

BIOLOGY

Chapter 16: Environmental Issues



Environmental Issues

Environmental Issues:

With increase in human population, demands for food, shelter, water, electricity, roads, and automobiles are increasing rapidly and exerting pressure on environment and altering the natural health of ecosystem. All across the world, people are facing a wealth of new and challenging environmental problems every day. Some of them are- pollution, greenhouse effect, ozone depletion, deforestation etc.

Pollution:



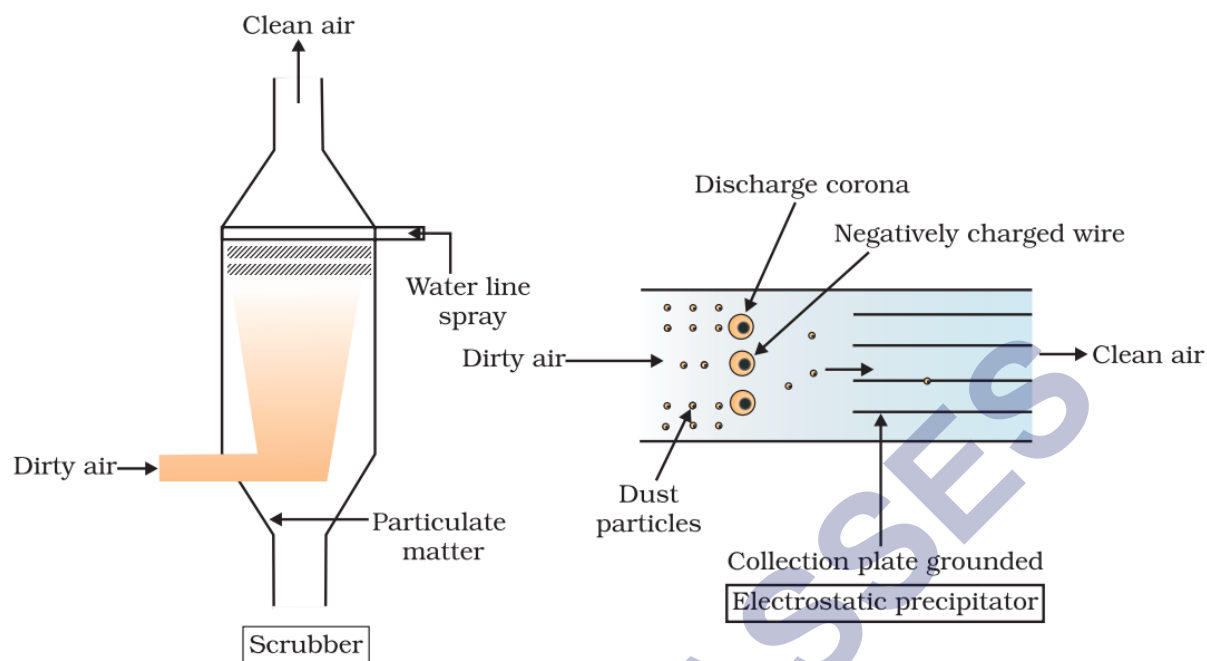
Pollution is undesirable change in physical, chemical or biological properties of air, land, water or soil. The agents which cause undesirable change are called pollutants.

Air Pollution and its Control:

Air is essential for respiration in all living organisms. Pollutants reduce growth and production of crops as well as premature death of plants. The harmful effect of pollution on all the living organisms depends upon:

- Concentration of pollutants.
- Duration of exposure.
- Organisms involved.

Electrostatic precipitator:



- Thermal power plants, smelters and other industries release particulate and gaseous air pollutants along with harmless gases such as nitrogen, oxygen etc. These pollutants should be filtered out before releasing the harmless gases into the atmosphere. There are many methods of removing particulate matter; the most widely used is the electrostatic precipitator.
- It can remove over 99% of particulate matter present in the exhaust from thermal power plant.
- It has electrode wires that are maintained at several thousand volts to produce a corona that releases electrons. These electrons attach to dust particles giving them a net negative charge. The collecting plates are grounded and attract the charged dust particles so that clean air can pass through electrostatic precipitator.
- A scrubber can remove gases like sulphur dioxide. The exhaust is passed through spray of water or lime.
- According to CPCB (Central Pollution Control Board) particulate size less 2.5 micrometers or less in diameter (PM 2.5) cause greatest harm to human health.
- The fine particles can be inhaled deep into the lungs and can cause breathing and respiratory symptoms, irritation, inflammations and damage to lungs and premature death.
- Automobiles are main cause of atmospheric pollution in metro cities. Proper maintenance of automobiles along with use of lead-free petrol or diesel can reduce the pollutants they emit.
- Catalytic converters contain platinum- palladium and rhodium as the catalyst, are fitted into automobiles for reducing emission of poisonous gases. 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. The vehicles fitted with catalytic converter should use unleaded petrol because lead in the petrol inactivates the catalyst.

