.

(i) **Global temperature increase:** It is estimated that the earth's mean temperature will rise between 1.5 to 5.5°C by 2050 if input of greenhouse gases continues to rise at the present rate.

(ii) **Rise in sea level:** With the increase in global temperature sea water will expand. Heating will melt the polar ice sheets and glaciers resulting in further rise in sea level.

(iii) Rise in sea level will inundate low lying areas of cities like Shanghai, Cairo, Bangkok, Sydney, Hamburg and Venice as well as agricultural lowlands and deltas in Egypt, Bangladesh, India, China and will affect rice productivity. This will also disturb many commercially important spawning grounds, and would probably increase the frequency of storm damage to lagoons, estuaries and coral reefs.

(iv) **Effects on human health:** The global warming will lead to changes in the rainfall pattern in many areas, thereby affecting the distribution of vector-borne diseases like malaria, filariasis, elephantiasis, etc.

(v) **Effects on agriculture:** There are different views regarding the effect of global warming on agriculture. It may show positive or negative effects on various types of crops in different regions of the world.

Control: To slow down enhanced global warming the following steps will be important:

(i) Cut down the current rate of use of CFCs and fossil fuel.

(ii) Use energy more efficiently.

(iii) Shift to renewable energy resources.

(iv) Increase nuclear power plants for electricity production.

(v) Shift from coal to natural gas.

(vi) Stabilize population growth.

(viii) Efficiently remove CO₂ from smoke stacks.

(ix) Plant more trees.

1. 2. Climate Change

Definition

Climate is the average weather of an area. It is the general weather conditions, seasonal variations and extremes of weather in a region. Such conditions which average over a long period (at least 30 years) are called climate.

The phrase 'climate change' represents a change in the long-term weather patterns. Climate change is not a change of weather in a particular day; it is the cumulative change of long term weather pattern i.e. changes in climate.

In other words, Climate change means a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods.

Factors responsible for climate change

Significant human-led factors responsible for climate change are:

- Exponential growth in human population.
- Massive and unplanned urbanization and industrialization over the last century.
- Burning of fossil fuels such as coal, petroleum, and natural gas at huge scale to meet the growing energy needs of the bulging world population.
- Change in lifestyle and massive increase in the number of machinery, gadgets, etc.

Impact of Climate Change on Human Environment

The following are some consequences of climate change:

- Change in hydrological cycle and water supply.
- Increase in tropical and temperate cyclones, cloud cover, tornadoes and storms.

- Changes in pressure belts and atmospheric circulation.
- Warming of ocean water may endanger the corals worldwide.
- Expansion of deserts and more desertification within deserts.
- Effect on food supply and international trade of grains.

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1. 3. Population Explosion

Definition

Population: *A group of organisms of the same species which live together in one geographical area at the same time is called population.*

Population Explosion

There has been a dramatic reduction in the doubling time of the global human population. In the 20th century, human population has grown much faster than ever before. Between 1950–1990, in just 40 years the population crossed 5 billion marks with current addition of about 92 million every year, or so to say, adding a new Mexico every year. In the year 2000, the world population was 6.3 billion and it is predicted to grow four times in the next 100 years. This unprecedented growth of human population at an alarming rate is referred to as **population explosion**.

Causes of Population Explosion

Population explosion is causing severe resource depletion and environmental degradation. Our resources like land, water, fossil fuels, minerals etc. are limited and due to over exploitation these resources are getting exhausted. Even many of the renewable resources like forests, grasslands etc. are under tremendous pressure. Industrial and economic growth are raising our quality of life but adding toxic pollutants into the air, water and soil. As a result, the ecological life-support systems are getting jeopardized. There is a fierce debate on this issue as to whether we should immediately reduce fertility rates through worldwide birth control programs in order to stabilize or even shrink the population or whether human beings will devise new technologies for alternate resources, so that the problem of crossing the carrying capacity of the earth will never actually come.

Consequences of Population Explosion

The following are some consequences of population explosion:

(i) It can lead to depletion of resources.

- (ii) Severe competition for food and space.
- (iii) Increase in psychological stress and strain.
- (iv) Rapid pollution of environment.
- (v) Large scale unemployment.

Measures to Control over Population

Various methods for discouraging population growth in shortest period are:

- (i) To educate the people about the abuses of overpopulation (Population education), food production, self-employment.
- (ii) To provide free family planning aids (Family planning methods).
- (iii) Motivating people to undergo sterilization process (Birth control).
- (iv) More incentives to families observing family planning norms (Limited family).
- (v) By imposing legal restrictions (by laws).
- (vi) Over-population is one of the numerous problems facing India.

1. 4. Desertification

Definition

Desertification is defined by the UN Convention to Combat Desertification (CCD) 1995 as “land degradation in arid, semi-arid, and dry-sub-humid areas resulting from various factors including climate variation and human activities”.

It can also be defined as ‘the diminution or destruction of the biological potential of the land which can ultimately lead to desert like conditions’.

Causes of Desertification

Some of the principal causes, which promote desertification, are: over cultivation, overgrazing, deforestation, increased population and water logging.

(a) Over Cultivation

Every cycle of cultivation is preceded by ploughing to remove weeds. The ploughed land turns soil upside down thus exposing rich sub-soil to wind and water erosion. Such land may remain barren for most part of the year and in turn lose more soil due to erosion. Such erosion is most pronounced on slopes.

(b) Overgrazing

Deserts receive less rainfall. Deserts have sparse vegetation mostly consisting of grasses and herbs less and best used for grazing. Overgrazing by goats, domestic cattle remove the protective vegetation and expose the soil. Further the movement of grazing animals loosens the soil surface by their hoofs. Unprotected loose soil becomes highly susceptible to erosion by wind and water.

(c) Deforestation

Forests and vegetation prevent soil erosion and to hold water in soil. Plant roots absorb and recycle nutrients released from the decaying organic matter. Forests are often cleared to agriculture, timber, construction wood, firewood, raw material for paper etc. All this leads to barrenness of the land leading to desertification.

(d) Increased population

Livestock pressure on marginal lands accelerates desertification.

