

## CHAPTER 16 – ENVIRONMENTAL ISSUES

Human population is increasing tremendously; therefore there is a lot of demand for food, electricity, clothing, roads, housing, vehicles etc. These are exerting a lot of pressure on land, water, air and other resources. This leads to pollution and degradation of the environment and biodiversity that is a part of it.

### **What is pollution?**

Pollution is any undesirable change in physical, chemical or / and biological composition of air, water and land, and the agents that cause these are called pollutants.

### **What is air pollution?**

It's the increase in amount of particles in the air, especially particles smaller than 2.5um such as CO, NO, lead, arsenic, cyanide CFCs ammonia etc that cause respiratory diseases, lung cancer, Tuberculosis, lack of O<sub>2</sub> to the brain and premature deaths.

### **How is it caused?**

Use of vehicles is the main cause of air pollution due to release of harmful gases. Use of petrol & coal in industries and cigarette smoking also contribute to air pollution. Improper disposal of domestic & industrial wastes led to the release of methane.

**Smog:** Mixture of air pollutants (like arsenic, lead, NO, CO etc), dust & fog is called smog and is deadly to the body as it results in deposition of dry mucus in the alveoli of lungs, tuberculosis, lung cancer, aging, premature death etc

**Health fact:** Studies show that living in cities like Delhi, Mumbai, Bangalore, Kolkata and many others is equal to smoking an average of 20 cigarettes a day and this problem is fast increasing.

*Ways we can help reduce air pollution and global warming:*

- Reducing the use of vehicles for travelling short distances & carpooling.
- Use of hydrogen power in cars & machines or Hybrid cars.
- By planting trees across town or growing plants in our homes.
- Use of Electrostatic precipitators, Baghouses, Particulate scrubbers.
- Use of magnetic trains.
- Upgrading industries, factories & aircraft with better engines & turbines

- Use of renewable sources of energy such as wind, water, solar & infrared, geothermal, tidal etc
- Carbon credits are the most effective way of reducing carbon footprint. These credits can be sold to companies or individuals for cash and at the same time reduce CO<sub>2</sub> production.
- An electrostatic precipitator is a particulate removing device that removes particles such as dust, smoke etc from air using force of an electrostatic charge. They are highly effective & consume very less energy for their use.
- In particulate scrubbers, the polluted gas is passed through a layer of scrubbing liquid, or forced through a pool of liquid. These are highly effective in the removal of pollutants from the gas. But these scrubbers have a high chance of corrosion as the toxic gases removed are highly acidic & these scrubbers require large amount of power. Also it is hard to dispose of the waste – water.

*Laws passed by some countries to control Air Pollution:*

- Environmental Protection Act (1990)\_Environment Act (1995)\_British Clean Air Act (1956)~UK
- Air Pollution Control Act (1955)\_Clean Air Act (1963,1970,1990)~US
- Air Act (1981)\_Environment Act (1986)~India
- Environmental Promotion Act (1994)\_Environmental Compatibility Act (1994)~Austria

What is water pollution?

- It's the pollution of water bodies with substances like domestic wastes, industrial, thermal, mineral, toxic, nitrogen & phosphorous rich wastes. The nutrient rich wastes multiply the algae concentration in the water bodies & this leads to depletion of oxygen in these bodies & hence leads to the death of fish and other biodiversity in the area.

*It's harmful effects include:*

- Biomagnification i.e. increase in the toxicity among the food chain at successive trophic levels. This phenomenon is well known with mercury and DDT.
- Accelerated Eutrophication. Eutrophication is the aging of a lake to convert into land, which generally takes 1000s of years or more. But human activities have accelerated this

natural process & as a result many lakes are already extinct. It is caused due to dumping of nutrient rich and thermal waste into lakes.

- Death of biodiversity living near the polluted water bodies, accelerated global warming & extinction of many species.

Note: DDT reduces fat levels, is an endocrine disruptor, causes cancer, causes developmental and reproductive toxicity, Parkinson's & asthma & thinning of eggshells.

India has the most polluted rivers in the world. The excuse of religion & spirituality has been the main reason for their degradation.

**BOD** : Biochemical Oxygen Demand for various organisms.

BOD is the amount of oxygen required by the biodegradable material & the organic matter living in a certain water body like lake or pond.

**Invasive plant water hyacinth:** It is used to control and remove BOD, suspended solids, nutrients (phosphorous, nitrogen), heavy metals & organochlorides from water bodies that have been polluted with mineral, industrial & chemical wastes. Water Hyacinth Scrubbers manage and optimize water hyacinth's natural capability to extract nutrient pollutants to ensure sustainability and increased treatment performance. But if their growth is unchecked then it spreads across water bodies quickly. In India it is also called 'Terror of Bengal'.