Controlling Vehicular Air Pollution: A Case Study of Delhi

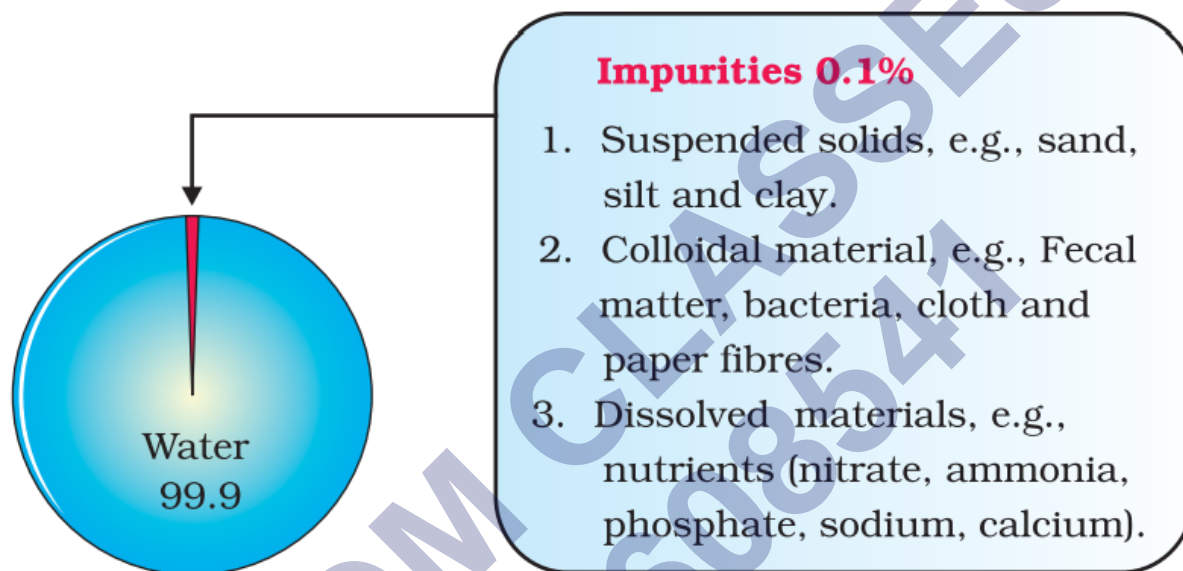


- In Delhi, entire fleet of public transport was converted to compressed natural gas (CNG) mode to reduce the increasing pollution level of metro. CNG is better than diesel because it is cheaper than petrol and diesel, burn completely with leaving any residue and cannot be adulterated like petrol and diesel. But the main problem with switching over to CNG is the difficulty of laying down pipelines to deliver CNG through distribution points/ pumps and ensuring uninterrupted supply.
- **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 policy is to reduce Sulphur to 50 ppm in petrol and diesel and reduce levels of aromatic hydrocarbons to 35% of the fuel. The Bharat Stage II will be applicable to all automobiles in all cities April, 1, 2005. The cities (like Delhi, Mumbai, Chennai, Kolkata etc.) will have to meet Euro III emission norms from April 1, 2005 and Euro IV Emission norms from April 1, 2010.
- In India, the Air (Prevention and Control of Pollution) Act came into force in 1981 and was amended in 1987 to include noise as an air pollutant. Noise is undesired high level of sound. High sound level greater than 150 dB or more generated by take-off or a jet plane or rocket may damage ear drums thus permanently impairing hearing ability.
- Noise also causes sleeplessness, increased heart beating, altered breathing pattern, thus considerably stressing humans.
- Reduction of noise in industries can be affected by use of sound absorbent materials

or by muffling noise.

Water Pollution and its Control:

Water bodies are lifeline of human beings as well as other animals. Due to disposal of all kinds of waste and other anthropogenic actions the ponds, lakes, stream, river, estuaries and oceans are becoming polluted in several parts of world. The Government of India has passed the Water (Prevention and Control of Pollution) Act, 1974 to protect the water resources.



Domestic Sewage and Industrial Effluents:

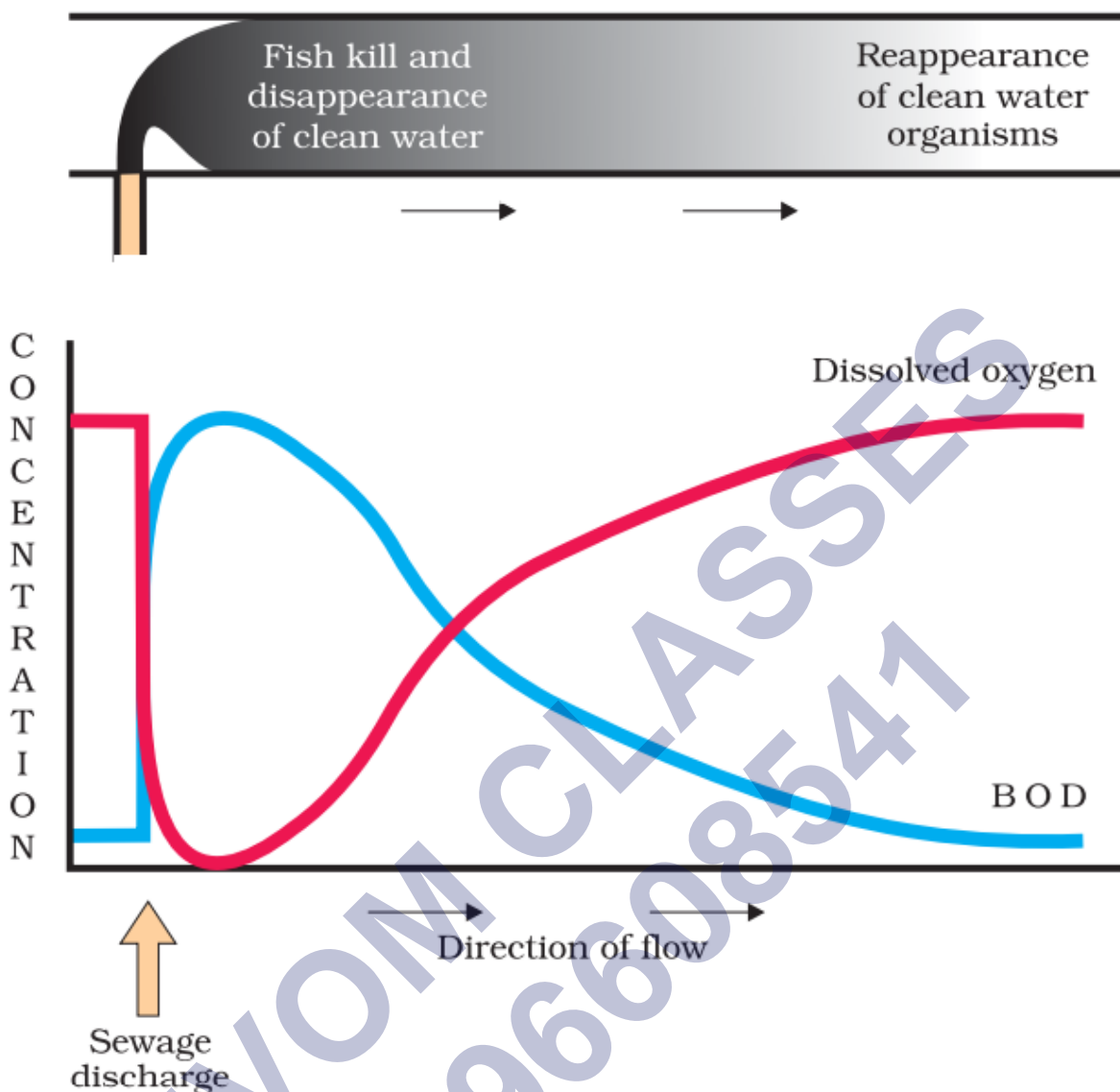
The sewage that comes out from house and office makes the domestic sewage. A mere 0.1% impurities make domestic sewage unfit for human use. Solid wastes are relatively easy to remove but dissolved salts as nitrates, phosphates and other nutrients and toxic metal ions and organic compounds present in domestic wastes are comparatively difficult to remove.