(e) Water logging

When free water is standing on the surface of soil, the soil is called waterlogged soil. This condition usually arises under shallow ground water table due to seepage from the adjoining canal or non-exploitation of the brackish groundwater and poor drainage of the soil. Generally farmers apply flood irrigation to meet the water requirement of the crops. Excess irrigation water, which is necessary for the leaching of salts beyond the root zone of crops, may also sometimes causes water logging due to poor drainage condition of the soil. Some soils are permanently waterlogged whereas some are seasonally waterlogged especially during rainy season. Under waterlogged condition, plant growth and development is restricted mainly due to the deficiency of oxygen as plant roots require oxygen for respiration. Water logging is most often associated with the problem of soil salinity.

Effects of Desertification

A major impact of desertification is biodiversity loss, and loss of productive capacity, such as the transition from grassland dominated by perennial grasses to one dominated by perennial shrubs. In extreme cases, it leads to the destruction of lands' ability to support life.

Measures to Control Desertification

1. Afforestation and planting of soil binding grasses can check soil erosion, floods and water logging.
2. Crop rotation and mixed cropping improve the fertility of the soil. It would increase production which can sustain large population.
3. Desertification can be checked by artificial bunds or covering the area with proper type of vegetation.

4. Shifting of sand can be controlled by mulching (use of artificial protective covering).

5. Salinity of the soil can be checked by improved drainage. Saline soil can be recovered by leaching with more water, particularly where water table of the ground is not very high.

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1. 5. Ozone Layer Depletion

Ozone: The word ozone is derived from the Greek word ‘ozein’, meaning “to smell.” Ozone has a pungent odor that allows ozone to be detected even in very low amounts.

Ozone Location: Most ozone (about 90%) is found in the stratosphere, a region that begins about 10-16 kilometers (6-10 miles) above Earth’s surface and extends up to about 50 kilometers (31 miles) altitude . The stratosphere begins at higher altitudes (16 kilometers) in the tropics than in the Polar Regions (10 kilometers). Most ozone resides in the stratosphere in what is commonly known as the “ozone layer.” The remaining ozone, about 10%, is found in the troposphere, which is the lowest region of the atmosphere between Earth’s surface and the stratosphere.

Importance or Significance of Ozone Layer/Ozonosphere: The significance of ozone layer lies in the fact that presence of ozone in stratosphere, because the lethal UV-radiations from the sun are blocked by this layer and protect the living organisms on the earth. That is why this layer is called as **earth’s protective umbrella**.

Ozone Depleting Substances (ODS)

The substances that cause the destruction or depletion of ozone in ozone layer are called as Ozone depleting substances. The main ODS include chlorofluorocarbons, halons, carbon tetrachloride, hydrofluorocarbons, etc. that are responsible for the depletion of ozone layer.

- Scientific evidence indicates that stratospheric ozone is being destroyed by a group of manufactured chemicals, containing mainly chlorine or bromine, called “ozone-depleting substances” (ODS).

Thinning of Ozone Layer: The ozone depletion has caused thinning of the ozone layer generally called as ozone hole. Ozone hole formation in Antarctica due to its unique climatic and weather conditions. The Antarctic ozone hole was discovered by Dr. J. C. Farman in 1985. During the cold, dark, southern winter in Antarctica, a powerful swirling vortex of westerly wind is formed. In these conditions, temperature drops below -85°C and clouds of ice particles called as **polar stratospheric clouds** are formed. These clouds trap and concentrate the highly reactive chlorine on the surface. Chlorine atoms get frozen and locked within ice particles. At the end of the polar winter, with the first rays of the spring sun, the chlorine atoms are released and these begin reacting with ozone. Thus, the hole is observed every spring season.

Effects of Ozone Depletion

The following are some effects of Ozone Depletion

1. Effects of human and animal health

- Potential risks include an increase in the incidence of and morbidity from eye diseases, skin cancer and infectious diseases.
- UV radiation has been shown in experimental systems to damage the cornea and lens of the eye. Experiments in animals show that UV exposure decreases the immune response to skin cancers, infectious agents and other antigens and can lead to unresponsiveness upon repeated challenges.

2. Effects on terrestrial plants

- Psychological and developmental processes of plants are affected by UV-B radiation.
- Response to UV-B also varies considerably among species and also cultivars of the same species. In agriculture, this will necessitate using more UV-B tolerant cultivars and breeding new ones.

3. Effects on aquatic ecosystems

- Exposure to solar UV-B radiation has been shown to affect both orientation mechanisms and motility in phytoplankton, resulting in reduced survival rates for these organisms.

Control of Ozone Depletion : In order to prevent further damage to ozone layer, a large number of substances are now being used as substitutes for ODS that are being phased out under Montreal Protocol. These ozone friendly chemicals are now widely being manufactured as alternatives to CFCs in refrigeration, foam sector, industry and fire extinguishing by both developing as well as developed countries.

Montreal Protocol

The Montreal Protocol is related to the substance that depletes the ozone layer of the atmosphere. This International Treaty is designed to protect the ozone layer, by phasing out the production of numerous substances believed to be responsible for ozone depletion. The Treaty was opened for signature on 16 September, 1987 and came into force on 1 January, 1989.

The main objective of this protocol was to reduce the consumption of ozone depleting substances like CFCs, HCFCs, Halons, CCl₄, etc.

1. 6. Acid Rain/Acid Precipitation

Definition

The term 'acid rain' was coined by a British Chemist, Robert Angus Smith, in 1872. It is the major factor responsible for biodiversity depletion and environmental degradation.

Acid rain literally means 'the presence of excessive acids in rain waters'. Acid precipitation is the rain water containing sulphuric acid (H_2SO_4) and nitric acid (HNO_3) along with a small amount of hydrochloric acid (HCl) which are formed from the oxides of sulphur and nitrogen present in the air as pollutants and has a pH of less than 5.6.

Effects of Acid Rain

- It causes deterioration of buildings especially made of marble e.g. monuments like Taj Mahal.
- Crystals of calcium and magnesium sulphate are formed as a result of corrosion caused by acid rain.
- It damages stone statues. Priceless stone statues in Greece and Italy have been partially dissolved by acid rain.
- It also damages iron and steel structures.
- Aquatic life especially fish are badly affected by lake acidification.
- Many lakes of Sweden, Norway, Canada, etc have become fishless due to acid rain.
- It damages foliage and weakens trees.

