ENVIRONMENT

SECTION A

Short answers:

1. Green house gases

A **greenhouse gas** is a gas in an atmosphere that absorbs and emits radiant energy within the thermal infrared range. This process is the fundamental cause of the greenhouse effect. The primary greenhouse gases in Earth's atmosphere are water vapor, carbon dioxide, methane, nitrous oxide, and ozone. Without greenhouse gases, the average temperature of Earth's surface would be about −18 °C (0 °F),[2] rather than the present average of 15 °C (59 °F).In the Solar System, the atmospheres of Venus, Mars and Titan also contain gases that cause a greenhouse effect.

2. Radio activity pollution

Radioactive contamination, also called **radiological contamination**, is the deposition of, or presence of radioactive substances on surfaces or within solids, liquids or gases, where their presence is unintended or undesirable. Such contamination presents a hazard because of the radioactive decay of the contaminants, which emit harmful ionizing radiation such as alpha particles or beta particles, gamma rays or neutrons. The degree of hazard is determined by the concentration of the contaminants, the energy of the radiation being emitted, the type of radiation, and the proximity of the contamination to organs of the body. It is important to be clear that the contamination gives rise to the radiation hazard, and the terms "radiation" and "contamination" are not interchangeable.

3. Air Pollution

Air pollution occurs when harmful or excessive quantities of substances including gases, particulates, and biological molecules are introduced into Earth's atmosphere. It may cause diseases, allergies and also death of humans; it may also cause harm to other living organisms such as animals and food crops, and may damage the natural or built environment. Human activity and natural processes can both generate air pollution.

4. Disaster Management

Disaster Management refers to manage disaster response in the country. India has been traditionally vulnerable to the natural disasters on the account of its unique geo-climatic conditions. Floods, droughts, cyclones, earthquakes and landslides would have been recurrent phenomena. About 60% of the landmass is prone to earthquakes of various intensities; over 40 million hectares is prone to floods; about 8% of the total area is prone to cyclones and 68% of the area is susceptible to drought. In the decade 1990-2000, an average of about 4344 people lost their lives and about 30 million people were affected by disasters every year.

5. Swachh Bharat

Swachh Bharat Abhiyan (**SBA**) (or **Swachh Bharat Mission** (**SBM**) or **Clean India Mission** in English) is a campaign in India that aims to clean up the streets, roads and infrastructure of India's cities, smaller towns, and rural areas. The objectives of Swachh Bharat include eliminating open defecation through the construction of household-owned and community-owned toilets and establishing an accountable mechanism of monitoring toilet use. Run by the Government of India, the mission aims to achieve an Open-Defecation Free (ODF) India by 2 October 2019, the 150th anniversary of the birth of Mahatma Gandhi, by constructing 90 million toilets in rural India at a projected cost of ₹1.96 lakh crore. The mission will also contribute to India reaching Sustainable Development Goal Number 6 .

6. In-situ Conservation

In-situ **conservation** is the on-site conservation or the conservation of genetic resources in natural populations of plant or animal species, such as forest genetic resources in natural populations of tree species.[1] It is the process of protecting an endangered plant or animal species in its natural habitat, either by protecting or restoring the habitat itself, or by defending the species from predators. It is applied to conservation of agricultural biodiversity in agro ecosystems by farmers, especially those using unconventional farming practices. e.g., Nilgiri biosphere in India.

7. Ex-situ Conversation

Ex situ **conservation** literally means, "Off-site conservation". It is the process of protecting an endangered species, variety or breed, of plant or animal outside its natural habitat; for example, by removing part of the population from a threatened habitat and placing it in a new location, which may be a wild area or within the care of humans.[1] [2] The degree to which humans control or modify the natural dynamics of the managed population varies widely, and this may include alteration of living environments, reproductive patterns, access to resources, and protection from predation and mortality. *Ex situ* management can occur within or outside a species' natural geographic range. Individuals maintained *ex situ* exist outside an ecological niche. This means that they are not under the same selection pressures as wild populations, and they may undergo artificial selection if maintained *ex situ* for multiple generations.

8. Ecological Footprint

The **ecological footprint** measures human demand on nature, i.e., the quantity of nature it takes to support people or an economy. It tracks this demand through an ecological accounting system. The accounts contrast the biologically productive area people use for their consumption to the biologically productive area available within a region or the world. In short, it is a measure of human impact on Earth's ecosystem and reveals the dependence of the human economy on natural capital. The ecological footprint is defined as the biologically productive area needed to provide for everything people use: fruits and vegetables, fish, wood, fibers, absorption of carbon dioxide from fossil fuel use, and space for buildings and roads.

9. Fire Safety

Fire safety is the set of practices intended to reduce the destruction caused by fire. Fire safety measures include those that are intended to prevent ignition of an uncontrolled fire, and those that are used to limit the development and effects of a fire after it starts. Fire safety measures include those that are planned during the construction of a building or implemented in structures that are already standing, and those that are taught to occupants of the building. Threats to fire safety are commonly referred to as *fire*

hazards. A fire hazard may include a situation that increases the likelihood of a fire or may impede escape in the event a fire occurs.

SECTION B

Long Answers:

Q Describe Ecosystem, its structure and functions.

An **ecosystem** is a community of living organisms in conjunction with the nonliving components of their environment (things like air, water and mineral soil), interacting as a system.[2] These biotic and abiotic components are regarded as linked together through nutrient cycles and energy flows.[3] As ecosystems are defined by the network of interactions among organisms, and between organisms and their environment,[4] they can be of any size but usually encompass specific, limited spaces[5] (although some scientists say that the entire planet is an ecosystem).[6] Energy, water, nitrogen and soil minerals are other essential abiotic components of an ecosystem. The energy that flows through ecosystems is obtained primarily from the sun. It generally enters the system through photosynthesis, a process that also captures carbon dioxide from the atmosphere. By feeding on plants and on one another, animals play an important role in the movement of matter and energy through the system. They also influence the quantity of plant and microbial biomass present. By breaking down dead organic matter, decomposers release carbon back to the atmosphere and facilitate nutrient cycling by converting nutrients stored in dead biomass back to a form that can be readily used by plants and other microbes.