Domestic sewage mainly contains biodegradable organic matter, which can be easily decomposed by microbes like bacteria and fungi. They use organic wastes as nutrients.

Biological Oxygen Demand (BOD):

The microbes that decompose organic wastes in water bodies consume a lot of oxygen that result into sharp decline in dissolved oxygen downstream from the point of sewage discharge. This causes mortality of fish and other aquatic creatures.

BOD refer to the amount of oxygen that would be consumed if all the organic matter is 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.



Algal Bloom:

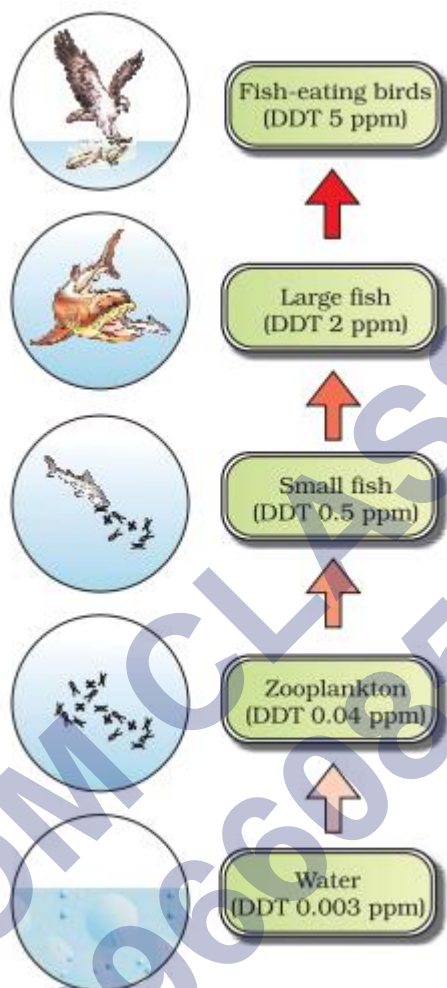
Presence of large amount of organic nutrients in water causes excessive growth of planktonic or free-floating algae called algal bloom. Due to this color of water bodies get changed. This may cause deterioration of the water quality and fish mortality.

'Terror of Bengal': Water hyacinth (*Eichhornia crassipes*) is the world's most problematic aquatic weed. They are introduced into India for their beautiful flowers that have caused havoc by their excessive growth by causing blocks in our water bodies. This weed is commonly known as 'Terror of Bengal'.

Biomagnification or Biological Magnification:

Toxic wastes present in industrial wastes and water from farmhouse containing pesticides and weedicides enters the food chain of aquatic organisms. The increase in concentration of toxicant at each successive trophic levels is called biological magnification. The most common toxicant that get accumulated at successive trophic levels includes DDT and

Mercury. High concentrations of DDT disturb calcium metabolism in birds, which causes thinning of eggshell and their premature breaking, eventually causing decline in bird populations.



Eutrophication:

It is the natural aging of a lake by biological enrichment of its water. Due to addition of nutrients such as nitrogen and phosphorus that encourage the growth of aquatic organism the accumulation of organic remains in course of time leads to shall lowing of lake. Over the centuries the silt and organic debris piles up at the bottom of lake and encourage the growth of marsh plants in the shallow and begin to fill in the original lake basin. Eventually large masses of floating plants grow and finally converting into land.

Cultural or Accelerated Eutrophication: The pollutants from man's activities such as effluents from the industries and homes radically accelerate the aging of lake. This phenomenon is called Cultural or Accelerated Eutrophication. Main contaminants include nitrates, phosphates that act as plant nutrients. They increase the growth of algae, causing unsightly scum and unpleasant odours, and depleting the dissolved oxygen of water which is important for other aquatic life.

Integrated Wastewater Treatment:

Wastewater including sewage can be treated in an integrated way, by combining artificial and natural processes. An example of such an initiative is the town of Arcata, situated along the northern coast of California. The native people in collaboration with Humboldt State University created an integrated wastewater treatment process within a natural system.