Control of Acid Rain

- Emission of SO_2 and NO_2 from industries and power plants should be reduced by using pollution control equipments.

- Liming of lakes and soils should be done to correct the adverse effects of acid rain. A coating of protective layer of inert polymer should be given in the interior of water pipes for drinking water.
- Implementation of the environmental pollution laws more effectively.
- EIA on any major/minor industry before the establishment.
- Public awareness about acid rain and its impact on economy, society and ecology.
- Planting air pollution tolerant trees (like Peepal tree) near industries is known as Greenbelt Designing.

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1. 7. Global Biodiversity Loss

Definition

The term 'Biodiversity' was coined by Walter G. Rosen in the national forum on Biodiversity held in Washington D.C. in 1986. Biodiversity is now an international buzzword through its use in the Biodiversity Convention which has been agreed on by the UNCED.

Bio = life/living beings; Diversity = Variations/variety

It is defined as "variety or variability among living organisms and variety among the ecosystems in which they live, is known as biodiversity".

Loss of Biodiversity/Threats to Biodiversity

The main human impacts which threaten biodiversity are:

- (i) **Habitat Destruction:** Destruction of habitats by humans is the largest cause of loss of biodiversity. The greatest destruction of biological communities is caused due to expansion of human activities and human population. As per JUCN, UNEP-report (1986), more than 50% of the wild life habitats have been destroyed in the old world tropical countries and there are high rates of destruction going on in Asian countries like Sri Lanka, Bangladesh and India too. Most of the habitat destruction has been caused in recent times due to rapid expansion of human population and human activities like mining, deforestation, expansion of agriculture, constructions, all have caused a great threat to the world biodiversity.
- (ii) **Habitat Fragmentation:** Sometimes the loss of habitat is in installments so that the habitat is divided into small and scattered patches, a phenomenon known as habitat fragmentation. Due to habitat fragmentation many song birds are vanishing.
- (iii) **Hunting:** Animals are killed for enjoyment to provide food is known as hunting.

(iv) **Poaching of Wildlife:** Illegal trading of animals to obtain useful and costly materials is known as poaching. Poaching of wildlife for trade and commercial activities has been on the rise for the last many decades. It has been a significant cause of the extinction of hundreds of species and the endangerment of many more, such as whales and many African large mammal, Asian tigers, etc. Most extinction over the past several hundred years is mainly due to overharvesting for food, fashion, and profit. Illicit trade in wildlife in current times is driving many species of wild animals and plants to extinction. Elephants are poached for ivory; tigers and leopards for their skin; pangolins for meat and scales; and rare timber is targeted for hardwood furniture.

(v) **Introduction of Exotic Species:** species which are not the natural members of a community but have been introduced into that community are known as exotic species. These may be free from diseases, parasites and competition in the newly introduced area and may become super aggressive. Such successful establishment of the exotic species may kill the native species to the point of extinction by aggressively dominating the area or may change the habitat conditions of the new area so that the native species could no more persist.

(vi) **Pollution:** High temperature is caused by global warming and climate change. Polar bear and penguins cannot survive at high temperature; they are threat and becoming extinct.

(vi) **Diseases:** Organisms are more prone to diseases when under stress or under captivity or are confined to a small geographical area. Human activities like plant introduction may increase the incidences of diseases to wild species

(vii) **Overexploitation:** overexploitation of valuable species usually causes the extinction of that very species at a much greater pace. Market hunting gives rise to smuggling of furs, Hades specimens, teeth, tusks, skin etc. to have maximum gains. Unsustainable methods of harvesting, international trade of species also

exploits the species to the point of extinction or reduces the size of population to a point where from its recovery is very much difficult e.g. 200 yrs ago, the Passenger pigeon, worlds most abundant bird inhabiting Eastern North American was drawn to extinction in 1900 because of hunting pressure and habitat destruction causing the complete removal of this species from the globe.

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UNIT II

ENVIRONMENTAL GOVERNANCE AND POLICY

2. 1. Concept of Environmental Governance

Environmental Governance comprises the rules, practices, policies and institutions that shape how humans interact with the environment. Good environmental governance takes into account the role of all actors that impact the environment. From governments to NGOs, the private sector and civil society, cooperation is critical to achieving effective governance that can help us move towards a more sustainable future. UNEP's mandate is to be the leading global environmental authority. From delivering expert scientific assessments to providing international platforms for negotiation and decision making,

Goals of Environmental Governance

The Environmental Governance sub-programme focuses on strengthening global, regional, national and local environmental governance to address agreed environmental priorities. The sub-programme has four key goals:

- **Sound science for decision-making:** UNEP aims to influence the international environmental agenda by reviewing global environmental trends and emerging issues, and bringing these scientific findings to policy forums.
- **International cooperation:** UNEP helps States cooperate to achieve agreed environmental priorities, and supports efforts to develop, implement and enforce new international environmental laws and standards.
- **National development planning:** UNEP promotes the integration of environmental sustainability into regional and national development policies, and helps States understand the benefits of this approach.

- **International policy setting and technical assistance:** UNEP works with States and other stakeholders to strengthen their laws and institutions, helping them achieve environmental goals, targets and objectives. UNEP's work on Environmental Governance is focused on four core services:

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2. 2. Environmental Literacy – Three Levels of Learning

In examining the various ways that environmental experts and educators think about and position public environmental education and information activities, a framework emerges with three basic levels of learning: 1) Environmental awareness, 2) personal conduct knowledge, and 3) true environmental literacy.

The first level is **environmental awareness**: NEETF/Roper research finds that about 50% to 70% of adults have "heard of" most major environmental subjects such as water and air pollution, energy efficiency, solid waste, habitat loss, and climate change. Awareness is best characterized by simple familiarity with an environmental subject with little real understanding of its deeper causes and implications. The research demonstrates that environmental awareness by itself has limited lasting effect on environmental stewardship attitudes (although it can reinforce existing sentiments) and by itself has little effect on "environmentally-friendly" behavior. The main advantage of widespread environmental awareness is its contribution to public support for government action in environmental policy and management.