Structure

Generally ecosystems consist of two basic components. 1. Abiotic component. 2. Biotic component.

1. Abiotic components

It includes basic in-organic (soil, water, oxygen, calcium carbonates, phosphates etc.) and organic compounds. It also includes physical factors such as moisture, wind currents and solar radiation. Radiant energy of sun is the only significant energy source for any ecosystem.

2. Biotic components

Include producers, consumers and decomposers.

Producer: These are the autotrophic, chlorophyll-bearing organisms, which produce their own food.

Consumers: A consumer which gets nutrition by eating plants is called **Primary consumers** (herbivore) (eg) Rabbit, deer and cow.

The Secondary Consumer**:** (carnivores) is an animal that eats the flesh of herbivores (eg) cats and dogs.

Tertiary Consumers: are the types of carnivores, which prey upon other carnivores. (eg) Lion, tiger and vulture.

Functions

An ecosystem is a functional and life sustaining environmental system. The environmental system consists of biotic and abiotic components. Biotic components include living organisms and abiotic components includes in organic matter and energy.

In an ecosystem there are three functional components.

1. Inorganic constituents
2. Organism
3. Energy input

These three components interact with each other to form an environmental system. The primary producers convert inorganic constituents into organic components by photosynthesis using the energy from the solar radiations. The herbivores make use of the energy from the producers and they themselves serve as a food for the carnivores. Animals of different types accumulate organic matter in their body which is taken as food. They are known as secondary producers. The dead organic matters of plants and animals are decomposed by bacteria and fungi which break the complex molecules and liberate inorganic components. These are known as decomposers. During this process some amount of energy is released in the form of heat. The ecosystem of different habitats is interrelated with one another.

Q What is biodiversity and how to conserve it.

Biodiversity, a portmanteau of "bio" (life) and "diversity", generally refers to the variety and variability of life on Earth. According to the United Nations Environment Programme (UNEP), biodiversity typically measures variation at the genetic, the species, and the ecosystem level. Terrestrial biodiversity tends to be greater near the equator, which seems to be the result of the warm climate and high primary productivity. Biodiversity is not distributed evenly on Earth, and is richest in the tropics. These tropical forest ecosystems cover less than 10 percent of earth's surface, and contain about 90 percent of the world's species. Marine biodiversity tends to be highest along coasts in the Western Pacific, where sea surface temperature is highest, and in the mid-latitudinal band in all oceans. There are latitudinal gradients in species diversity. Biodiversity generally tends to cluster in hotspots, and has been increasing through time, but will be likely to slow in the future.

Conservation

Conservation biology matured in the mid-20th century as ecologists, naturalists and other scientists began to research and address issues pertaining to global biodiversity declines.[225] [226] [227]

The conservation ethic advocates management of natural resources for the purpose of sustaining biodiversity in species, ecosystems, the evolutionary process and human culture and society.

Conservation biology is reforming around strategic plans to protect biodiversity.[225][230][231] Preserving global biodiversity is a priority in strategic conservation plans that are designed to engage public policy and concerns affecting local, regional and global scales of communities, ecosystems and cultures.[232] Action plans identify ways of sustaining human well-being, employing natural capital, market capital and ecosystem services.[233] [234]

In the EU Directive 1999/22/EC zoos are described as having a role in the preservation of the biodiversity of wildlife animals by conducting research or participation in breeding programs.[235]

Protection and restoration techniques

Removal of exotic species will allow the species that they have negatively impacted to recover their ecological niches. Exotic species that have become pests can be identified taxonomically (e.g., with Digital Automated Identification System (DAISY), using the barcode of life).[236][237] Removal is practical only given large groups of individuals due to the economic cost.

As sustainable populations of the remaining native species in an area become assured, "missing" species that are candidates for reintroduction can be identified using databases such as the *Encyclopedia of Life* and the Global Biodiversity Information Facility.

- Biodiversity banking places a monetary value on biodiversity. One example is the Australian Native Vegetation Management Framework.

- Gene banks are collections of specimens and genetic material. Some banks intend to reintroduce banked species to the ecosystem (e.g., via tree nurseries).[238]

- Reduction of and better targeting of pesticides allows more species to survive in agricultural and urbanized areas.

- Location-specific approaches may be less useful for protecting migratory species. One approach is to create wildlife corridors that correspond to the animals' movements. National and other boundaries can complicate corridor creation.

Q Describe different types of pollution and discuss any two in detail.

Pollution is the introduction of contaminants into the natural environment that causes adverse change.[1] Pollution can take the form of chemical substances or energy, such as noise, heat or light. Pollutants, the components of pollution, can be either foreign substances/energies or naturally occurring contaminants. Pollution is often classed as point source or nonpoint source pollution. In 2015, pollution killed 9 million people in the world.

Pollution can take any form including chemical substances, heat, light, noise or energy. To make it easier to distinguish, pollution has been divided into eight categories by the scientific community.

The different types of pollution are:

- Water Pollution.
- Air Pollution.
- Soil Pollution.
- Thermal Pollution.
- Radioactive Pollution.
- Noise Pollution.
- Light Pollution.

AIR POLLUTION

Air pollution refers to the release of pollutants into the air that are detrimental to human health and the planet as a whole. The Clean Air Act authorizes the U.S. Environmental Protection Agency (EPA) to protect public health by regulating the emissions of these harmful air pollutants. The NRDC has been a leading authority on this law since it was established in 1970.

Causes:

"Most air pollution comes from energy use and production," says John Walke, director of the Clean Air Project, part of the Climate and Clean Air program at NRDC. "Burning fossil fuels releases gases and chemicals into the air." And in an especially destructive feedback loop, air pollution not only contributes to climate change but is also exacerbated by it. "Air pollution in the form of carbon dioxide and methane raises the earth's temperature," Walke says. "Another type of air pollution is then worsened by that increased heat: Smog forms when the weather is warmer and there's more ultraviolet radiation." Climate change also increases the production of allergenic air pollutants including mold (thanks to damp conditions caused by extreme weather and increased flooding) and pollen (due to a longer pollen season and more pollen production).