The cleaning occurs in two stages:

- The conventional sedimentation, filtering and chlorine treatments are given.
- To combat with pollutants like dissolved heavy metals, the biologists developed a series of six connected marshes over 60 hectares of marshland where plants, algae, fungi and bacteria were seeded which neutralize, absorb and assimilate the pollutants.
- As the water flows through the marshes, it gets purified naturally. The marshes also constitute a sanctuary, which is highly diverse in the form of fishes, animals and birds that now reside there.
- A citizens group called Friends of the Arcata Marsh (FOAM) are responsible for the safety of this project.
- Ecological sanitation is a sustainable system for managing human excreta, using dry composting toilets. This is a practical, hygienic, efficient and cost-effective solution to human waste disposal. The important part is that with this composting method, human excreta can be recycled into natural fertilizer. There are working 'EcoSan' toilets in many areas of Kerala and Sri Lanka.

Solid Wastes:

Municipal solid wastes are wastes from home, offices, stores, schools, hospitals etc. that are collected and disposed by the municipality. It consists of paper, food wastes, plastics, glass, metals, rubber, leather, textile etc. Burning reduces the volume of the wastes but the waste generally not burnt to its completion and open dumps often serve as the breeding ground for rodents and flies. Sanitary landfills were used as substitute for open burning dumps where wastes are dumped in a depression or trench after compaction and covered with dirt every day. There is a danger of seepage of chemicals from these landfills polluting the underground water resources.

Municipal wastes:

- Bio-degradable wastes, Recyclable wastes, non-biodegradable waste
- The biodegradable materials can be put into deep pits in the ground and be left for natural breakdown.

- Kabadiwallahs and rag-pickers do a great job of separation of materials for recycling of different kinds of wastes.
- **Polyblend:** Polyblend is the best way to combat with ever-increasing problem of accumulating plastic waste. It is a fine powder of recycled modified plastic which is mixed with the bitumen. Polyblend and bitumen, when used to lay roads, enhanced the bitumen's water repellent properties, and helped to increase road life by a factor of three.
- Hospitals generate hazardous wastes that contain disinfectants and other chemicals also pathogenic micro-organisms. Such wastes need careful treatment and disposal. Inclinator is used for disposal of hospital wastes.

Electronic wastes:



Unrepairable computers and other electronic goods are known as electronic wastes (e-wastes). E-wastes are buried in landfills or incinerated. 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. Recycling is the only solution for the treatment of e-wastes provided it is carried out in an environment-friendly manner.

Agro-chemicals and other effects:

Use of inorganic fertilizers and pesticides has been increased many fold due to green revolution for enhancing crop production. The pesticides and insecticides are toxic to non-target organisms that are important components of the soil ecosystem. They are biomagnified in the terrestrial ecosystem and causes eutrophication in aquatic ecosystems.

Organic Farming:



Integrated organic farming is a cyclic, zero-waste procedure in which waste products from one process are cycled in as nutrients for other processes to allow the maximum utilization of resource and increase the efficiency of production. It includes bee-keeping, dairy management, water harvesting, composting and agriculture in a chain of processes which support each other and allow an extremely economical and sustainable venture. No chemical fertilizer is used in this process.

Radioactive Wastes:



Nuclear energy has two very serious problems:

- Accidental leakage.
- Safe disposal of radioactive wastes.

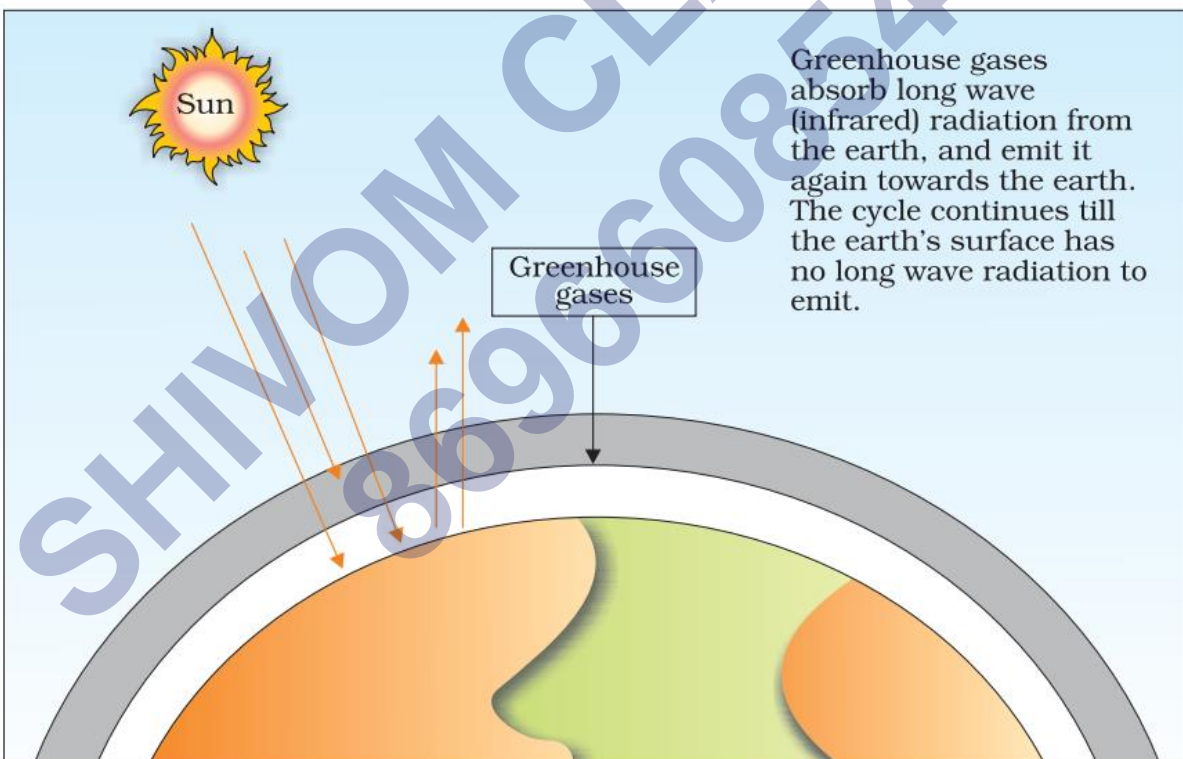
The radiation released from nuclear wastes is extremely damaging to biological organisms as