Personal conduct knowledge does not require detailed knowledge of causal sequences because most of the connections are fairly simple and usually require just one step. We refer to this level as "personal conduct" knowledge because, unlike general environmental awareness, people willingly go a step farther to take personal action and make the connection between an environmental issue and their own individual conduct.

The third and final level is "**environmental literacy**" and it is distinct from simple awareness or immediate personal conduct instruction because of its depth of information and the actual skills (thinking and doing) that are imparted. True environmental literacy takes time. It can't be placed in an educational "microwave."

2.3. Environmental Governance at Global Level/Outlook (institutional arrangements)

The GEO is UNEP's flagship assessment and the only UN report with an outlook component to provide a regular update on the state and trends of the global environment. It identifies policy options and their indicative costs and benefits, bringing diverse stakeholder groups together to raise awareness on these key trends and policy solutions. UNEP is currently working on the fifth GEO which will be published in 2012, and will contribute to the Rio+20 preparations.

- **Scientific networks:** To help close science-policy gaps, UNEP works to connect key scientific networks to policymakers and development authorities.
- **Capacity building tools and services:** UNEP helps States and other actors design and deploy tools to regularly monitor their natural resources and keep their environmental situation under review. International cooperation UNEP catalyses international efforts to implement internationally agreed objectives.
- **International laws, norms and standards:** UNEP promotes cooperation on environmental policy between governments, UN agencies, other intergovernmental bodies, and major groups and stakeholders. UNEP's work focuses in particular on aligning international laws and standards with the goals, targets and commitments identified in the UN's Programme for the Development and Periodic Review of Environmental Law (Montevideo Programme).
- **Setting the global agenda:** UNEP uses alert services, such as annual reports, to update the global community on emerging environmental issues, problems and trends. UNEP also uses its many assessments and indicators on the state of the global environment to steer the global policy dialogue. To

enhance cooperation, UNEP helps link national and regional agendas through the priorities set by regional and sub regional ministerial environmental forum and the Governing Council.

- **Environmental law and institutions:** UNEP helps governments develop and strengthen their judicial, political and legal systems to provide a sound basis for environmental governance.
- **Regional institutions:** UNEP helps develop and strengthen institutional arrangements across the world that support sustainable management of shared natural resources, and address transboundary environmental issues.

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2. 4. Non-Governmental Organizations (NGO's)

- NGO's are non-governmental organizations usually referred to as organizations which are not part of government though could be funded by the government. The primary objective of these organizations is public service.
- Environmental NGO's can play a crucial role in helping to plug gaps by conducting research to facilitate policy development, building institutional capacity and facilitating independent dialogue with civil society to help people live more sustainable lifestyles. Environmental NGO's typically take up causes related to the environment such as climate change, air pollution, deforestation, ozone layer depletion, waste management, biodiversity and land use, energy, conservation, environmental degradation, land degradation, etc.
- Some of the prominent examples of environmental NGO's working in India are Bombay Natural History, Assam Science society, Centre for environmental Education, Centre for science education, Kerela Sastra Sahitya Parishad, Greenpeace India, etc. These NGO's have been successful in protecting the environment to a great extent. Thus we can say that NGO's have played an active role in the protection of environment in India.

Characteristics of NGO's

- Environmental monitoring and reporting.
- Protecting the environment.
- Management of resources and environment: Community based project.
- Providing basic social services.
- Awareness-raising, campaigning and advocacy.
- Education, training and capacity building.
- Government and NGO's partnership.

Role of NGO's in Protecting the Environment

The NGO's that work to save the environment conduct campaigns across the country to create awareness among people about the depleting natural resources. Moreover, due to the increasing number of factories, chemical waste gets mixed with clean drinking water causing health problems. NGO's for environment in India have helped reduce deforestation, soil erosion and they educate the people on the significance of segregating waste material into biodegradable waste. NGO's for environment in India, take steps to educate people and make them aware of the perishing environment. There are NGO's in India that help in preserving the environment: Creating awareness among the public on current environmental issues and solutions. These also help in

- i.** Facilitating the participation of various categories of stakeholders in the discussion on environmental issues.
- ii.** Conducting participatory rural appraisal.
- iii.** Being involved in the protection of human rights to have a clean environment.

Conclusion

NGO's contribute to global environmental governance in different ways and to different degrees by offering knowledge and expertise, moral arguments and new ideas, and by taking action on implementing policies and assuming the role of stakeholders. The approaches used by NGO's, and ultimately their influence, depend in some part on their resources and their comparative advantages in terms of, for example, expertise, access to policy-makers, or the ability to join networks. The overall landscape of NGO's involved in global environmental governance is hence characterized by plurality, inequality, and contradictions.

2.5 Constitutional Provisions for Environmental Protection

Provisions for environmental protection in the Constitution of India were made within four years of Stockholm Conference, in 1976, through the 42nd amendment as follows:

- **Article 48-A** of the Constitution provides: *“The state shall endeavour to protect and improve the environment and to safeguard forests and wildlife of the country.”* This article falls under the Part IV of the Constitution deals with the *Directive Principles of State Policy*.
- **Article 51A (g)** provides: *“It shall be the duty of every citizen of India to protect and improve the natural environment including forests, lakes, rivers and wildlife and to have compassion for living creatures.”* This article falls under the Part IVA of the Constitution deals with the Fundamental Duties.
- **Articles 21:** Under Fundamental Rights (Part-III), Articles 21, 14 and 19 have been used by judiciary to establish Right to clean environment as one of the implied fundamental rights. Article 21 which says: *“no person shall be deprived of his life or personal liberty except according to procedure established by law”*, has been subject to maximum scrutiny by Supreme Court, which has mandated for more than once that the right to environment, free of danger of disease and infection are inherent in this act.
- Thus, whenever any problem of environment occurs or is brought before the court, the Article 21, 48A and 51A (g) play an important role in giving justice and reminding states and their citizens their due duties towards improvement and protection of our environment.
- Apart from the above, Supreme Court (via Article 32) and High Courts (via Article 226) have frequently admitted to public interest litigation related to environment.

What is an Environmental Policy?