It is necessary to control water pollution as it leads to diseases like jaundice, cholera, typhoid, dysentery, dengue, malaria etc many of which are very hard to cure.

- The waste water should be treated before dumping in rivers and lakes.
- Domestic waste water can be mildly treated and used for irrigation.
- Planting of trees to reduce acid rain & pollution of ground water.
- Rainwater harvesting to conserve water and reduce wastage of fresh water.
- Prevention/control of use of rivers for purposes related to religious ceremonies.
- Use of dry composting toilets that do not require water, also the human waste collected can be used as a good natural fertilizer.

Some important actions taken by governments to reduce pollution of water bodies:

- The International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978.

- International Convention on Oil Pollution Preparedness, Response and Cooperation, 1990.
- International Convention on Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances (HNS) by Sea.
- Water Act 1974-India
- Agricultural Nitrates Directive-UK
- Anything that is thrown out along with garbage such as wastes from our homes, schools, offices, shops, hospitals etc are classified as solid wastes. These include glass, plastic, wood, metals, organic matter, food, electrical equipment etc.

*It is classified into three main types:*

- Bio Degradable waste.
- Non-Bio Degradable waste.
- Recyclable waste.
- Everyday humans produce millions of tonnes of waste all over the world. But what happens to this waste produced?
- In many countries the waste produced is burnt to reduce its volume, but burning is not an effective way to reduce waste as it causes pollution & release of toxic wastes.
- Wastes are also dumped in landfills- a landfill is a deep trench covering a very large area in which waste is dumped. In countries like Germany, the methane produced from the wastes is collected & used as fuel, & the decomposed waste is used as fertilizer as it is highly rich in nutrients. Modern landfills are designed such that the waste is fully made use of & such that they do not pollute the ground water levels. The toxic seepage from under the landfills is collected & treated before being used as fertilizer.

Landfills aren't much of a solution to solving the problem of the large amounts of wastes generated as they get filled up overtime, faster than the waste can be removed or recycled.

Only we can reduce the amount produced by us. We could:

- Use jute bags for shopping instead of plastic or even paper.
- Glass or metal waste must be recycled & reused.

- Waste produced from hospitals must be incinerated before dumping into landfills as these wastes contain pathogens & harmful germs, & toxic chemicals.
- Using E-Book readers for reading and writing instead of using books. Use of E-Books can save hundreds of millions of trees around the world every year.
- Recycling of electronic items instead of dumping or burning them.
- Use of bio degradable plastic for packaging.

### Agro-chemicals and their effects

Over the years the use of agro chemicals has increased considerably. Most of the crops are treated with Pesticides, in-organic fertilizers, insecticides etc to increase crop yield.

- But use of these chemicals results in bio-magnification & eutrophication.
- Many useful insects, rodents & microorganisms are also killed by the use of these chemicals.
- These chemicals seep into the ground & pollute the soil & ground water.
- These cause cancer and inhibit development of brain and the body.

The use of agro-chemicals can be overcome by smart farming strategies.

- Bee-keeping. Placing a bee hive in the centre of a crop field drastically increases crop yield & provides honey & beeswax that can be sold for profit. Also bees help keep elephants away as elephants are afraid of bees.
- Use of ladybugs and worms. Lady bugs help protect the crops against smaller insects & worms help aerate the soil.
- Using cow manure or plant waste to fertilize the soil.
- Planting tree belts around the crop fields helps protect the crops from winds & rains.
- Growing more than one crop in a given farmland per year not only provides variety but also helps replenish nutrients in the soil.
- Placing guard dogs such as German Shepards helps protect the farmlands against animals like rabbits & wild cattle.

Steps such as these can help reduce the use of chemicals in growing crops and help increase crop yield. Growing of crops in such a manner is called organic farming.

## **Radioactive wastes**

The waste produced from the nuclear fission of heavy atoms such as uranium, thorium etc for the production of power is radioactive waste.

This waste is highly toxic and causes mutations and cancer. It has to be dealt with utmost caution.

The nuclear waste should be stored after heavy treatment and packed in special containers. It should be buried deep under the ground for minimum of 60 – 80 years for the waste to stabilize. Even then there is a high chance of nuclear contamination of the surrounding areas & the ground water. Failure of nuclear power plants can have disastrous consequences. The use of nuclear fuels should be avoided if possible.