it causes mutations to occur at very high rate. It has been recommended that storage of nuclear wastes after sufficient pre-treatment should be done in suitably shielded containers and buried within the rock about 500m deep below the earth surface.

Green House Effect and Global Warming:

The greenhouse effect is a naturally occurring phenomenon that is responsible for heating of Earth's surface and atmosphere due to increase in concentration of carbon dioxide and methane gas. 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. The surface of earth re-emits heat in the form of infrared radiation but part of this does not reflected back due to greenhouse gases that leads to heating of earth atmosphere. Global warming is caused due to greenhouse effect.

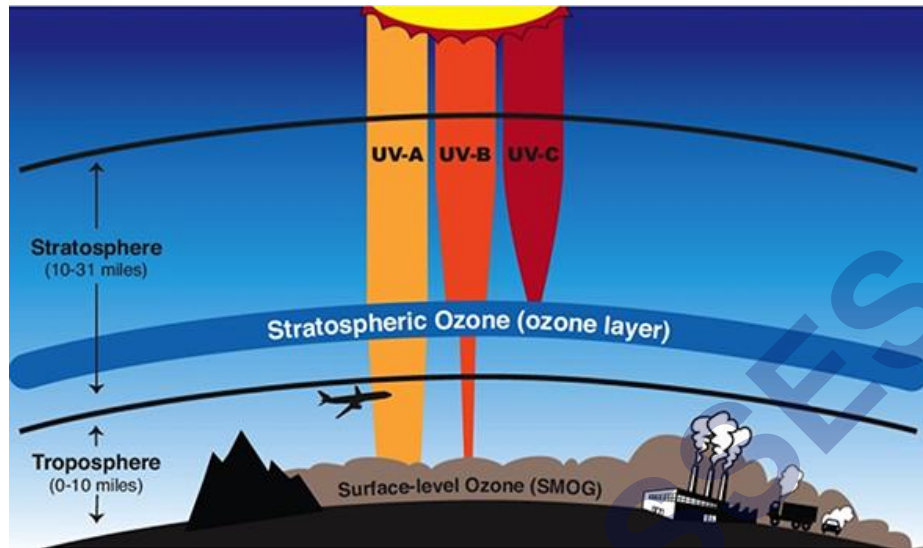
Scientists believe that this rise in temperature is leading to harmful changes in the environment and resulting in odd climatic changes (e.g. El Nino effect), thus leading to increased melting of polar ice caps.



Global warming can be controlled by:

- Cutting down use of fossil fuel.
- Improving efficiency of energy usage.
- Reducing deforestation.
- Planting tree.
- Slowing down the growth of human population.

Ozone Depletion in the Stratosphere:



- Ozone found in the upper part of the atmosphere called stratosphere acts as a shield absorbing ultraviolet radiation from the sun. UV rays are highly injurious to living organisms.
- The thickness of the ozone-layer in a column of air from the ground to the top of the atmosphere is measured in terms of Dobson units (DU). Ozone layer absorbs the harmful UV-rays. It causes aging of skin, damage to skin cells and various types of skin cancers. In human eye, cornea absorbs UV-B radiation, and a high dose of UV-B causes inflammation of cornea, called snow-blindness cataract, etc. Such exposure may permanently damage the cornea.
- Chlorofluoro Carbons 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.
- Chlorine atoms trap oxygen atoms and ozone is not formed again from oxygen. This leads to depletion of ozone in the stratosphere.

Deforestation:

It is the conversion of forested areas to non-forested ones due to human activities like slash and burn agriculture also called Jhum cultivation where 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 use of fertilizers and cutting of trees for industries and residential use.



Main consequence of deforestation includes:

- Enhanced carbon dioxide concentration.
- Loss of biodiversity.
- Disturbed hydrologic cycles.
- Soil erosion.
- Desertification etc.

Reforestation:



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

Amrita Devi Bishnoi Wildlife Protection Award:

The Government of India has recently started the Amrita Devi Bishnoi Wildlife Protection
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Award for individuals or communities from rural areas that have shown extraordinary courage and dedication in protecting wildlife.