WATER POLLLUTION: Water pollution is the pollution of bodies of water, such as lakes, rivers, seas, the oceans, as well as groundwater. It occurs when pollutants reach these bodies of water, without treatment. Waste from homes, factories and other buildings get into the water bodies.

There are many chemicals that are naturally found in these bodies of water but today it is polluted by nitrates, phosphates, oil, acid from acid rain, and debris like sediments, fallen logs and so on. And hence it creates diseases to human and other living organisms e.g. they drink water from rivers which are mixed with poisonous chemicals which can effect them. Aquatic organisms in rivers are also effected and then humans who consume this fishes can also have serious health problems.

Water pollution is caused due to several reasons. Here are the few major causes of water pollution:

Sewage and Waste Water: Sewage, garbage and liquid waste of households, agricultural lands and factories are discharged into lakes and rivers. These wastes contain harmful chemicals and toxins which make the water poisonous for aquatic animals and plants.

Dumping: Dumping of solid wastes and litters in water bodies causes huge problems. Litters include glass, plastic, aluminum, Styrofoam etc. Different things take different amount of time to degrade in water. They affect aquatic plants and animals.

Industrial Waste: Industrial waste contains pollutants like asbestos, lead, mercury and petrochemicals which are extremely harmful to both people and environment. Industrial waste is discharged into lakes and rivers by using fresh water making the water contaminated.

Oil Pollution**:** Sea water gets polluted due to oil spilled from ships and tankers while traveling. The spilled oil does not dissolve in water and forms a thick sludge polluting the water.

Acid Rain**:** Acid rain is pollution of water caused by air pollution. When the acidic particles caused by air pollution in the atmosphere mix with water vapor, it results in acid rain.

Global Warming: Due to global warming, there is an increase in water temperature. This increase in temperature results in death of aquatic plants and animals. This also results in bleaching of coral reefs in water.

Q What is Global warming? Explain its effects on environment.

Global warming is the term used to describe a gradual increase in the average temperature of the Earth's atmosphere and its oceans, a change that is believed to be permanently changing the Earth's climate

The main driver of today's warming is the combustion of fossil fuels. These hydrocarbons heat up the planet via the greenhouse effect, which is caused by the interaction between Earth's atmosphere and incoming radiation from the sun. The greenhouse effect is the process by which absorption and emission of infrared radiation by gases in a planet's atmosphere warm its lower atmosphere and surface.

Effects of global warming

The big melt

The most visible effect of climate change so far is the melting of glaciers and sea ice. The ice sheets have been retreating since the end of the last Ice Age about 11,700 years ago, but the last century's warming has hastened their demise. A 2016 study found that there is a 99 percent chance that global warming has caused the recent retreat of glaciers; in fact, the research showed, these rivers of ice retreated 10 to 15 times the distance they would have if the climate had stayed stable. Glacier National Park in Montana had 150 glaciers in the late 1800s. Today it has 26. The loss of glaciers can cause the loss of human life when icy dams holding back glacier lakes destabilize and burst, or when avalanches caused by unstable ice bury villages.

Extreme weather

Changes in regional climate are expected to include greater warming over land, with most warming at high northern latitudes, and least warming over the Southern Ocean and parts of the North Atlantic Ocean.[156]

Future changes in precipitation are expected to follow existing trends, with reduced precipitation over subtropical land areas, and increased precipitation at sub polar latitudes and some equatorial regions.[157] Projections suggest a probable increase in the frequency and severity of some extreme weather events, such as heat waves.

Sea level rise

The sea level rise since 1993 has been estimated to have been on average 2.6 mm and 2.9 mm per year ± 0.4 mm. additionally, sea level rise has accelerated from 1995 to 2015.[163] Over the 21st century, the IPCC projects for a high emissions scenario, that global mean sea level could rise by 52–98 cm.[164] The IPCC's

projections are conservative, and may underestimate future sea level rise.[165]Other estimates suggest that for the same period, global mean sea level could rise by 0.2 to 2.0 m (0.7–6.6 ft), relative to mean sea level in 1992.[145]

Ecological systems

In terrestrial ecosystems, the earlier timing of spring events, as well as pole ward and upward shifts in plant and animal ranges, have been linked with high confidence to recent warming.[170] Future climate change is expected to affect particular ecosystems, including tundra, mangroves, coral reefs,[156] and caves.[171] it is expected that most ecosystems will be affected by higher atmospheric CO_2levels, combined with higher global temperatures.[172] Overall, it is expected that climate change will result in the extinction of many species and reduced diversity of ecosystems.[173]

Adaptation

Other policy responses include adaptation to climate change. Adaptation to climate change may be planned, either in reaction to or anticipation of climate change, or spontaneous, i.e., without government intervention.[220] Planned adaptation is already occurring on a limited basis.[213] the barriers, limits, and costs of future adaptation are not fully understood.[213]

Q Renewable and Non Renewable sources of Energy

Renewable energy is energy that is collected from renewable resources, which are naturally replenished on a human timescale, such as sunlight, wind, rain, tides, waves, and geothermal heat.[2] Renewable energy often provides energy in four important areas: electricity generation, air and water heating/cooling, transportation, and rural (off-grid) energy services.

Renewable energy resources exist over wide geographical areas, in contrast to other energy sources, which are concentrated in a limited number of countries. Rapid deployment of renewable energy and energy efficiency is resulting in significant energy security, climate change mitigation, and economic benefits.[7] The results of a recent review of the literature [8] concluded that as greenhouse gas (GHG) emitters begin to be held liable for damages resulting from GHG emissions resulting in climate change, a high value for liability mitigation would provide powerful incentives for deployment of renewable energy technologies.

Main Technologies

Wind Power

Airflows can be used to run wind turbines. Modern utility-scale wind turbines range from around 600 kW to 5 MW of rated power, although turbines with rated output of 1.5–3 MW have become the most common for commercial use. The largest generator capacity of a single installed onshore wind turbine reached 7.5 MW in 2015. The power available from the wind is a function of the cube of the wind speed, so as wind speed increases, power output increases up to the maximum output for the particular turbine.[41] Areas where winds are stronger and more constant, such as offshore and high altitude sites are preferred locations for wind farms. Typically full load hours of wind turbines vary between 16 and 57 percent annually, but might be higher in particularly favorable offshore sites.[42]

Hydropower

In 2015 hydropower generated 16.6% of the worlds total electricity and 70% of all renewable electricity.[45] Since water is about 800 times denser than air, even a slow flowing stream of water, or moderate sea swell, can yield considerable amounts of energy. There are many forms of water energy:

- Historically hydroelectric power came from constructing large hydroelectric dams and reservoirs, which are still popular in third world countries. The largest of which is the Three Gorges Dam(2003) in China and the Itaipu Dam(1984) built by Brazil and Paraguay.

