

1.SOIL POLLUTION

LEARNING OBJECTIVES:

- *Introduction of soil pollution*
- *Soil polluted reasons*
- *Types of solid waste – House hold, Hospital, Hazardous waste.*
- *Effect of solid waste on soil*
- *Methods of solid waste disposal and management.*
- *Introduction of noise pollution*
- *Source of noise pollution*
- *Unit of noise*
- *Effect of noise pollution*
- *Acceptable noise level*
- *Method of minimize noise pollution*

Unit 1: Soil pollution

1.1 Introduction of Soil Pollution:-

Soil is the thin layer of organic and inorganic materials that covers the Earth's rocky surface. The organic portion, which is derived from the decayed remains of plants and animals, is concentrated in the dark uppermost topsoil.

1.2 Soil becomes polluted by:-

- Seepage from a landfill.*
- Discharge of industrial waste into the soil.*
- Percolation of contaminated water into the soil.*
- Rupture of underground storage tanks.*
- Excess application of pesticides, herbicides or fertilizer.*
- Solid waste seepage.*
- Chemicals like petroleum hydrocarbons, heavy metals, pesticides and solvents.*



1.3 Some of the major types of solid waste management are as follows:

1. *House hold waste,*
2. *Hazardous Wastes,*

3. Industrial Wastes,

4.. Agricultural Wastes,

5. Bio-medical Wastes,

1. Household waste:-

Household Waste, also known as domestic waste or residential waste, is refuse generated by households. Non-hazardous waste is often made up of food scraps, newspapers, bottles, cans, etc. and parts of it that can be recycled. Refuse from households can also include some forms of hazardous waste and can originate from household cleaners, batteries, or oils. These types of waste need to be handled in a safe manner to ensure that they will not find their way into the environment and become a threat to both humans and animals.

2. Hospital waste

Hospital waste is any kind of waste that contains infectious material This definition includes waste generated by healthcare facilities like physician’s offices, dental practices, laboratories, medical research facilities, and veterinary clinics.



Poison or toxic. These materials, if ingested, can cause serious illness or death, in addition to cancer, birth defects or other chronic health problems.



Flammable. These materials will burn under certain conditions.



Explosive. These materials may react violently when exposed to heat or other substances.

3. Hazardous waste:-

It waste that has substantial or potential threats to public health or the environment.



Corrosive. These materials can eat away other substances, including living tissue.



Radioactive. These materials may cause illness if not shielded properly or if their shield breaks down due to improper disposal.



Biohazardous/ infectious. These materials may pass on disease. No household items should contain this symbol.

Types of hazardous waste:-

1. *Nuclear waste*
2. *Industrial waste*
3. *Medical waste*
4. *Universal waste*
5. *Construction waste*
6. *Electronic waste*

1.4 Effect of Solid waste

Municipal solid wastes heap up on the roads due to improper disposal system. People clean their own houses and litter their immediate surroundings which affects the community including themselves.

This type of dumping allows biodegradable materials to decompose under uncontrolled and unhygienic conditions. This produces foul smell and breeds various types of insects and infectious organisms besides spoiling the aesthetics of the site. Industrial solid wastes are sources of toxic metals and hazardous wastes, which may spread on land and can cause changes in physicochemical and biological characteristics thereby affecting productivity of soils.

Toxic substances may leach or percolate to contaminate the ground water. In refuse mixing, the hazardous wastes are mixed with garbage and other combustible wastes. This makes segregation and disposal all the more difficult and risky.

Various types of wastes like cans, pesticides, cleaning solvents, batteries (zinc, lead or mercury), radioactive materials, plastics and e-waste are mixed up with paper, scraps and other non-toxic materials which could be recycled. Burning of some of these materials produces dioxins, furans and polychlorinated biphenyls, which have the potential to cause various types of ailments including cancer.



1.5 Methods of solid waste disposal and management are as below:-

1. *Open burning*
2. *Dumping into the sea*
3. *Sanitary Landfills*
4. *Incineration*
5. *Composting*
6. *Ploughing in fields*
7. *Hog feeding*
8. *Grinding and discharging into sewers*
9. *Salvaging*
10. *Fermentation and biological digestion*

1.Open burning of Solid Wastes

Not an ideal method in the present day context

2.Dumping into Sea

1. *Possible only in coastal cities*
2. *Refuse shall be taken in barges sufficiently far away from the coast (15-30 km) and dumped there*
3. *Very costly*

4. Not environment friendly

3. Sanitary Landfilling of Solid Wastes

1. Simple, cheap, and effective

2. A deep trench (3 to 5 m) is excavated

3. Refuse is laid in layers

4. Layers are compacted with some mechanical equipment and covered with earth, leveled, and compacted

5. With time, the fill would settle

6. Microorganisms act on the organic matter and degrade them

7. Decomposition is similar to that in composting

8. Facultative bacteria hydrolyze complex organic matter into simpler water soluble organics

9. These diffuse through the soil where fungi and other bacteria convert them to carbon dioxide and water under aerobic conditions

