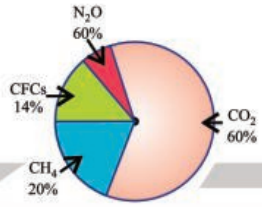
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CLASS XII BIOLOGY NOTES

Key Notes and Important Questions with Answers

ENVIRONMENTAL ISSUES





Chapter - 16

Environmental Issues

Pollution : Undesirable physical/chemical/biological characteristics of air/ water/ land which cause damage to the animals/plants/humans and architectural structures.

Pollutants : Agents which cause pollution.

Slash and Burn Agriculture (Jhum Cultivation) : Farmers cut down trees and burn the plant remains. Ash is used as a fertilizer and the land is then used for farming or cattle grazing.

Reforestation : Process of restoring a forest that was removed at some point of time in the past.

Effluents : Something flowing over a large body of water (may be sewage or industrial effluents).

CPCB : Central Pollution Control Board

FOAM : Friends of Arcata Marsh

JFM (Joint Forest Management) : Introduced by the Government of India in 1980s to work closely with local communities for protecting and managing forests.

Control of air pollution :

Air pollution can be controlled by following methods :

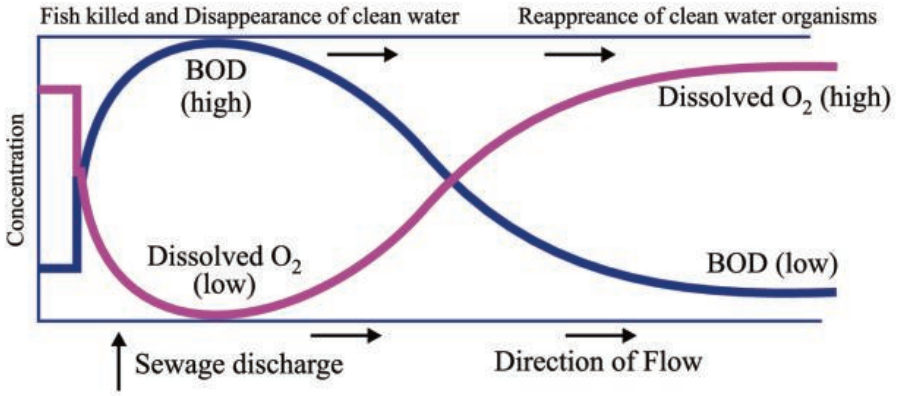
1. Electrostatic precipitator : This device is very efficient, used to remove particulate matter from air. This device can remove 99% particulates which are present industrial or thermal power plant's exhausts. In this device electrode wire at thousand volts are used and dust particles passed out through this device. Electrons released get attached to dust particles giving them negative charge. The collecting plates which are grounded attract these charged particles

2. Scrubber : This device is used to remove gaseous pollutant like sulphur dioxide. The exhaust is passed through a spray of water and lime, which on reacting with sulphur dioxide form precipitate

3. Catalytic converter : This is a device fitted in automobiles for reducing emmission of gases. In catalytic converter metals like rhodium and platinum-palladium acts as catalyst. Only unleaded petrol can be used in vehicle in which catalytic converter is fitted.

Biochemical Oxygen Demand (BOD)

- BOD refers to the amount of oxygen that would be consumed if all the organic matter in one litre of water were oxidized by bacteria. The BOD test measures the rate of uptake of oxygen by micro-organisms in a sample of water.
- Indirectly, BOD is a measure of the organic matter present in the water. The greater the BOD of waste water, more is its polluting potential.
- In the given figure, the effect of sewage on some important characteristics of a river is shown :



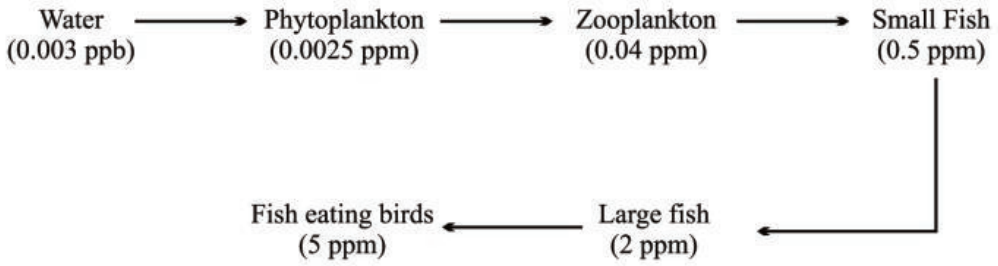
Algal Bloom : Presence of large amounts of nutrients in water causes excessive growth of algae, called an algal bloom.

