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## Environmental Issues

- 1.** Pollution is any undesirable change in physical, chemical or biological characteristics of air, land, water or soil. Agents that bring about such an undesirable change are called as pollutants.
- 2.** In order to control environmental pollution, the Government of India has passed the Environment (Protection) Act, 1986 to protect and improve the quality of our environment (air, water and soil).
- 3.** There are several ways of removing particulate matter; the most widely used of which is the electrostatic precipitator, which can remove over 99 per cent particulate matter present in the exhaust from a thermal power plant.
- 4.** It has electrode wires that are maintained at several thousand volts, which produce a corona that releases electrons.
- 5.** These electrons attach to dust particles giving them a net negative charge.
- 6.** The collecting plates are grounded and attract the charged dust particles.
- 8.** The velocity of air between the plates must be low enough to allow the dust to fall.
- 9.** A scrubber can remove gases like sulphur dioxide.
- 10.** In a scrubber, the exhaust is passed through a spray of water or lime.
- 11.** Recently we have realised the dangers of particulate matter that are very very small and are not removed by these precipitators.
- 12.** According to Central Pollution Control Board (CPCB), particulate size 2.5 micrometers or less in diameter (PM 2.5) are responsible for causing the greatest harm to human health.
- 13.** These fine particulates can be inhaled deep into the lungs and can cause breathing and respiratory symptoms, irritation, inflammations and damage to the lungs and premature deaths.
- 14.** Automobiles are a major cause for atmospheric pollution atleast in the metro cities.
- 15.** Proper maintenance of automobiles along with use of lead-free petrol or diesel can reduce the pollutants they emit.

**16.** Catalytic converters, having expensive metals namely platinum-palladium and rhodium as the catalysts, are fitted into automobiles for reducing emission of poisonous gases.

**17.** As the exhaust passes through the catalytic converter, unburnt hydrocarbons are converted into carbon dioxide and water, and carbon monoxide and nitric oxide are changed to carbon dioxide and nitrogen gas, respectively.

**18.** Motor vehicles equipped with catalytic converter should use unleaded petrol because lead in the petrol inactivates the catalyst.

**19.** In India, the Air (Prevention and Control of Pollution) Act came into force in 1981, but was amended in 1987 to include noise as an air pollutant. Noise is undesired high level of sound.

**20.** A brief exposure to extremely high sound level, 150 dB or more generated by take off of a jet plane or rocket, may damage ear drums thus permanently impairing hearing ability.

**21.** Even chronic exposure to a relatively lower noise level of cities may permanently damage hearing abilities of humans.

**22.** Noise also causes sleeplessness, increased heart beating, altered breathing pattern, thus considerably stressing humans.

**23.** The Government of India has passed the Water (Prevention and Control of Pollution) Act, 1974 to safeguard our water resources.

**24.** Domestic sewage primarily contains biodegradable organic matter, which readily decomposes – thanks to bacteria and other micro-organisms, which can multiply using these organic substances as substrates and hence utilise some of the components of sewage.

**25.** It is possible to estimate the amount of organic matter in sewage water by measuring Biochemical Oxygen Demand (BOD). Micro-organisms involved in biodegradation of organic matter in the receiving water body consume a lot of oxygen, and as a result there is a sharp decline in dissolved oxygen downstream from the point of sewage discharge.

**26.** This causes mortality of fish and other aquatic creatures.

**27.** Presence of large amounts of nutrients in waters also causes excessive growth of planktonic (free-floating) algae, called an algal bloom which imparts a distinct colour to the water bodies.