- Small hydro systems are hydroelectric power installations that typically produce up to 50 MW of power. They are often used on small rivers or as a low impact development on larger rivers. China is the largest producer of hydroelectricity in the world and has more than 45,000 small hydro installations.[46]

- Run-of-the-river hydroelectricity plants derive kinetic energy from rivers without the creation of a large reservoir. This style of generation may still produce a large amount of electricity, such as the Chief Joseph Dam on the Columbia river in the United States.

Solar Energy

Solar energy, radiant light and heat from the sun, is harnessed using a range of ever-evolving technologies such as solar heating, photovoltaics, concentrated solar power (CSP), concentrator photovoltaics (CPV), solar architecture and artificial photosynthesis.[48][49] Solar technologies are broadly characterized as either passive solar or active solar depending on the way they capture, convert and distribute solar energy. Passive solar techniques include orienting a building to the Sun, selecting materials with favorable thermal mass or light dispersing properties, and designing spaces that naturally circulate air. Active solar technologies encompass solar thermal energy, using solar collectorsfor heating, and solar power, converting sunlight into electricity either directly using photovoltaics (PV), or indirectly using concentrated solar power.

Bio Energy

Biomass is biological material derived from living, or recently living organisms. It most often refers to plants or plant-derived materials which are specifically called lignocellulosic biomass.[64] As an energy source, biomass can either be used directly via combustion to produce heat, or indirectly after converting it to various forms of biofuel. Conversion of biomass to biofuel can be achieved by different methods which are broadly classified into: *thermal*, *chemical*, and *biochemical* methods. Wood remains the largest biomass energy source today;[65] examples include forest residues – such as dead trees, branches and tree stumps –, yard clippings, wood chips and even municipal solid waste. In the second sense, biomass includes plant or animal matter that can be converted into fibers or other industrial chemicals, including biofuels. Industrial biomass can be grown from numerous types of plants, including miscanthus, switchgrass, hemp, corn, poplar, willow, sorghum, sugarcane, bamboo,[66] and a variety of tree species, ranging from eucalyptus to oil palm (palm oil).

Energy Storage

Energy storage is a collection of methods used to store electrical energy on an electrical power grid, or off it. Electrical energy is stored during times when production (especially from intermittent power plants such as renewable electricity sources such as wind power, tidal power, solar power) exceeds consumption, and returned to the grid when production falls below consumption. Pumped-storage hydroelectricity is used for more than 90% of all grid power storage.

Non-renewable resource

A **non-renewable resource** (also called a finite resource) is a resource that does not renew itself at a sufficient rate for sustainable economic extraction in meaningful human time-frames. An example is carbon-based, organically-derived fuel. The original organic material, with the aid of heat and pressure, becomes a fuel such as oil or gas. Earth minerals and metalores, fossil fuels (coal, petroleum, natural gas) and groundwater in certain aquifers are all considered non-renewable resources, though individual elements are almost always conserved.

Earth minerals and metal ores

Earth minerals and metal ores are examples of non-renewable resources. The metals themselves are present in vast amounts in Earth's crust, and their extraction by humans only occurs where they are concentrated by natural geological processes (such as heat, pressure, organic activity, weathering and other processes) enough to become economically viable to extract. These processes generally take from tens of thousands to millions of years, through plate tectonics, tectonic subsidence and crustal recycling.

The localized deposits of metal ores near the surface which can be extracted economically by humans are non-renewable in human time-frames. There are certain rare earth minerals and elements that are more scarce and exhaustible than others. These are in high demand in manufacturing, particularly for the electronics industry.

Fossil Fuels

Natural resources such as coal, petroleum (crude oil) and natural gas take thousands of years to form naturally and cannot be replaced as fast as they are being consumed. Eventually it is considered that fossil-based resources will become too costly to harvest and humanity will need to shift its reliance to other sources of energy such as solar or wind power, see renewable energy.

An alternative hypothesis is that carbon based fuel is virtually inexhaustible in human terms, if one includes all sources of carbon-based energy such as methane hydrates on the sea floor, which are vastly greater than all other carbon based fossil fuel resources combined.[1] These sources of carbon are also considered non-renewable, although their rate of formation/replenishment on the sea floor is not known. However their extraction at economically viable costs and rates has yet to be determined.

Nuclear Fuels

The use of nuclear technology relying on fission requires Naturally occurring radioactive material as fuel. Uranium, the most common fission fuel, and is present in the ground at relatively low concentrations and mined in 19 countries.[9] This mined uranium is used to fuel energy-generating nuclear reactors with fissionable uranium-235 which generates heat that is ultimately used to power turbines to generate electricity.

Nuclear power provides about 6% of the world's energy and 13–14% of the world's electricity.[13] Nuclear energy production is associated with potentially dangerous radioactive contamination as it relies upon unstable elements. In particular, nuclear power facilities produce about 200,000 metric tons of low and intermediate level waste (LILW) and 10,000 metric tons of high level waste (HLW) (including spent fuel designated as waste) each year worldwide.

Q What is the importance of disaster management?

Refer Short asnwer for Definition.

Over the past couple of years, the Government of India have brought about a paradigm shift in the approach to disaster management. The new approach proceeds from the conviction that development cannot be sustainable unless disaster mitigation is built into the development process. Another corner stone of the approach is that mitigation has to be multi-disciplinary spanning across all sectors of development. The new policy also emanates from the belief that investments in mitigation are much more cost effective than expenditure on relief and rehabilitation.

Disaster management occupies an important place in this country's policy framework as it is the poor and the under-privileged who are worst affected on account of calamities/disasters.