Harmful effect of algal bloom are :

1. Fish mortality
2. Deterioration of water quality
3. Toxic to animals and human beings.

Biomagnification

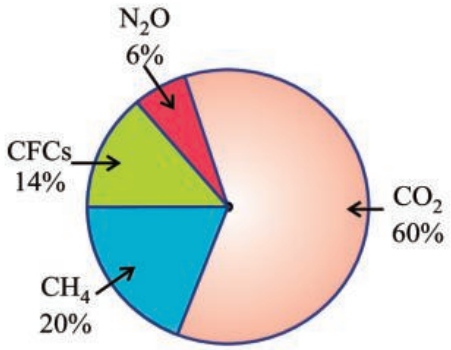
- It refers to increase in concentration of toxic substances at successive trophic levels.
- Biomagnification of DDT in an aquatic food chain is given below :



Harmful Effect : High concentration of DDT disturbs calcium metabolism in birds, which causes thining of egg shell and their premature breaking, causing decline in birds population.

Eutrophication : It is the process of nutrient enrichment of water and subsequent loss of species diversity like fishes. Excess nutrients causes algal bloom which may cover the whole surface of water body and release toxins. It causes oxygen deficiency in water that leads to the death of aquatic animals like fishes.

Global Warming : Increase in the level of greenhouse gases is mainly responsible for global warming, (increase in mean global temperature due to trapping of infrared radiation). Carbon dioxide, Methane, CFCs, N_2O are the main gases that causes greenhouse effect.



Percentage of Green House Gases

Harmful effect of Global Warming :

1. Melting of glaciers
2. Over many years, this will result in a rise in sea level that can flood the coastal areas.

Measures to Control Global Warming

1. Minimise the use of fossil fuel.
2. Improving efficiency of energy usage.
3. Reducing deforestration.
4. Planting trees.

Climate change impact and Mitigation

Human activities are changing the composition as well as behaviour of the atmosphere leading to its deterioration at global level. Climate change is phenomenon of seasonal changes over a period of time with accumulation of green house gases in the atmosphere. Since climate plays major role in the formation of natural ecosystem and the human economy, therefore we need to tackle this phenomenon. Due to climate change, we are facing new challenges for survival. More frequent and intense drought, storms, heat waves, rising sea level, melting of glaciers which can harm not only animals but also their habitat climate change will adversely affect our agriculture and thus our food supply.

Climate change mitigation refer to the efforts to reduce or prevent the emission of green house gases. Climate change mitigation consist of action which limit the magnitude or rate of long term climate change. We can achieve mitigation by increasing the capacity of carbon sink eg through reforestration. It is said that mitigation policies can substantially reduce the risk which are associate with human induced global warming. So we have to think about–

- Phasing out of fossil fuel and switching on to low carbon energy sources.
- Use of renewable energy resources
- Expanding forest to remove greater amount of carbon dioxide from the atmosphere.

Ozone Depletion

- Ozone gas is continuously formed by the action of UV-rays on molecular oxygen and also degraded into molecular oxygen in stratosphere.
- The thickness of the ozone-layer in a column of air from the ground to the top of the atmosphere is measured in terns of Dobson units (DU).
- Ozone layer absorbs the harmful UV-rays. These rays cause the skin cancer, damages genes, causes inflammation of cornea.
- Chlorofluorocarbon (CFCs) deplete the ozone layer. The part of atmosphere with lesser concentration of ozone is called ozone hole.

Steps leading to ozone depletion

- UV-rays split CFCs and release atomic chlorine (Cl)
- UV-rays also split ozone into oxygen. ($O_3 \xrightarrow{\text{UV-rays}} O_2 + [O]$)
- Chlorine atoms trap oxygen atoms and ozone is not formed again from oxygen. This leads to depletion of ozone in the stratosphere.

Ozone Hole : Large area of thinned ozone layer over Antartica.

Control of Vehicular Air Pollution in Delhi : All the buses of Delhi were converted to run on CNG by the end of the 2002. Other steps to reduce air pollution in Delhi include.

1. Phasing out of old vehicles.
2. Use of unleaded petrol and low sulphur petrol and diesel.
3. Use of catalytic converters in vehicles.
4. Application of Euro-IV norms for vehicles from April 1, 2010.