Chipko Movement:

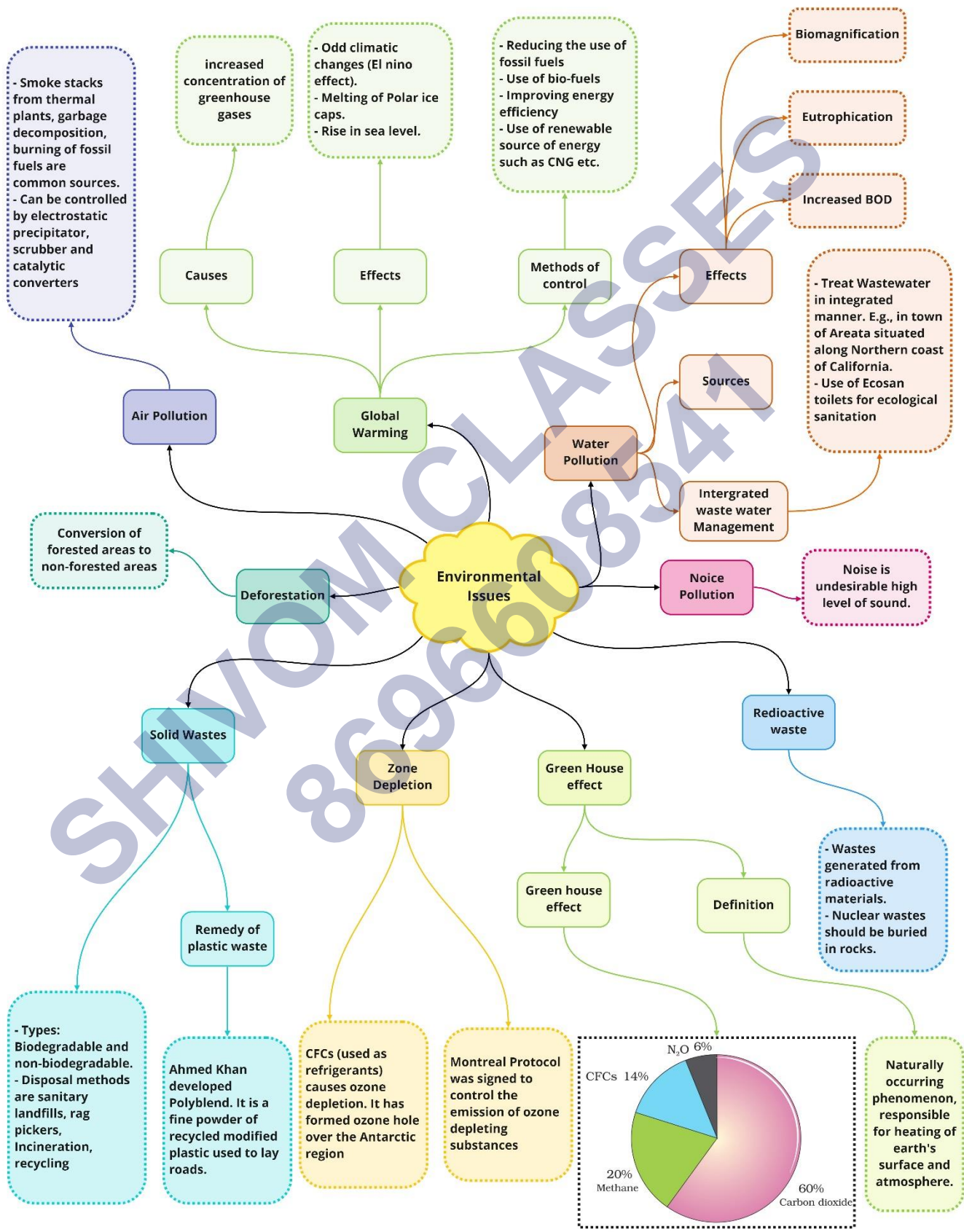
In 1974, local women of Garhwal Himalayas showed tremendous courage in protecting trees from the axe of contractors by hugging them. People all over the world have appreciated the Chipko movement.

Joint Forest Management (JFM):

Realising the importance of participation by local communities, the Government of India in 1980s has introduced the concept of Joint Forest Management (JFM) as to work closely with the local communities for protecting and managing forests.

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Class : 12th Biology
Chapter- 16 : Environmental Issues



Important Questions

➤ Multiple Choice Questions:

- Non-biodegradable pollutants are created by:
 - nature
 - excessive use of resources
 - humans
 - natural disasters.
- According to the Central Pollution Control Board, particles that are responsible for causing great harm to human health are of diameter:
 - 2.50 micrometres
 - 5.00 micrometres
 - 10.00 micrometres
 - 7.5 micrometres.
- The material generally used for sound proofing of rooms like a recording studio and auditorium, etc. is:
 - cotton
 - coir
 - wood
 - styro foam.
- Compressed Natural Gas (CNG) is:
 - propane
 - methane
 - ethane
 - butane.
- World's most problematic aquatic weed is:
 - Azolla
 - Woiffia
 - Eichhomia
 - Trapa.
- Which of the following causes biomagnification?
 - SO₂
 - Mercury
 - DDT
 - Both B and C.
- The expanded form of DDT is:
 - dichloro diphenyl trichloroethane

- (b) dichloro diethyl trichloroethane
(c) dichloro dipyrydyl trichloroethane
(d) dichloro diphenyl tetrachloroacetate.
8. Which of the following material takes the longest time for biodegradations?
(a) Cotton
(b) Paper
(c) Bone
(d) Jute.
9. Choose the incorrect statement.
(a) The Montreal protocol is associated with the control of emission of ozone depleting substances.
(b) Methane and carbon dioxide are greenhouse gases.
(c) Dobson units are used to measure oxygen content.
(d) Use of incinerators is crucial to disposal of hospital wastes.
10. Among the following which one causes more indoor chemical pollution?
(a) Burning coal
(b) Burning cooking gas
(c) Burning mosquito coil
(d) Room spray.
11. The green scum seen in the fresh water bodies is:
(a) blue green algae
(b) red algae
(c) green algae
(d) Both (a) and (c).
12. The loudness of a sound that a person can withstand without discomfort is about
(a) 150 dB.
(b) 215 dB.
(c) 30 dB.
(d) 80 dB.
13. The major source of noise pollution world wide is due to:
(a) office equipment
(b) transport system
(c) sugar, textile and paper industries
(d) oil refineries and thermal power plants.
14. Catalytic converters are fitted into automobiles to reduce emission of harmful gases. Catalytic converters change unburnt hydrocarbons into:

- (a) carbon dioxide and water
- (b) carbon monoxide
- (c) methane
- (d) carbon dioxide and methane.