Environmental policy is defined as “*any action deliberately taken to manage human activities with a view to prevent, reduce, or mitigate harmful effects on nature and natural resources, and to ensure that man-made changes to the environment do not have harmful effects on human or the environment*”.

2. 6. National Environment Policy-2006

The National Environment Policy seeks to extend the coverage, and fill in gaps that still exist, in light of present knowledge and accumulated experience. It does not displace, but builds on the earlier policies.

- The dominant theme of this policy is that while conservation of environmental resources is necessary to secure livelihoods and well-being of all, the most secure basis for conservation is to ensure that people dependent on particular resources obtain better livelihoods from the fact of conservation, than from degradation of the resource.
- The policy also seeks to stimulate partnerships of different stakeholders, i.e. public agencies, local communities, academic and scientific institutions, the investment community, and international development partners, in harnessing their respective resources and strengths for environmental management.
- Involvement of Panchayati Raj Institutions and urban local bodies has been highlighted.
- It also seeks to revisit the Coastal Regulation Zone notifications to make the approach to coastal environmental regulation more holistic and, thereby, ensure protection to coastal ecological systems, waters and the vulnerability of some coastal areas to extreme natural events and potential sea level rise.

Objectives of National Environment Policy-2006

The principal Objectives of this policy are enumerated below. These Objectives relate to current perceptions of key environmental challenges.

- To protect and conserve critical ecological systems and resources.
- To ensure equitable access to environmental resources and quality for all sections of society, and in particular, to ensure that poor communities, which are most dependent on environmental resources for their livelihoods, are assured secure access to these resources.
- To ensure judicious use of environmental resources to meet the needs and aspirations of the present and future generations.
- To integrate environmental concerns into policies, plans, programmes, and projects for economic and social development.

AADIL SIR'S MATERIAL

UNIT III

ENVIRONMENTALISM, CITIZEN SCIENCE AND SUSTAINABILITY

3.1. Concept of Environmentalism, Biocentrism, Anthropocentrism, Ecocentrism

Environmentalism

The Encyclopedia Britannica defines the term environmentalism as “*a political and ethical movement that seeks to improve and protect the quality of the natural environment through changes to environmentally harmful human activities: through the adoption of forms of political, economic and social organizations that are thought to be necessary for or at least conducive to, the benign treatment of the environment by humans; and through a reassessment of humanity’s relationship with nature*”. A simpler definition of environmentalism calls it “a social movement that seeks to influence the political process by lobbying, education, activism and setting an example in order to protect natural resources and ecosystem.

Bio-centric Philosophy: Bio-centric philosophy claims that nature has an intrinsic moral worth that does not depend on its usefulness to human beings and it is this intrinsic worth that gives rise directly to obligations to the environment. Humans are therefore morally bound to protect the environment, as well as individual creatures and species, for their own sake. In this sense, bio-centric thinkers view human beings and other elements of the natural environment, both living and often non-living, as members of a single moral and ecological community. The bio-centric principle of interconnectedness was extensively developed by British environmentalist James Lovelock, who postulated in his *Gaia: A New Look at Life*

on Earth that the planet earth is a single living, self regulating entity capable of re-establishing an ecological equilibrium even without the existence of human life.

Environmental Ethics: Between Anthropocentrism and Ecocentrism

Environmental ethics is defined as the moral relationship between humans and the natural environment. It is an area of environmental philosophy that faces a lot of conflict due to the various subdivisions in terms of ethical perceptions. For traditional and religious views, some people believe that they were given dominion over nature's plants and animals to serve their needs.

It all depends on how do we *think and act*. If we consider, nature has supplied us with all the resources for success, the good-looking life and nurture us like a mother, this is called as an *earth-centric thinking or Ecocentrism*. Due to this perspective, it becomes obligatory to preserve the mother planet. The fundamental reality is that humans cannot wear away the mother planet completely, but it can devastate us in altogether. It is our fundamental demand to safeguard the environment so that we can assure our survival, and avert ourselves from deteriorates. Thus, it can say all that exists in nature and all natural systems have indigenous value. If human beings have to remain alive, the environment needs to be safeguard. The earth is our home and dwell for all other living beings too. We need to remind the age old adage "live and let live". Now it is our moral duty to protect our mother planet from any detriment and if it is harm we have to support in its recapture. Similarly, if we consider, man is all mighty and the highest creature on this mother planet and human is the dominant of nature and can harness it at his desire, it shows our human-centric perspective and thus it is called *anthropocentric*.

3. 2. Environmental Movements/Greenbelt Movements

Environmental movements are generally understood as those movements that are taken up against the development projects as the latter depend on vast amounts of natural resources and their injudicious use and exploitation.

Chipko Movement/The tree-Hugging Movement

- The first recorded event of Chipko however, took place in village Khejarli, Jodhpur district, in 1730 AD, when 363 Bishnois, led by Amrita Devi sacrificed their lives while protecting green Khejri trees, considered sacred by the community, by hugging them, and braved the axes of loggers sent by the local ruler, today it is seen an inspiration and a precursor for Chipko movement of Garhwal.
- The women spotted the labour with axes, who came to cut the trees, they protested and vowed to protect the trees. Small groups of women kept constant vigilance and hugged the trees in order to prevent the felling. Led by Gauri (sometimes referred as Gaura) Devi and Gunga Devi, along with their co-workers, the movement was a much successful one.
- The Chipko Movement, which is also identified chiefly as a women's movement, originated in the Garhwal Himalayan mountain region of the present Uttarakhand state.
- This movement was launched by **Sunderlal Bahuguna** along with Chandi Prasad Bhutt in Dec, 1973 at a small hilly village at Tehri, District Garhwal of Uttarakhand State.
- It is a social-ecological movement that practised the Gandhian methods of satyagraha and non-violent resistance, through the act of hugging trees to protect them from falling.

- The movement was launched from Srinagar (Garhwal) to Siliguri (West Bengal).
- **The main aim of movement was to save trees on the Himalayan slopes.**
- According to Chipko Movement, a self sustained community requires **5F's** i.e., (food, fodder, fuel, fibre and fertilizer).
- The landmark event in this struggle took place on March 26, 1974, when a group of peasant women in Reni village, Hemwalghati, in Chamoli district, Uttarakhand, India, acted to prevent the cutting of trees and reclaim their traditional forest rights that were threatened by the contractor system of the state Forest Department.
- By the 1980's the movement had spread throughout India and led to formulation of people-sensitive forest policies, which put a stop to the open felling of trees in regions as far reaching as Vindhyas and the Western Ghats.