Auto Fuel Policy : The Government of India has laid out a road map to cut down the vehicular air pollution in many cities of India. The goal of this of aromatic hydrocarbons to 35% of the fuel. The Bharat Stage II was applied to all automobiles in all cities from April, 1,2005. The cities like Delhi, Mumbai, Chennai, Kolkata have to meet Euro emission norms from April 1, 2005 and Euro IV Emission norms April, 1, 2010.

Electronic Wastes (e-waste) : e-wastes are irreparable computer and other electronic goods.

Disposal of e-wastes :

1. Burned in landfills
2. Incineration.
3. Recycling.

El Nino effect : Rise in temperature leading to deleterious changes in the environment and resulting in odd climatic changes is El Nino effect.

Adverse effect : Increased melting of polar ice, submerging of coastal areas, flood, loss of habitat leading to loss of biodiversity.

Questions

VSA (1 Mark)

1. Particulate size PM 2.5 is responsible for causing greatest harm to human health. What is it ? How is it harmful ?
2. What is the noise level that can cause permanent impairment of hearing ability of human beings ?
3. Why was the Montreal Protocol signed ?
4. Jhum cultivation has been in practice from earlier days, but it is considered more problematic these days. Why ?

SA-I (2 Marks)

5. Landfills are not much a solution for getting rid of solid wastes. Why ?
6. There is a sharp decline in dissolved oxygen downstream from the point of sewage discharge. Why? What are its adverse effects ?
7. Catalytic converters use expensive metals as catalysts.
   (a) Name the metals generally used.
   (b) What precaution should be observed while using catalytic converter ?
8. What are e-wastes? Why are they creating more problem in developing countries in comparison to developed countries ?

SA-II (3 Marks)

9. Deforestation is creating a lot of problems in the environments. List the consequences of deforestation.
10. People have been actively participating in the effects for the conservation of forests.
    (i) Name the award instituted in respect of Amrita Devi to promote such efforts.
    (ii) Name the movement launched to protect the trees by hugging them.
    (iii) Name the step has undertaken by Government of India in 1980's to work closely with the local communities for protecting and mananging forests.

11. What is optimum percentage of forest area recommended by the National Forest policy (1988) for the plains and the hills respectively? List any four problems caused due to deforestation.

LA **(5 Marks)**

12. In Arcata, the towns people have created an integrated waste water treatment process within a natural system. A citizen group called FOAM helps in upkeep of this project.
    (a) What are the main steps in waste water management done in this way ?
    (b) 'Ecosen' toilets in Kerala and Sri Lanka is also an initiative for water conservation. How ?

Answers

VSA **(1 Mark)**

1. PM2.5 stands for particulate matter of size 2.5 micrometers or less in diameter. Its responsible for causing greatest harm to human health as it can be inhaled deep into lungs and cause breathing problems.
2. 150 dB or more
3. To control emission of ozone depleting substance.
4. Enough time gap is not being given for the natural process of recovery of land from the effect of cultivation.

SA-I **(2 Marks)**

5. Landfill sites are getting filled very fast due to large amount of garbage generation. Also underground water resources may get polluted due to seepage of chemicals.
6. Following discharge of sewage into river, microorganisms involved in biodegradation of organic matter present in sewage consume more oxygen. This cause mortality of fish and other aquatic creatures.
7. (a) Catalysts : platinum - palladium and rhodium
   (b) Motor vehicles equipped with catalytic converters should use unleaded petrol as lead inactivates the catalysts.

8. (a) Irreparable computers and other electronic wastes.

(b) Recycling in developing countries involves manual participation thus exposing workers to toxic substances. In developed countries its mechanised so less dangerous.

SA-II **(3 Marks)**

9. • Enhanced CO_2 concentration in atmosphere
   - Loss of biodiversity
   - Soil erosion
   - Desertification
   - Disturbed hydrological cycles.
   - Reduce emission of automobile exhaust
   - Growing more trees.

10. (i) Amrita Devi Bishnoi Wildlife Protection Award.

(ii) Chipko Movement

(iii) Joint Forest Management (JFM).

11. 3% forest cover for the plains and 67% for the hills

1. Deforestation increases atmospheric carbon dioxide.
2. Loss of biodiversity and germplasm.
3. Leads to desertification.
4. Soil erosion and disturbance in water cycle.

LA **(5 Marks)**

12. (a) Conventional sedimentation, filtering and chlorine treatment. Absorption and assimilation of pollutants by algae fungi and bacteria.

(b) 'Ecosan' derived from ecological sanitation. Handling human excreta using dry composting toilets. Its practical, hygienic and cost effective method.