The steps being taken by the Government emanate from the approach outlined above. The approach has been translated into a National Disaster Framework [a roadmap] covering institutional mechanisms, disaster prevention strategy, early warning system, disaster mitigation, preparedness and response and human resource development. The expected inputs, areas of intervention and agencies to be involved at the National, State and district levels have been identified and listed in the roadmap. This roadmap has been shared with all the State Governments and Union Territory Administrations. Ministries and Departments of Government of India, and the State Governments/UT Administrations have been advised to develop their respective roadmaps taking the national roadmap as a broad guideline. There is, therefore, now a common strategy underpinning the action being taken by all the participating organisations/stakeholders.

Institutional and Policy Framework

The institutional and policy mechanisms for carrying out response, relief and rehabilitation have been well -established since Independence. These mechanisms have proved to be robust and effective insofar as response, relief and rehabilitation are concerned.

At the national level, the Ministry of Home Affairs is the nodal Ministry for all matters concerning disaster management. The Central Relief Commissioner (CRC) in the Ministry of Home Affairs is the nodal officer to coordinate relief operations for natural disasters. The CRC receives information relating to forecasting/warning of a natural calamity from India Meteorological Department (IMD) or from Central Water Commission of Ministry of Water Resources on acontinuing basis. The Ministries/Departments/Organizations concerned with the primary and secondary functions relating to the management of disasters include:India Meteorological Department, Central Water Commission, Ministry of Home Affairs, Ministry of Defence, Ministry of Finance, Ministry of Rural Development, Ministry of Urban Development, Department of Communications, Ministry of Health, Ministry of Water Resources, Ministry of Petroleum, Department of Agriculture & Cooperation. Ministry of Power, Department of Civil Supplies, Ministry of Railways, Ministry of Information and Broadcasting, Planning Commission, Cabinet Secretariat, Department of Surface Transport, Ministry of Social Justice, Department of Women and Child Development, Ministry of Environment and Forest, Department of Food. Each Ministry/Department/Organization nominate their nodal officer to the Crisis Management Group chaired by Central Relief Commissioner. The nodal officer is responsible for preparing sectoral Action Plan/Emergency Support Function Plan for managing disasters.

Control Room (Emergency Operation Room): An Emergency Operations Center (Control Room) exists in the nodal Ministry of Home Affairs,which functions round the clock, to assist the Central Relief Commissioner in the discharge of his duties. The activities of the Control Room include collection and transmission of information concerning natural calamity and relief, keeping close contact with

governments of the affected States, interaction with other Central Ministries/Departments/Organizations in connection with relief, maintaining records containing all relevant information relating to action points and contact points in Central Ministries etc., keeping up-to-date details of all concerned officers at the Central and State levels.

Contingency Action Plan: A National Contingency Action Plan (CAP) for dealing with contingencies arising in the wake of natural disasters has been formulated by the Government of India and it had been periodically updated. It facilitates the launching of relief operations without delay. The CAP identifies the initiatives required to be taken by various Central Ministries/Departments in the wake of natural calamities, sets down the procedure and determines the focal points in the administrative machinery.

State Relief Manuals: Each State Government has relief manuals/codes which identify that role of each officer in the State for managing the natural disasters. These are reviewed and updated periodically based on the experience of managing the disasters and the need of the State.

National Crisis Management Committee (NCMC): Cabinet Secretary, who is the highest executive officer, heads the NCMC. Secretaries of all the concerned Ministries /Departments as well as organizations are the members of the Committee The NCMC gives direction to the Crisis Management Group as deemed necessary. The Secretary, Ministry of Home Affairs is responsible for ensuring that all developments are brought to the notice of the NCMC promptly.

Q Discuss the relationship between environment and human health

Health is the level of functional or metabolic efficiency of a living being. In humans, it is the general condition of a person's mind, body and spirit, usually meaning to be free from illness, injury or pain. The World Health Organization (WHO) has defined health in its broader sense in 1946 as "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity."

A disease is an abnormal condition affecting the body of an organism. It may be caused by external factors, such as infectious disease, or it may be caused by internal dysfunctions, such as autoimmune diseases. In humans, "disease" is often used more broadly to refer to any condition that causes pain, dysfunction, distress, social problems, or death to the person afflicted, or similar problems for those in contact with the person.

Human health is influenced by many factors like nutritional, biological, chemical or psychological. It is quite true that environment has a direct impact on those living in it and many diseases are the outcome of man's maladjustment to his environment.

The factors such as malfunctioning of the body parts, hormonal imbalances, malfunctioning of immune system and genetic disorders, which exist within the human body, are called Intrinsic Factors. The disease caused by intrinsic factors is called organic diseases or metabolic diseases.

There are three types of health hazards:

1. Physical Hazards:

Radioactive and UV radiations, Global warming, Chlorofluorocarbons, Noise etc.

2. Chemical Hazards:

Combustion of Fossil fuels, industrial effluence, pesticides, heavy metals.

3. Biological Hazards:

Bacteria, Viruses, Parasites.

Infectious Organisms:

Infectious diseases, also known as transmissible diseases or communicable diseases comprise clinically evident illness resulting from the infection, presence and growth of pathogenic biological agents in an individual host organism. Infectious pathogens include some viruses, bacteria, fungi, protozoa, multicellular parasites, and aberrant proteins known as prions.

Malnutrition:

The term malnutrition refers to an unhealthful intake of dietary nutrients. Malnutrition may arise with inadequate or overabundant food intake, an imbalance of dietary nutrients or an inability to digest, absorb or utilize the food you eat.

Food Adulteration:

Adulteration of food is defined as the addition or subtraction of any substance to or from food, so that the natural composition and quality of the original food substance is affected. It is difficult for the consumer to detect the extent of adulteration. Adulteration of foods can either be intentional, unintentional or natural.

Radiation:

High doses of radiation can be harmful or even fatal. The damage caused by exposure to radiation is determined by the type of radiation, the duration of exposure, and the part of the body that is exposed. It is important to note that an average of one in four people develops some form of cancer.

Q What is the significance of ozone layer and how is it depleted?