- 28.** Algal blooms cause deterioration of the water quality and fish mortality. Some bloom-forming algae are extremely toxic to human beings and animals.
- 29.** They grow faster than our ability to remove them.
- 30.** These are plants of water hyacinth (*Eichhornia crassipes*), the world's most problematic aquatic weed, also called 'Terror of Bengal'.
- 31.** They grow abundantly in eutrophic water bodies, and lead to an imbalance in the ecosystem dynamics of the water body.
- 32.** A few toxic substances, often present in industrial waste waters, can undergo biological magnification (Biomagnification) in the aquatic food chain.
- 33.** Biomagnification refers to increase in concentration of the toxicant at successive trophic levels.
- 34.** This happens because a toxic substance accumulated by an organism cannot be metabolised or excreted, and is thus passed on to the next higher trophic level.
- 35.** This phenomenon is well-known for mercury and DDT.
- 36.** Biomagnification of DDT in an aquatic food chain.
- 37.** The concentration of DDT is increased at successive trophic levels; say if it starts at 0.003 ppb (ppb = parts per billion) in water, it can ultimately reach 25 ppm (ppm = parts per million) in fish-eating birds, through biomagnification.
- 38.** High concentrations of DDT disturb calcium metabolism in birds, which causes thinning of eggshell and their premature breaking, eventually causing decline in bird populations.
- 39.** Eutrophication is the natural aging of a lake by biological enrichment of its water.
- 40.** In a young lake the water is cold and clear, supporting little life.
- 41.** With time, streams draining into the lake introduce nutrients such as nitrogen and phosphorus, which encourage the growth of aquatic organisms.
- 42.** As the lake's fertility increases, plant and animal life burgeons, and organic remains begin to be deposited on the lake bottom.

**43.** Over the centuries, as silt and organic debris pile up, the lake grows shallower and warmer, with warm-water organisms supplanting those that thrive in a cold environment.

**44.** Marsh plants take root in the shallows and begin to fill in the original lake basin. Eventually, the lake gives way to large masses of floating plants (bog), finally converting into land.

**45.** Depending on climate, size of the lake and other factors, the natural aging of a lake may span thousands of years.

**46.** However, pollutants from man's activities like effluents from the industries and homes can radically accelerate the aging process. This phenomenon has been called Cultural or Accelerated Eutrophication.

**46.** lakes in many parts of the earth have been severely eutrophied by sewage and agricultural and industrial wastes.

**47.** The prime contaminants are nitrates and phosphates, which act as plant nutrients.

**48.** They overstimulate the growth of algae, causing unsightly scum and unpleasant odors, and robbing the water of dissolved oxygen vital to other aquatic life.

**49.** At the same time, other pollutants flowing into a lake may poison whole populations of fish, whose decomposing remains further deplete the water's dissolved oxygen content.

**50.** In such fashion, a lake can literally choke to death. Irreparable computers and other electronic goods are known as electronic wastes (e-wastes).

**51.** E-wastes are buried in landfills or incinerated.

**52.** Over half of the e-wastes generated in the developed world are exported to developing countries, mainly to China, India and Pakistan, where metals like copper, iron, silicon, nickel and gold are recovered during recycling process.

**53.** Unlike developed countries, which have specifically built facilities for recycling of e-wastes, recycling in developing countries often involves manual participation thus exposing workers to toxic substances present in ewastes.

**54.** Eventually recycling is the only solution for the treatment of e-wastes provided it is carried out in an environment-friendly manner.

**55.** The greenhouse effect is a naturally occurring phenomenon that is responsible for heating of Earth's surface and atmosphere.

**56.** Clouds and gases reflect about one-fourth of the incoming solar radiation, and absorb some of it but almost half of incoming solar radiation falls on Earth's surface heating it, while a small proportion is reflected back.

**57.** Earth's surface re-emits heat in the form of infrared radiation but part of this does not escape into space as atmospheric gases (e.g., carbon dioxide, methane, etc.) absorb a major fraction of it.

**58.** The molecules of these gases radiate heat energy, and a major part of which again comes to Earth's surface, thus heating it up once again.

**59.** The above-mentioned gases – carbon dioxide and methane – are commonly known as greenhouse gases because they are responsible for the greenhouse effect. 'bad' ozone, formed in the lower atmosphere (troposphere) that harms plants and animals.

**60.** There is 'good' ozone also; this ozone is found in the upper part of the atmosphere called the stratosphere, and it acts as a shield absorbing ultraviolet radiation from the sun.

**61.** UV rays are highly injurious to living organisms since DNA and proteins of living organisms preferentially absorb UV rays, and its high energy breaks the chemical bonds within these molecules.