15. Why is it necessary to remove sulphur from petroleum products?

- (a) To reduce the emission of sulphur dioxide in exhaust fumes
- (b) To increase efficiency of automobiles engines
- (c) To use sulphur removed from petroleum for commercial purposes
- (d) To increase the life span of engine silencers.

➤ Very Short Question:

1. Why should the velocity of air between the plates of an electrostatic precipitator be low?
2. PM_{2.5} is responsible for causing greatest harm to human health. What is it? How is it harmful?
3. What is the noise level that can cause permanent impairment of hearing ability of human beings?
4. Why was the Montreal Protocol signed?
5. Jhum cultivation has been in practice from earlier days, but its considered more problematic these days. Why?
6. Aradiation causes ageing of skin, skin cancer, and inflammation of cornea called snow blindness. It also damages DNA. Name the radiation.
7. Name any three gases contributing to green-house effect.
8. Name any two metals found in the catalytic converts?
9. What is meant by ozone hole?
10. Define polar Vortex?

➤ Short Questions:

1. Landfills are not much a solution for getting rid of solid wastes. Why?
2. Electrostatic precipitator can remove over 99% particulate matter present in exhaust from a thermal power plant. How?
3. Why is a scrubber used? Which spray is used on exhaust gases passing through a scrubber?
4. There is a sharp decline in dissolved oxygen downstream from the point of sewage discharge. Why? What are its adverse effects?
5. Catalytic converters use expensive metals as catalysts.
 - (a) Name the metals generally used.

(b) What precaution should be observed while using catalytic converter.

6. What are e-wastes? Why are they creating more problem in developing countries in comparison to developed countries?
7. Water logging and salinity are some of the problems that have come in the wake of Green revolution. How does water logging create problems of salinity?
8. What is the relationship between BOD, micro-organisms and amount of bio degradable matter?

➤ Long Questions:

1. What measures do you suggest to control pollution from automobile exhaust?
2. Blends of polyblend and bitumen, when used, help to increase road life by a factor of three. What is the reason?
3. Why is the ozone layer in the stratosphere called a protective layer?

➤ Assertion & Reason Questions:

1. For two statements are given-one labelled Assertion and the other labelled Reason. Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below.
 - a. Both assertion and reason are true, and reason is the correct explanation of assertion.
 - b. Both assertion and reason are true, but reason is not the correct explanation of assertion.
 - c. Assertion is true, but reason is false.
 - d. Both assertion and reason are false.

Assertion: Bharat stage IV emission norms have been in place since April 2010, for 4 wheelers in 13 mega cities of India.

Reason: Green muffler scheme refers to the plantation of trees and shrubs along road sides and is effective to control noise pollution only.

2. For two statements are given-one labelled Assertion and the other labelled Reason. Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below.
 - a. Both assertion and reason are true, and reason is the correct explanation of assertion.
 - b. Both assertion and reason are true, but reason is not the correct explanation of assertion.
 - c. Assertion is true, but reason is false.

d. Both assertion and reason are false.

Assertion: Methylmercury is a highly persistent kind of pollutant that accumulates in food chains.

Reason: Mercury pollution is responsible for Minamata disease.

➤ Case Study Questions:

1. Read the following and answer any four questions from (i) to (v) given below:

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. Algal blooms cause deterioration of the water quality and fish mortality. Some bloom-forming algae are extremely toxic to human beings and animals. You may have seen the beautiful mauve-colored flowers found on very appealingly-shaped floating plants in water bodies. These plants which were introduced into India for their lovely flowers have caused havoc by their excessive growth by causing blocks in our waterways. They grow faster than our ability to remove them.

These are plants of water hyacinth (*Eichhornia crassipes*), the world's most problematic aquatic weed, also called 'Terror of Bengal'. They grow abundantly in eutrophic water bodies, and lead to an imbalance in the ecosystem dynamics of the water body.

1) An aquatic weed hyacinth is also called as

- (a) Terror of Bengal
- (b) Terror of Nepal
- (c) Terror of Gujrat
- (d) Terror of Assam

2) Planktonic algae is also known as algal.....

- (a) Hyacinth
- (b) Mauva
- (c) Bloom
- (d) Weed

3) Type of algae is toxic to the animals.

- (a) Root forming
- (b) Bloom forming
- (c) Flower forming
- (d) Fungi forming

4) Write causes of mauve-coloured flowers.

5) What does algal bloom causes?

2. Read the following and answer any four questions from (i) to (v) given below:

Integrated organic farming is a cyclical, zero-waste procedure, where waste products from one process are cycled in as nutrients for other processes. This allows the maximum utilisation of resource and increases the efficiency of production. Ramesh Chandra Dagar, a farmer in Sonapat, Haryana, is doing just this. He includes bee-keeping, dairy management, water harvesting, composting and agriculture in a chain of processes, which support each other and allow an extremely economical and sustainable venture. There is no need to use chemical fertilisers for crops, as cattle excreta (dung) are used as manure. Crop waste is used to create compost, which can be used as a natural fertiliser or can be used to generate natural gas for satisfying the energy needs of the farm. Enthusiastic about spreading information and help on the practice of integrated organic farming, Dagar has created the Haryana Kisan Welfare Club, with a current membership of 5000 farmers.