The **ozone layer** or **ozone shield** is a region of Earth's stratosphere that absorbs most of the Sun's ultraviolet (UV) radiation. It contains high concentrations of ozone (O_3) in relation to other parts of the atmosphere, although still small in relation to other gases in the stratosphere. The ozone layer contains less than 10 parts per million of ozone, while the average ozone concentration in Earth's atmosphere as a whole is about 0.3 parts per million. The ozone layer is mainly found in the lower portion of the stratosphere, from approximately 20 to 30 kilometres (12 to 19 mi) above Earth, although its thickness varies seasonally and geographically.[1]

Importance of ozone layer

Ozone is harmful at ground level but high up the atmosphere ozone layer plays a vital role in the protection of all living beings. The sun propagates ultraviolet radiations which as an adverse effect on living beings. This layer absorbs the radiations and prohibits them from entering the outer surface of the earth. The ozone layer resides in the stratospheric layer of the earth's atmosphere. The layers which occupy the lower part of the atmosphere removes the unwanted pollutants from the earth's surface

Depletion

Ozone layer depletion is one of the most serious problems faced by our planet earth. It is also one of the prime reasons which are leading to global warming. Ozone is a colourless gas which is found in the stratosphere of our upper atmosphere. The layer of ozone gas is what which protects us from the harmful ultraviolet radiations of the sun. The ozone layer absorbs these harmful radiations and thus prevents these rays from entering the earth's atmosphere. Ultraviolet radiations are high energy electromagnetic waves emitted by the sun which if enters the earth's atmosphere can lead to various environmental issues including global warming, and also a number of health related issues for all living organisms. Thanks to the ozone layer which protects us from these harmful rays.

The main things that lead to destruction of the ozone gas in the ozone layer. Low temperatures, increase in the level of chlorine and bromine gases in the upper stratosphere are some of the reasons that leads to ozone layer depletion. But the one and the most important reason for ozone layer depletion is the production and emission of chlorofluorocarbons (CFCs). This is what which leads to almost 80 percent of the total ozone layer depletion.

There are many other substances that lead to ozone layer depletion such as hydro chlorofluorocarbons (HCFCs) and volatile organic compounds (VOCs). Such substances are found in vehicular emissions, by-products of industrial processes, aerosols and refrigerants. All these ozone depleting substances remain stable in the lower atmospheric region, but as they reach the stratosphere, they get exposed to the ultra violet rays. This leads to their breakdown and releasing of free chlorine atoms which reacts with the ozone gas, thus leading to the depletion of the ozone layer.

Q What are natural resources? Explain relationship between man and nature.

Natural resources are resources that exist without actions of humankind. This includes all valued characteristics such as magnetic, gravitational, electrical properties and forces etc. On earth it includes: sunlight, atmosphere, water, land (includes all minerals) along with all vegetation, crops and animal life that naturally subsists upon or within the heretofore identified characteristics and substances.[1][2][3][4]

Particular areas such as the rainforest in Fatu-Hiva are often characterized by the biodiversity and geodiversity existent in their ecosystems. Natural resources may be further classified in different ways. Natural resources are materials and components (something that can be used) that can be found within the environment. Every man-made product is composed of natural resources (at its fundamental level). A **natural resource** may exist as a separate entity such as fresh water, air, and as well as a living organism such as a fish, or it may exist in an alternate form that must be processed to obtain the resource such as metal ores, rare earth metals, petroleum, and most forms of energy.

There is much debate worldwide over natural resource allocations, this is particularly true during periods of increasing scarcity and shortages (depletion and overconsumption of resources) but also because the exportation of natural resources is the basis for many economies (particularly for developed countries).

Some natural resources such as sunlight and air can be found everywhere, and are known as ubiquitous resources. However, most resources only occur in small sporadic areas, and are referred to as localised resources.

Relationship between man and nature

Humans are sophisticated and evolved animals who have modified the natural environment to make it suitable for living. While human dependency on nature has been decreased over the process of evolution, people still demonstrate many forms of nature connectedness**.** This includes emotional attachment to nature, perception of themselves as a part of nature, and activities aimed at nature protection. How strongly are humans dependent on nature? Can its modified version substitute the real form of it?

The issues as above have been of a scientific interest of researchers across the world. It has been established that nature has intrinsic value for people. For example, the concept of biophilia was introduced by a US-based biologist Edward O. Wilson in his 1984 book. Biophilia is defined as an evolutionarily conditioned need to bond with nature, to experience its proximity and maintain contact with it. While the etymology of the word suggests “loving” attitude towards living nature, this term can be used in a broader context meaning the general need to relate with both living and nonliving form of it.

A significant amount of research has demonstrated that even children are aware of the fact that nature bears importance to humans**.** A series of studies between 1995 and 2002 have shown that children from different social and cultural backgrounds share affiliation with nature and demonstrate a moral sentiment towards it. For example, children were aware of the fact that water pollution would do harm to both people and other living organisms, and that it would distort the landscapes as we know them. They expressed the belief that it was people’s moral obligation to protect nature and prevent the negative effects of pollution. Although their responses within the study were human-oriented, it is believed that the sentiment towards nature is authentic in children as well as in adults.

After the strong attachment to nature was established in people, the question about its technological replica still remained. The next focus of studies was observation of nature through technological means. Thus, Peter Kahn and his colleagues conducted a study in 2008, in which a plasma television was installed in a windowless workspace in the university, and moving images of nature were displayed on the screen. The research continued for 16 weeks, after which psychological well-being of the employees was assessed. The university staff that had visual contact with “technological nature” had significant improvements as compared to those who did not maintain such contact. However, the study conducted later in 2008 showed that, in comparison to observation of real landscapes outside of glass windows, landscapes viewed on plasma screen were not helpful when it came to stress reduction or improvement of emotional well-being. These finding suggests that no technological replica can replace real nature in regard to its significance to people.

Q Discuss the importance of environmental education

Environmental education (**EE**) refers to organized efforts to teach how natural environments function, and particularly, how human beings can manage behavior and ecosystems to live sustainably. It is a multi-disciplinary field integrating disciplines such as biology, chemistry, physics, ecology, earth science, atmospheric science, mathematics, and geography. The term often implies education within the school system, from primary to post-secondary. However, it sometimes includes all efforts to educate the public and other audiences, including print materials, websites, media campaigns, etc..