## **Greenhouse effect and global warming**

Global warming refers to the heating up of the Earth due to greenhouse effect. Greenhouse effect is caused when gases such as CO<sub>2</sub>, CH<sub>4</sub> etc increase in the atmosphere & this leads to the heating up of the earth as these are good absorbers of heat. These gases prevent the excess heat from leaving the Earth's atmosphere thus resulting in greenhouse effect.

Presently the earth is 0.9°C hotter than normal, if earth's temperature continues to rise then it could give rise to runaway global warming or the El Nino Effect. Over time this could disrupt the delicate pattern of ocean currents & give rise to another Ice Age which could be followed by mass extinction of several species and even endanger the Human Race.

Global warming can have grave consequences on the health of the planet & the biodiversity within it. Already thousands of species of flora & fauna have become extinct. The melting of ice caps will result in flooding of low lying areas; massive tsunamis; more powerful, fierce & unpredictable tornados; terrible storms & droughts etc.

Scientists predict that about 3 – 4 billion humans would lose their lives mostly from developing countries by the year 2050. Finally the resulting Ice Age would have a devastating effect on the planet.

We must control global warming to ensure that the biodiversity on Earth is conserved. The following steps can help reduce global warming:

- Use of Hydrogen fuels & reducing the dependence on fossil fuels.
- Improving the efficiency of engines & turbines can drastically reduce pollution & also help save millions of Dollars\Euros every year.

- Controlling & reducing the human population.
- Planting hundreds of trees across cities & in homes.
- Using Magnetic trains. Mag - Lev trains are faster than planes & cause very little or no pollution compared to electric trains.
- Preventing Deforestation & use of Carbon Credits.

These are some of the few ways to help protect Earth & conserve its biodiversity.

### **Depletion of ozone layer**

The depletion of ozone layer is one of the major contributors of cancer.

Ozone is formed in the stratosphere by the effect of UV rays on O<sub>2</sub>. The thickness of ozone is measured in Dobson units.

The UV rays act on the CFCs to release freons that react with ozone to release pure oxygen. The freons merely act as catalysts & are not used up in the reaction. Hence the released freons have a continuous harmful effect on the ozone layer.

The CFCs released in the lower part of the atmosphere move upwards towards the south pole, hence depleting the ozone layer over Antarctica.

There are around 10 types of UV rays. Out of these the most common ones are UVa, UVb, UVc.

UV-a or black light (long wave) : It is used in tanning beds & to find counterfeit money.

UV-b (medium wave) : Absorbed by ozone layer under normal conditions. If exposed to the body, causes snow blindness, cataract, inflammation of cornea, aging of skin and skin cancer.

UV-c (short wave) : Used as a germicidal & in laboratories & in the treatment of water.

Realizing the harmful effects of CFCs an international treaty called the Montreal Protocol was signed at Montreal, Canada in 1987 (effective 1989) to control CFCs emission throughout the world.

### **Degradation by improper utilization & maintenance of resources**

Soil erosion & Desertification: It is a result of poor maintenance of top soil. Fertile top soil takes years to form but it can easily be removed especially due to human activities such as over – cultivation, over – grazing, deforestation, poor irrigation practices, use of chemicals etc. It results in degradation of the top soil & the land becomes barren. Urbanization is also a major problem of desertification.

Water logging & soil salinity: Over irrigation especially without proper drainage leads to water logging of the soil. It also increases the salt content of the soil which heavily affects the health of plants. It is a post – green revolution problem.

### **Deforestation**

Deforestation refers to the cutting down of trees for wood for furniture, fire wood, paper, to make cigarettes, to clear land for cultivation, due to the expansion of cities etc. Jhum cultivation is also a major contributor to deforestation in India.

Deforestation has a very harmful effect on the environment. It leads to desertification, global warming, acid rain, depletion & pollution of ground water levels, loss of biodiversity in the affected areas etc.

There are various efforts to conserve the forests.

- Hug a tree movement.
- Organizations fighting to save trees.
- In India Amrita Devi Bishnoi Wildlife Protection Award is given to individuals or organizations that show courage & dedication towards biodiversity.

There are various ways in which we can help conserve trees:

- Avoiding the use paper to read books & news.
- Reforestation
- Controlling growth of Human population & the expansion of cities.
- Forming groups and communities to fight against deforestation.
- Seeking help from governmental and non – governmental organizations for the conservation of forests.
- Creating awareness about illegal selling of forestlands to companies & rich social groups.
- Pressurizing the governments to pass laws to conserve trees & to check the deforestation caused by private companies, to limit the deforestation they cause.

Help conserve trees as they are the lungs of Earth & provide us with our most basic needs.

- **Stop Planet Earth's degradation or we'll pay the price.**
- **It is our responsibility to conserve the biodiversity on Earth.**

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