**62.** The thickness of the ozone in a column of air from the ground to the top of the atmosphere is measured in terms of Dobson units(DU).

**63.** Ozone hole is the area above Antarctica, shown in purple colour, where the ozone layer is the thinnest.

**64.** Ozone thickness is given in Dobson unit (see carefully the scale shown in colour violet to red).

**65.** The ozone hole over Antarctica develops each year between late August and early October.

**66.** Ozone gas is continuously formed by the action of UV rays on molecular oxygen, and also degraded into molecular oxygen in the stratosphere.

**67.** There should be a balance between production and degradation of ozone in the stratosphere. Of late, the balance has been disrupted due to enhancement of ozone degradation by chlorofluorocarbons (CFCs).

**68.** CFCs find wide use as refrigerants.

**69.** CFCs discharged in the lower part of atmosphere move upward and reach stratosphere. In stratosphere, UV rays act on them releasing Cl atoms.

**70.** Cl degrades ozone releasing molecular oxygen, with these atoms acting merely as catalysts; Cl atoms are not consumed in the reaction.

**71.** whatever CFCs are added to the stratosphere, they have permanent and continuing affects on Ozone levels.

**72.** Although ozone depletion is occurring widely in the stratosphere, the depletion is particularly marked over the Antarctic region has resulted in formation of a large area of thinned ozone layer, commonly called as the ozone hole.

**73.** UV radiation of wavelengths shorter than UV-B, are almost completely absorbed by Earth's atmosphere, given that the ozone layer is intact. But, UV-B damages DNA and mutation may occur.

**74.** It causes aging of skin, damage to skin cells and various types of skin cancers.

**75.** In human eye, cornea absorbs UV-B radiation, and a high dose of UV-B causes inflammation of cornea, called snow-blindness cataract, etc.

**76.** Such exposure may permanently damage the cornea. Recognising the deleterious affects of ozone depletion, an international treaty, known as the Montreal Protocol, was signed at Montreal (Canada) in 1987 (effective in 1989) to control the emission of ozone depleting substances.

**77.** Subsequently many more efforts have been made and protocols have laid down definite roadmaps, separately for developed and developing countries, for reducing the emission of CFCs and other ozone depleting chemicals.

**78.** The development of the fertile top-soil takes centuries.

**79.** But, it can be removed very easily due to human activities like over-cultivation, unrestricted grazing, deforestation and poor irrigation practices, resulting in arid patches of land.

**80.** When large barren patches extend and meet over time, a desert is created.

- 81.** Internationally, it has been recognised that desertification is a major problem nowadays, particularly due to increased urbanisation.
- 82.** Waterlogging and soil salinity: Irrigation without proper drainage of water leads to waterlogging in the soil.
- 83.** Besides affecting the crops, waterlogging draws salt to the surface of the soil.
- 84.** The salt then is deposited as a thin crust on the land surface or starts collecting at the roots of the plants. This increased salt content is inimical to the growth of crops and is extremely damaging to agriculture.
- 85.** Waterlogging and soil salinity are some of the problems that have come in the wake of the Green Revolution.
- 86.** Slash and burn agriculture, commonly called as Jhum cultivation in the north-eastern states of India, has also contributed to deforestation.
- 87.** In slash and burn agriculture, the farmers cut down the trees of the forest and burn the plant remains.
- 88.** The ash is used as a fertiliser and the land is then used for farming or cattle grazing.
- 89.** After cultivation, the area is left for several years so as to allow its recovery.
- 90.** The farmers then move on to other areas and repeat this process.
- 91.** In earlier days, when Jhum cultivation was in prevalence, enough time-gap was given such that the land recovered from the effect of cultivation.
- 92.** With increasing population, and repeated cultivation, this recovery phase is done away with, resulting in deforestation.
- 93.** Realising the significance of participation by local communities, the Government of India in 1980s has introduced the concept of Joint Forest Management (JFM) so as to work closely with the local communities for protecting and managing forests.
- 94.** In return for their services to the forest, the communities get benefit of various forest products (e.g., fruits, gum, rubber, medicine, etc.), and thus the forest can be conserved in a sustainable manner.