- 1) In the organic farming, cattle excreta were used as
 - (a) Waste
 - (b) Gas
 - (c) Fuel
 - (d) Manure
- 2) In the farming, integrated organic farming is a Waste procedure.
 - (a) Zero
 - (b) One
 - (c) Two
 - (d) Three
- 3) In the natural farming, is used as a natural fertiliser and can generate natural gas.
 - (a) e-waste
 - (b) Crop waste
 - (c) Pond waste
 - (d) None of these
- 4) Who created Haryana Kisan Welfare Club?
- 5) Which processes are included in the integrated organic farming by Dagar?

✓ Answer Key-

➤ Multiple Choice Answers:

1. (c) humans
2. (a) 2.50 micrometres
3. (d) styro foam.
4. (b) methane

5. (c) Eichhomia
6. (d) Both B and C.
7. (a) dichloro diphenyl trichloroethane
8. (c) Bone
9. (c) Dobson units are used to measure oxygen content.
10. (a) Burning coal
11. (d) Both (a) and (c).
12. (d) 80 dB.
13. (b) transport system
14. (a) carbon dioxide and water
15. (a) To reduce the emission of sulphur dioxide in exhaust fumes

➤ Very Short Answers:

1. To allow the dust to fall.
2. PM_{2.5} 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.
3. Ans.150 dB or more
4. To control emission of ozone depleting substances.
5. Enough time gap is not being given for the natural process of recovery of land from the effect of cultivation.
6. Ultraviolet B rays (UV-B rays)
7. Carbon dioxide, methane & chlorofluorocarbons.
8. Platinum, rhodium.
9. The decline in this thickness of spring time ozone layer is called ozone hole.
10. Polar vortex refers to the natural circulation of wind that completely isolates the Antarctic air from rest of world.

➤ Short Answer:

1. 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.
2. Electrode wire at thousand volts, produce corona to release electrons, electrons attach to dust particules giving them net negative charge, charged dust particules attracted/collected by collecting plates which are grounded.
3. To remove gases like sulphur dioxide. Spray of water or lime is used.

4. Following discharge of sewage into river, micro organisms involved in biodegradation of organic matter present in sewage consume more oxygen. This cause mortality of fish and other aquatic creatures.
5. (a) Catalysts : platinum – palladium and Rhodium
(b) Motor vehicles equipped with catalytic converters should use unleaded petrol as lead inactivates the catalysts.
6. (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.
7. Water logging draws salt to surface of soil. Salt deposited on land surface as a thin crust or at the roots of the plants
8. Increase in amount of biodegradable matter leads to rapid multiplication of micro organisms to degrade it, thereby increasing BOD level of the water body.

➤ Long Answer:

1. Control of pollution from automobile exhaust:
 - i. Efficient engines can reduce the number of unburnt hydrocarbons from vehicuLar emissions.
 - ii. Use of cataLytic converters to convert harmful gases to harmless.
 - iii. Use of good quality fuel.
 - iv. Unleaded petrol can reduce the amount of lead in the exhaust.
 - v. The use of CNG (compressed natural gas) Lowers the toxic contaminants in the exhaust.
2. Polyblend is a fine powder of recycled modified plastic. The binding property due to increased cohesion and enhanced water-repelling property of plastic makes the road last longer besides giving added strength to withstand more loads.

This is because:

- Plastic increases the melting point of the bitumen which would prevent it from melting in India's hot and extremely humid climate, where temperature frequently crosses 45°C.
 - Rainwater will not seep through because of the plastic in the tar.
3. Ozone layer as a protective layer: The ozone layer in the stratosphere is very useful to human beings because it absorbs the major part of harmful ultraviolet radiation coming from the sun. Therefore, it is called a protective layer. However, it has been observed that the ozone layer is getting depleted. One of the reasons for the depletion of the ozone layer is the action of aerosols spray propellants.

Chemicals such as fluorocarbons and chlorofluorocarbons are used as aerosol propellants. These compounds react with ozone gas in the atmosphere thereby depleting it. Scientists all over the world are worried about the destruction of the ozone layer. If the ozone layer in the atmosphere is significantly decreased, these harmful radiations would reach the earth and would cause many damages such as skin cancer, genetic disorders in man and other living forms. Efforts are being made to find substitutes for these chemicals that do not react with ozone.

➤ Assertion and Reason Answers:

1) c) Assertion is true, but reason is false.

Explanation:

Bharat stage emission standards are emission standards issued by the Government of India to regulate the emission of air pollutants from internal combustion of engine equipments of motor vehicles. Bharat Stage IV norms have been in place for 4-wheelers in 13 mega cities of India since April 2010. Green muffler or green belt vegetation is rows of trees and shrubs grown and maintained to serve as noise absorbers. It also reduces air pollution because the trees and shrubs absorb pollution gases and cause settling of suspended particulate matter.

2) b) Both assertion and reason are true, but reason is not the correct explanation of assertion.

Explanation:

Mercury pollution has been responsible for several deaths in Sweden and Japan and has caused the Minamata disease in Japan, chlor alkali plants seem to be chief sources of mercury containing effluents. Mercury is persistent in water it gets changed into water soluble dimethyl form $[(CH_3)_2Hg]$ and enters the food chain accompanied by biological or ecological amplification.

➤ Case Study:

1.

- 1) (a) Terror of Bengal
- 2) (c) Bloom.
- 3) (b) Bloom forming.
- 4) Mauva-coloured flower causes blocks in the waterways.
- 5) Algal bloom can cause fish mortality and water deterioration.

2.

- 1) (d) Manure.
- 2) (a) Zero.

- 3) (b) Crop waste.
- 4) The Haryana Kisan Welfare Club was created by Ramesh Chandra Dagar.
- 5) Processes like dairy management, composting, water harvesting and bee-keeping are included in the integrated organic farming by Dagar.

SHIVOM CLASSES
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