Appiko Movement

- Appiko movement was a revolutionary movement based on environmental conservation in India.
- The Chipko movement in Uttarakhand in the Himalayas inspired the villagers of the district of Karnataka province in southern India to launch a similar movement to save their forests.
- It was started in 8 September 1983, men, women and children of Salkani village, District Kanara in Karnataka State “hugged the trees and forced the axeman to stop felling the trees” in Kalase forest. (The local term for “hugging” in Kannada is ‘appiko’.)
- Appiko movement gave birth to a new awareness all over the southern India.

Narmada Bachao Movement/Andolan

India's first Prime Minister Mr. Pt. Jawahar Lal Nehru once said that the "Dams are the temples of the modern India". Such remark of his is considered the construction of the dams is quite essential part of the development of a country, although he reiterated them as "a disease of gigantism" which India should abandon. During 1970's Govt. of India formulated a plan to build 30 dams on the river Narmada that flows through Gujarat, MP and Maharashtra. The construction of two major dams Sardar Sarovar project in Gujarat and Indra Sagar project in Madhya Pradesh raised the main conflict among the masses of the Narmada valley. As a part of Narmada Dam Project the aim of these dams is to provide irrigation and electricity to these states. Thus the Narmada Bachao Andolan got developed gradually as a resistance movement spearheaded by native tribal's, farmers, environmentalists and human rights activists against the construction of these dams. The mode of campaigning under this Andolan includes court actions, hunger strikes, rallies and gatherings and other support from notable persons. The chief leaders of this movement, Baba Amete and Medha Patker later on received the Right Livelihood Award in 1961. Baba Amete registered a case in courts against both these projects in both the states. As per the reports of MoEF, the environmental cost of Sardar Sarovar and Indra Sagar project will be the loss of forest area worth 30923 crores and 8190 crores respectively. About 80 million trees will be cut down in one go and the ecological balance of the area would be seriously damaged by changing the climate and hydrological cycle. As per the official report, about 130428 hectares of land area would be submerged including 55681 hectares of agricultural lands and 56066 hectares of forest land. Besides, there would be displacement of about thousands of inhabitants and thousands of livestock would be rendered devoid of grazing area. As a result, the report submitted by Forest Advisory Committee in 1990 advocated that work on project

be stopped with an immediate effect. There were many stakeholders like Narmada Asar Grastha Samiti (Gujarat based), Narmada Ghati Nav Nirmaan Samiti (Madhya Pradesh) and Narmada Dharangrastha Samiti (Maharashtra based) who worked for the need of fair rehabilitation plans for the people and voluntarily opposed the dam construction. The movement was also joined by several environmental organizations, local people, professionals and activists as founders of a non-violent movement to pressurize the World Bank to stop the aid for the construction of the project. With the help of experts from different fields this Andolan has worked out alternate measures for both irrigation as well as electricity generation for these states. For energy scenario, a combination of energy conservation, decentralized power generation and natural gas plants was suggested to prove less harmful to the environment than the energy provided by Narmada project in terms of cheaper electricity, less displacement of people and less damage to the forest land. For ensuring safe supply of water to these states, stress was laid down on new strategy of water conservation and watershed development projects. These measures help in preserving and reviewing ground water and waters of many small and large surface water bodies. This is to be done in a non destructive manner with full public involvement which is beneficial to both environment and people to yield significant results. In reality, the project is neither modified nor stopped till date for any decisive conclusion.

3. 3. What is Citizen Science?

Citizen science is an approach to environmental information that actively and genuinely encourages and solicits public input in the scientific process and incorporates data and information generated outside of traditional institutional boundaries. In *citizen science*, the public participates voluntarily in the scientific process, addressing real-world problems in ways that may include formulating research questions, conducting scientific experiments, collecting and analyzing data, interpreting results, making new discoveries, developing technologies and applications, and solving complex problems. EPA has engaged in citizen science primarily by working with community groups engaged in *community citizen science*. Community citizen science is collaboratively led scientific investigation and exploration to address community defined questions, allowing for engagement in the entirety of the scientific process.

Citizen science is more than the participation of volunteers in research. It is a model for the democratization of research and policy making. In addition, it is an environmental movement that is changing the way the government and institutions interact with the public.

Citizen Science in the Context of Global Sustainability

Citizen science is part of a global trend of sustainability that is built on empowerment and community engagement. From community gardens and renewable energy to community pollution monitoring, communities and cities are building greater resilience and transitioning to greater self-sufficiency. Scientists are finding new, cost-effective approaches to work with members of the public to expand and increase scientific knowledge.

Citizen science—and greater citizen involvement in all aspects of government—will play an important part in working toward a more sustainable future. EPA

should create conditions that support this transformation to advance the protection of human health and the environment.

Citizen science can be driven by Individuals, Communities and/or Institutions

Community citizen science can be initiated and implemented almost entirely by nonprofessional scientists in community groups. Although these groups may approach the Agency for advice, EPA researchers have limited or no involvement in project design and implementation. These efforts are conceived organically and reflect areas of interest and concern among individuals and groups of community members who are motivated to document local existing conditions and encourage local, state, tribal and/or federal action toward greater environmental protection. EPA often becomes aware of these projects when members of the public approach the Agency with data and information indicating an environmental concern. Institutions also may design studies that involve citizen scientists in activities such as data collection or processing. Some institution-driven projects are initiated and implemented within EPA, whereas others are designed and managed by professional researchers and scientists.

Citizen Science and Its Role in Sustainable Development: Status, Trends, Issues, and Opportunities

3.4. Concept of Environmental Justice and Stewardship

What is Environmental Justice?

The concept of environmental justice as a mobilizing force emerged in the US in the last forty years, in opposition to practices that were classified as environmental racism. This is defined as ‘any policy, practice or directive that differentially affects or disadvantages (whether intentionally or unintentionally) individuals, groups or communities based on race or color’.