Environmental education provides important opportunities for students to become engaged in real world issues that transcend classroom walls. They can see the relevance of their classroom studies to the complex environmental issues confronting our planet and they can acquire the skills they'll need to be creative problem solvers and powerful advocates

Environmental Education Benefits Students by…

Improving Academic Achievement. EE improves test scores by providing students with engaging lessons about the natural world that can be applied to all subject areas and grades.

Breaking the Indoor Habit. EE offers an antidote to the plugged-in lives of today's generation, which is the first to grow up indoors. Children who experience school grounds or play areas with diverse natural settings are more physically active, more aware of good nutrition, more creative, and more civil to one another.

Improving Student Health. EE gets students outdoors and active, and helps to address common health issues in children today, such as obesity, attention deficit disorder, and depression.

Supporting STEM. EE offers an engaging platform for gaining and applying knowledge and skills in science, technology, engineering, and mathematics (STEM).

Meeting 21st Century Needs. EE emphasizes skills essential for succeeding in tomorrow's world, such as questioning, investigating, defining problems, analyzing, interpreting, reasoning, developing conclusions, and solving problems.

Cultivating Leadership Qualities. EE emphasizes cooperative learning with others, critical thinking and discussion, and a focus on action strategies with real-world applications.

Improving Focus and Cognition. EE increases the ability of students to focus and improves their cognitive abilities. Children with attention-deficit disorder also benefit from more exposure to nature–the greener a child's everyday environment, the more manageable are their symptoms.

Q Write one essay on environmental policies of Modi's Government.

Modi Government's Environment Policy Endorses Everything That Bodes Well for Business

The last three years under the Modi government have seen the transformation of the environment from being a field of relative stability and inactivity, to functioning as an active instrument of capital accumulation. The sharp polarisation between extremely positive initiatives (like India's assertive global

position on climate change, ambitious forays into renewables and bills institutionalising water for life) and negative anti-people actions (especially decisions regulating natural ecosystems like coasts, forests and wetlands, and the eroding of people's rights), is based on the government rationale to endorse everything that bodes well for business, new technology and international acclaim, even if this is achieved at the expense of the protection of ecosystems, conservation, people's livelihood and well being.

Business development in the environment

The erosion of people's rights caused by the government's 'development' (or business development) initiatives, has been the most recurrent bone of contention over the last three years. Arguably, this mode of regulatory-business development is based on a command-and-control model whereby claims made by local community to the environmental commons are considerably eroded. Resources like land, air and water have come to be defined less by local ownership of 'environment management practices' and more by post-facto participatory public consultations.

The government is routing such practices through the system of Environmental Impact Assessment (EIA). The EIA is a critical constituent of responsible environmental governance and is a determining factor of how the balance between people, environment and industry will ultimately pan out. For instance, what happens when builders get automatic environmental clearance for online proposals pending more than a month, where there are no prior site checks? This is exactly what the Model Building Bye Laws do, which is just one among the many such prospective regulations.

While the UPA government, towards the end of its tenure and after being charged with policy paralysis, began distributing rapid-fire clearances to industrial projects, this government has systematised such manipulations as the norm. In the process, dispensing with the need to manipulate individual cases, by consistently working on the rules that have permitted companies to retrospectively apply for environmental clearance after their projects had already been launched. This allows violators an easy escape route – first commit violations and then cough up the payment, using the EIA route.

Under the present system, more hydropower units can be built on the Ganga, more land can be taken away from tribal forests to appease mining industries. Polluting construction projects along cities and coasts can easily get a go-ahead. Imagine this – already the 450 plus hydropower projects along the Ganga have adversely impacted 53% of its flow. And with the government planning more (remember the face-off between the ministry of environment, forest and climate change and the ministry of water resources), we can anticipate more devastating floods like those that took place in Chennai and Bihar.

The government knows its business

From its environmental track record, one thing that emerges is the current government's penchant for innovation, be that its earliest initiative – wanting to 'reform' (or dismantle) key environmental laws through the TSR recommendations – or the subsequent interventions that have, unfortunately, ended up in subverting the management of natural ecosystems, spanning forests, rivers, coasts and wetlands.

The rationale behind some of these policy 'innovations' does seem inexplicable. For instance, why do away with Central Wetland Regulatory Authority and devolve powers to states knowing that the latter are major violators of wetland conservation? It does away with EIA and shuts off citizens' voices. Or, why come up with the controversial river-linking proposal or the Act to build navigable waterways knowing that it will adversely impact the hydrology and water flow? In Bundelkhand, it makes little sense to transfer waters from Ken to Betwa (even though Ken cannot be defined as a water surplus river), and then facing the consequence of having Betwa waters diverted beyond the region. Even the Central Water Commission was reluctant to give the go-ahead to this idea.

Its overall track record shows that this government is active. It knows exactly what it is doing. It is therefore not contradicting itself when it approves a slew of regulations to project itself in a favourable light to foreign investors farmers. While at the same time, it has transformed the environment sector from the bureaucratic, corrupt and lethargic field that it was under the previous regime, to facilitate active capital accumulation. Arguably, environmental governance, in the last three years, has transformed into a convenient green growth strategy.

Q What is Sustainable Development?

Sustainable development is the organizing principle for meeting human development goals while at the same time sustaining the ability of natural systems to provide the natural resources and ecosystem services upon which the economy and society depend. The desired result is a state of society where living conditions and resource use continue to meet human needs without undermining the integrity and stability of the natural system and sustainable development can be classified as development that meet the needs of the present without compromising the ability of the future generation.