As defined by (Bullard RD. 1996), environmental justice is the principle that “all people and communities are entitled to equal protection of environmental and public health laws and regulations.” In the words of Bunyan Bryant, “Environmental justice is served when people can realize their highest potential”.

The key points considered in the environmental justice are:

1. Environmental justice mandates the right to ethical, balanced and responsible uses of land and renewable resources in the interest of a sustainable planet for humans and other living things.
2. Environmental justice calls for universal protection from nuclear testing, extraction, production and disposal of toxic or hazardous wastes and poisons that threaten the fundamental right to clean air, land, water, and food.
3. Environmental justice affirms the right of all workers to a safe and healthy work environment, without being forced to choose between an unsafe livelihood and unemployment. It also affirms the right of those who work at home to be free from environmental hazards.
4. Environmental justice demands that public policy be based on mutual respect and justice for all peoples, free from any form of discrimination or bias. Environmental justice affirms the sacredness of earth, ecological unity and the interdependence of all species, and the right to be free from ecological destruction.

5. Environmental justice is the social justice expression of environmental ethics.

Environmental Stewardship

Definition

Environmental Stewardship refers to the responsible use and protection of the natural environment through active participation in conservation efforts and sustainable practices by individuals, small groups, non-profit organizations, federal agencies, and other collective networks. In other words, The responsible use and protection of the natural environment through conservation and sustainable practices to enhance ecosystem resilience and human well-being.

Example of Environmental Stewardship

Environmental Stewardship is the responsible use and protection of the environment. Examples of responsible use including the limiting the harvest of natural resources. Examples of protection include conservation the creation of national and provincial parks.

Why is it important?

Environmental Stewardship conserves natural resources, combats pollution and protects biodiversity, but most importantly, it means we protect and sustain our environment for future generations.

What are the Objectives of Environmental Stewardship?

The main objectives of include restoring habitats, recovering wildlife, increasing and protecting at risk species, improving biodiversity, preserving natural resources and ecosystems, and overall improving the sustainability of our environment including both our urban and natural ecosystems.

Principles of Environmental Stewardship

Core Principle 1: Resource Conservation – making the most efficient use of resources (materials, energy and water) through:

- Energy Efficiency and Conservation
- Water Efficiency and Conservation
- Solid Waste Management and Conceptualizing Waste as a Resource
- Publications Management
- Events Management

Core Principle 2: Pollution Prevention – minimizing contamination of the environment by chemicals or other materials through:

- Vehicle/Fleet Management
- Management of the Use of Chemicals and Other Hazardous Substances

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3.5. Ecological Footprint and Sustainability

An Ecological Footprint is a measure of the amount of bioproductive land and sea required to support a person's lifestyle. It includes the land needed to grow their food, dispose of their waste and absorb their carbon emissions. The footprint counts all the impacts of personal spending as well as the business and government expenditure on their behalf. In other words, the effect that a person, company, activity, etc. has on the environment is called an environmental footprint. For example, the number of natural that they use and the amount of harmful gases that they produce.

Advantages of Ecological Footprints

- 1. It is a single unit that allows disaggregation of indicators.
- 2. It could be widely applied to various programs/ activities.
- 3. It may be top down or bottom up.
- 4. It is useful as a means of communication policy.
- 5. The method is constantly being updated and improved by the Global Footprint Network.

Disadvantages of Ecological Footprints

- 1. Ecological footprint analysis uses hypothetical land, which does not represent the actual land use.
- 2. It simplifies the use of natural resources,
- 3. It risks as having double counting.
- 4. Most are portraits of consumption.

Sustainability

Sustainability means meeting our own needs without compromising the ability of future generations to meet their own needs. Sustainability is a holistic approach that considers ecological, social and economic dimensions, recognizing that all must be considered together to find lasting prosperity.

Pillars of Sustainability

There are three pillars of sustainability:

Environmental Sustainability

- Ecological integrity is maintained, all of earth's environmental systems are kept in balance while natural resources within them are consumed by humans at a rate where they are able to replenish themselves.

Economic Sustainability

- Human communities across the globe are able to maintain their independence and have access to the resources that they require, financial and other, to meet their needs. Economic systems are intact and activities are available to everyone, such as secure sources of livelihood.

Social Sustainability

- Universal human rights and basic necessities are attainable by all people, who have access to enough resources in order to keep their families and communities healthy and secure. Healthy communities have just leaders who ensure personal, labour and cultural rights are respected and all people are protected from discrimination.

3.6 Concept of Sustainable Development

Brundtland Report, also called *Our Common Future*, a publication released in 1987 by the World Commission on Environment and Development (WCED) introduced and defined the concept of Sustainable Development as ***“meeting the needs of the present without compromising the ability of future generations to meet their own needs.”***

Today sustainable development has become a buzz word and hundreds of programmes have been initiated in the name of sustainable development. A clear discussion on sustainable development emerged on an international level in 1992, in the UN Conference on Environment and Development (UNCED), popularly known as The **Earth Summit**, held at Rio de Janeiro, Brazil. The Rio Declaration aims at *“a new and equitable global partnership through the creation of new levels of cooperation among states”*. Out of its five significant agreements,

Agenda-21 proposes a global programme of action on sustainable development in social, economic and political context for the 21st century. This was followed by UN World Summit on Sustainable Development (WSSD) or “Rio + 10” in Johannesburg, South Africa in 2002 (26 August - 4 September 2002) to review progress since the Rio conference in 1992, and to agree a new global deal on sustainable development and emphasize on national strategies for sustainable development.

The key aspects for sustainable development are:

(a) **Inter-generational equity:** This emphasizes that we should minimize any adverse impacts on resources and environment for future generations i.e. we should hand over a safe, healthy and resourceful environment to our future generations. This can be possible only if we stop over-exploitation of resources, reduce waste discharge and emissions and maintain ecological balance.

(b) **Intra-generational equity:** This emphasizes that the development processes should seek to minimize the wealth gaps within and between nations. The Human Development Report of United Nations (2001) emphasizes that the benefits of technology should seek to achieve the goals of intra-generational equity. The technology should address the problems of the developing countries, producing drought tolerant varieties for uncertain climates, vaccines for infectious diseases, clean fuels for domestic and industrial use. This type of technological development will support the economic growth of the poor countries and help in narrowing the wealth gap and lead to sustainability.

Measures for Sustainable Development

Some of the important measures for sustainable development are as follows:

(i) **Technology:** Using appropriate technology is one which is locally adaptable, eco-friendly, resource efficient and culturally suitable. It mostly involves local resources and local labour.

(ii) **Reduce, Reuse, and Recycle Approach:** The 3-R approach advocating minimization of resource use, using them again and again instead of passing it on to the waste stream and recycling the materials goes a long way in achieving the goals of sustainability. It reduces pressure on our resources as well as reduces waste generation and pollution.

(iii) **Promoting Environmental Education and Awareness:** Making environmental education the centre of all learning process will greatly help in changing the thinking pattern and attitude of people towards our earth and the environment. Introducing subject right from the school stage will inculcate a feeling of belongingness to earth in small children. ‘

(v) **Improving Quality of Life Including Social, Cultural and Economic Dimensions:** Development should not focus just on one-section of already affluent people. Rather it should include sharing of benefits between the rich and the poor.

The tribal, ethnic people and their cultural heritage should also be conserved. Strong community participation should be there in policy and practice. Population growth should be stabilized.

Sustainable development is a wholesome process of change in which the use of resources, investment, the orientation of technological development and institutional changes are all in harmony with and enhance both the current and future potential to meet human needs and aspirations.

Elements of Sustainable Development:

- Population stabilization
- New technologies/technology transfer
- Efficient use of natural resources
- Waste reduction and pollution prevention
- “Win-win” situations
- Integrated environmental systems management
- Determining environmental limits
- Refining market economy
- Education
- Social and cultural changes

New UN Development Goals for 2030

- End poverty in all its forms everywhere.
- End hunger, achieve food security and improved nutrition, and promote sustainable agriculture.
- Ensure healthy lives and promote well-being for all at all ages.
- Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

- Achieve gender equality and empower all women and girls.
- Ensure availability and sustainable management of water and sanitation for all.
- Ensure access to affordable, reliable, sustainable and modern energy for all.
- Promote inclusive and sustainable economic growth, full and productive employment, and decent work for all.
- Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation.
- Take urgent action to combat climate change and its impact.
- Conserve and sustainably use the oceans, seas, and marine resources for sustainable development.

The new goals replace the eight Millennium Development Goals adopted at a Summit in 2000, which expired at the end of 2015.

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Environment Calendar	
➤ World Wetland Day	February 2
➤ World Forest Day	March 21
➤ World Water Day	March 22
➤ World Meteorological Day	March 23
➤ World Earth Day	April 22
➤ International Biodiversity Day	May 22
➤ Anti-tobacco Day	May 3
➤ World Environment Day	June 5
➤ World Ocean Day	June 8
➤ World Population Day	July 11
➤ World Ozone Day	Sept. 16
➤ World Habitat Day	Oct. 3
➤ Wildlife Week	Oct. 1–7
➤ International Day for Natural Disaster Reduction	Oct. 13
➤ World Conservation Day	Oct. 24
➤ International Day for Biological Diversity	Dec. 29

Role of Contemporary Indian Environmentalists in Environmental Awareness

In our country, efforts to raise environmental awareness have been initiated, and several landmark judgments related to environmental litigations have highlighted the importance of this subject to general public. Two noted personalities, who need a mention here, are **Justice Kuldeep Singh**, known popularly as *the green judge* and **Sh. M.C. Mehta**, *the green advocate*, who have immensely contributed to the cause of environment.

In 1991, the Supreme Court of our country issued directives to make all curricula environment-oriented. This directive was, in fact, in response to a Public Interest Litigation (PIL) filed by *M.C. Mehta vs. Union of India (1988)* that prompted the apex court to give a mandate for creating environmental awareness among all citizens of India. Based on the judgement, Environmental Studies is being taught as a compulsory course to all students. There are some environmentalists in the present time who have made a mark in our country through environmental activism. *Sh. Sunderlal Bahuguna, known for his 'Chipko movement' and 'Tehri Bachao Andolan', Smt. Medha Patkar and Ms. Arundhati Roy known for their 'Narmada Bachao Andolan', the Magsaysay awardee Sh. Rajender Singh known for his water conservation efforts are some such contemporary figures. Salim Ali is a renowned ornithologist, famous for his work on Indian birds. In modern India, our late Prime Minister Mrs. Indira Gandhi was instrumental in introducing the concept of environmental protection in the Constitution of India as a fundamental duty while Mrs. Maneka Gandhi, formerly environment minister, has worked a lot for the cause of wildlife protection. Citizen's report on environment was first published by late Sh. Anil Aggarwal, the founder Chairman of Centre for Science & Environment.* Even with many such key persons leading the cause to environment, India is yet to achieve a lot in this field.

About the Author

Dr. Aadil Gulzar Khan (Ph.D; M.Phil; M.Sc; NET; B.ed; PGDDM; COPA) presently is working as Contractual Assistant Professor, Department of Environmental Science, GDC Kokernag, Kashmir. He has published **21** research papers in journals of repute, **10** book chapters and **3** articles. He has completed **4** training programs and has also worked in **3** projects as JRF position. He has attended more than **30** National and International conferences, seminars, workshops and webinars. He has also five years teaching experience at University and College levels and also working IGNOU Counselor in M.Sc Environmental Science course. He has received the **BEST YOUNG RESEARCHER NATIONAL AWARD** for the outstanding excellence and remarkable achievements in the field of TEACHING, RESEARCH and PUBLICATIONS as well as received the **Best Oral presentation** award at “International Conference on Environmental and Ecological Sustainability: Engaging the Stakeholders” under IGNOU University. His areas of interested are Biodiversity and Conservation Biology, Environmental Laws, Alpine-Treeline Ecotone Vegetation, Soil and Water Quality Analysis. He is a member of Environmental Policy Group, Srinagar (J&K) and Ecoparyavaran Organization (Chandigarh).



“Start by doing what is necessary, then what is possible and suddenly you are doing the impossible”. (Dr. Aadil)