While the modern concept of sustainable development is derived mostly from the 1987 Brundtland Report, it is also rooted in earlier ideas about sustainable forest management and twentieth century environmental concerns. As the concept developed, it has shifted to focus more on economic development, social development and environmental protection for future generations. It has been suggested that "the term 'sustainability' should be viewed as humanity's target goal of human-ecosystem equilibrium (homeostasis), while 'sustainable development' refers to the holistic approach and temporal processes that lead us to the end point of sustainability".[1] The modern economies are endeavouring to reconcile ambitious economic development and obligations of preserving the natural resources and ecosystem, the two are traditionally seen as of conflicting nature. Instead of holding climate change commitments and other sustainability measures as a drag to economic development, turning and leveraging them into market opportunities will do greater good. The economic development brought by such organized principles and practices in an economy is called Managed Sustainable Development

Themes of Sustainable Development

Progress

The United Nations Conference on Sustainable Development (UNCSD; also known as Rio 2012) was the third international conference on sustainable development, which aimed at reconciling the economic and environmental goals of the global community. An outcome of this conference was the development of the Sustainable Development Goals that aim to promote sustainable progress and eliminate inequalities around the world. However, few nations met the World Wide Fund for Nature's definition of sustainable development criteria established in 2006.[86] Although some nations are more developed than others, all nations are constantly developing because each nation struggles with perpetuating disparities, inequalities and unequal access to fundamental rights and freedoms.[87]

Measurement

In 2007 a report for the U.S. Environmental Protection Agency stated: "While much discussion and effort has gone into sustainability indicators, none of the resulting systems clearly tells us whether our society is sustainable. At best, they can tell us that we are heading in the wrong direction, or that our current activities are not sustainable. More often, they simply draw our attention to the existence of problems, doing little to tell us the origin of those problems and nothing to tell us how to solve them."[88] Nevertheless, a majority of authors assume that a set of well defined and harmonised indicators is the only way to make sustainability tangible. Those indicators are expected to be identified and adjusted through empirical observations (trial and error).

Natural capital

The sustainable development debate is based on the assumption that societies need to manage three types of capital (economic, social, and natural), which may be non-substitutable and whose consumption might be irreversible.[96] Leading ecological economist and steady-state theorist Herman Daly,[36] for example, points to the fact that natural capital can not necessarily be substituted by economic capital. While it is possible that we can find ways to replace some natural resources, it is much more unlikely that they will ever be able to replace eco-system services, such as the protection provided by the ozone layer, or the climate stabilizing function of the Amazonian forest. In fact natural capital, social capital and economic capital are often complementarities. A further obstacle to substitutability lies also in the multi-functionality of many natural resources. Forests, for example, not only provide the raw material for paper (which can be substituted quite easily), but they also maintain biodiversity, regulate water flow, and absorb CO2.

Education

Education must be revisited in light of a renewed vision of sustainable human and social development that is both equitable and viable. This vision of sustainability must take into consideration the social, environmental and economic dimensions of human development and the various ways in which these relate to education: ‘An empowering education is one that builds the human resources we need to be productive, to continue to learn, to solve problems, to be creative, and to live together and with nature in peace and harmony. When nations ensure that such an education is accessible to all throughout their lives, a quiet revolution is set in motion: education becomes the engine of sustainable development and the key to a better world.’[

Business-as-usual

If the degradation of natural and social capital has such important consequence the question arises why action is not taken more systematically to alleviate it. Cohen and Winn[97] point to four types of market failure as possible explanations: First, while the benefits of natural or social capital depletion can usually be privatised, the costs are often externalised (i.e. they are borne not by the party responsible but by society in general). Second, natural capital is often undervalued by society since we are not fully aware of the real cost of the depletion of natural capital.

Q Explain environmental laws, regulations and ethics.

Environmental law, also known as environmental **and natural resources** law, is a collective term describing the network of treaties, statutes, regulations, common and customary laws addressing the effects of human activity on the natural environment. The core environmental law regimes address environmental pollution. A related but distinct set of regulatory regimes, now strongly influenced by environmental legal principles, focus on the management of specific natural resources, such as forests, minerals, or fisheries. Other areas, such as environmental impact assessment, may not fit neatly into either category, but are nonetheless important components of environmental law.

Environmental law is a continuing source of controversy. Debates over the necessity, fairness, and cost of environmental regulation are ongoing, as well as regarding the appropriateness of regulations vs. market solutions to achieve even agreed-upon ends.

Allegations of scientific uncertainty fuel the ongoing debate over greenhouse gas regulation, and are a major factor in debates over whether to ban particular pesticides.[13] In cases where the science is well-settled, it is not unusual to find that corporations intentionally hide or distort the facts, or sow confusion.[14]

It is very common for regulated industry to argue against environmental regulation on the basis of cost.[15] Difficulties arise in performing cost-benefit analysis of environmental issues. It is difficult to quantify the value of an environmental value such as a healthy ecosystem, clean air, or species diversity. Many environmentalists' response to pitting economy vs. ecology is summed up by former Senator and founder of Earth Day Gaylord Nelson, "The economy is a wholly owned subsidiary of the environment, not the other way around."[16] Furthermore, environmental issues are seen by many as having an ethical or moral dimension, which would transcend financial cost. Even so, there are some efforts underway to systemically recognize environmental costs and assets, and account for them properly in economic terms.

While affected industries spark controversy in fighting regulation, there are also many environmentalists and public interest groups who believe that current regulations are inadequate, and advocate for stronger protection.[17][18][19] Environmental law conferences - such as the annual Public Interest Environmental Law Conference in Eugene, Oregon - typically have this focus, also connecting environmental law with class, race, and other issues.

An additional debate is to what extent environmental laws are fair to all regulated parties. For instance, researchers Preston Teeter and Jorgen Sandberg highlight how smaller organizations can often incur disproportionately larger costs as a result of environmental regulations, which can ultimately create an additional barrier to entry for new firms, thus stifling competition and innovation.[20]

Environmental ethics is the part of environmental philosophy which considers extending the traditional boundaries of ethics from solely including humans to including the non-human world. It exerts influence on a large range of disciplines including environmental law, environmental sociology, ecotheology, ecological economics, ecology and environmental geography.

There are many ethical decisions that human beings make with respect to the environment. For example:

- Should humans continue to clear cut forests for the sake of human consumption?
- Why should humans continue to propagate its species, and life itself? [1]
- Should humans continue to make gasoline-powered vehicles?
- What environmental obligations do humans need to keep for future generations?[2][3]
- Is it right for humans to knowingly cause the extinction of a species for the convenience of humanity?
- How should humans best use and conserve the space environment to secure and expand life?[4]

- What role can Planetary Boundaries play in reshaping the human-earth relationship?[5]