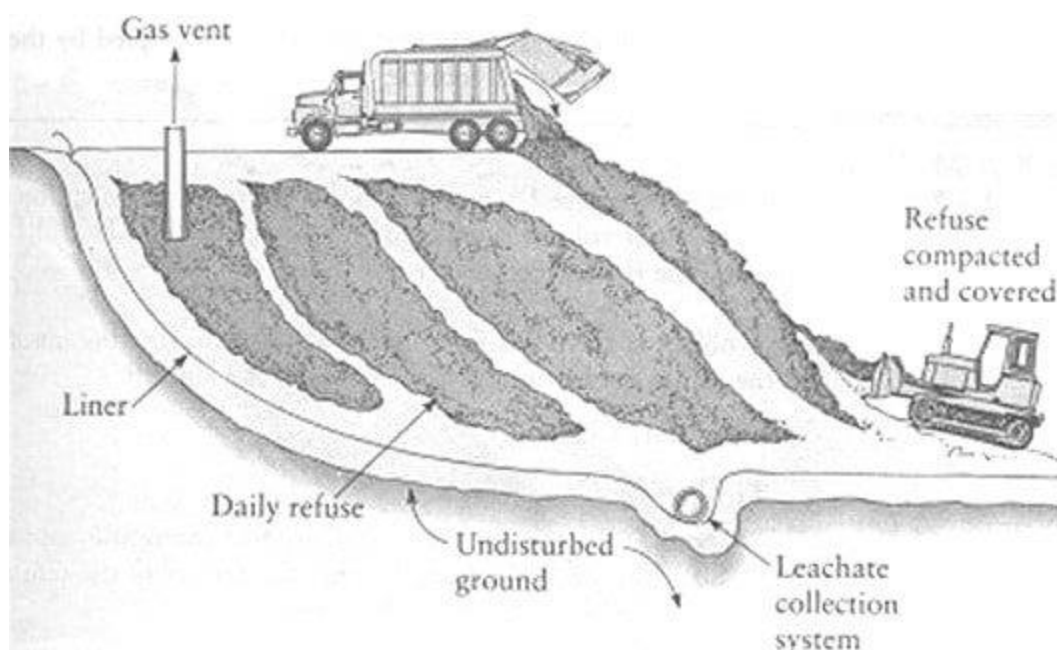
10. Aerobic methanogenic bacteria utilize the methane generated and the rest diffuses into the atmosphere

Too much refuse shall not be buried – fire hazard

11. Moisture content – not less than 60% for good biodegradation

12. Refuse depth more than 3m – danger of combustion due to compression of bottom layers – hence should be avoided

13. Refuse depth is generally limited to 2m Temperature in the initial stages of decomposition – as high as 70 degree C – then drops Reclaimed areas may be used for other uses



2.NOISE POLLUTION

2.1 Noise pollution:- *Noise pollution affects both health and behavior. Unwanted sound (noise) can damage physiological health. Noise pollution can cause hypertension, high stress levels, tinnitus, hearing loss, sleep disturbances, and other harmful effects.*



2.2 Sources of noise pollution

Household sources:

Gadgets like food mixer, grinder, vacuum cleaner, washing machine and dryer, cooler, air conditioners, can be very noisy and injurious to health. Others include loud speakers of sound systems and TVs, ipods and ear phones. Another example may be your neighbor's dog barking all night everyday at every shadow it sees, disturbing everyone else in the apartment.

Social events:

Places of worship, discos and gigs, parties and other social events also create a lot of noise for the people living in that area. In many market areas, people sell with loud speakers, others shout out offers and try to get customers to buy their goods. It is important to note that when these events are not often, they can be called 'Nuisance' rather than noise pollution.

Commercial and industrial activities:

Printing presses, manufacturing industries, construction sites, contribute to noise pollutions in large cities. In many industries, it is a requirement that people always wear earplugs to minimize their exposure to heavy noise. People who work with lawn mowers, tractors and noisy equipment are also required to wear noise-proof gadgets.

Transportation:

Think of aero planes flying over houses close to busy airports like Heathrow (London) or Ohare (Chicago), over ground and underground trains, vehicles on road—these are constantly making a lot of noise and people always struggle to cope with them.

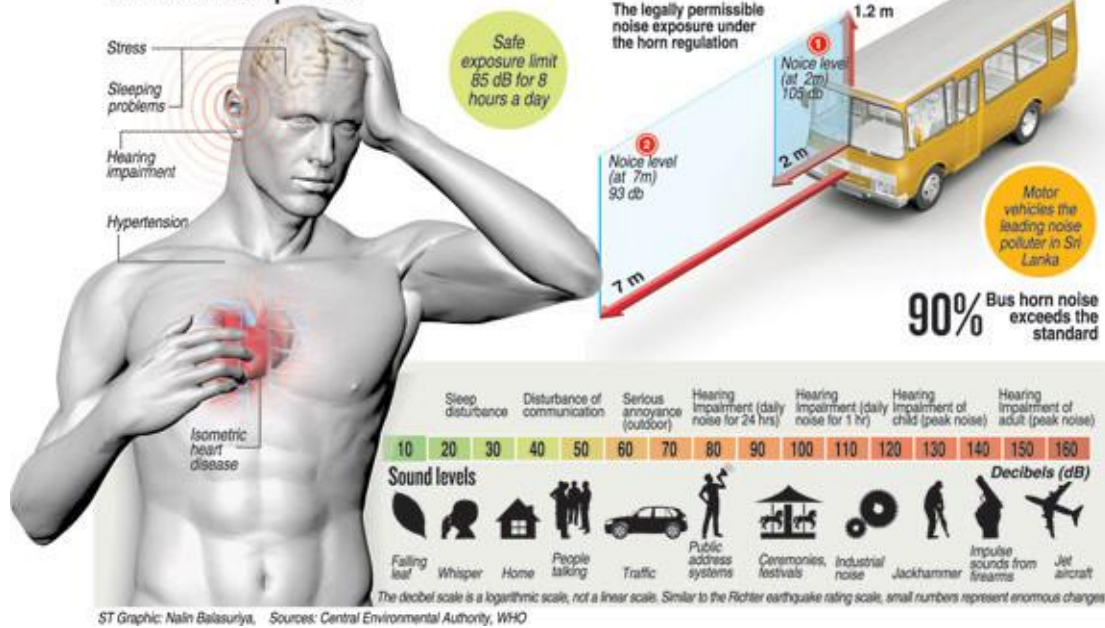
2.3 Unit of Noise

Sound waves are vibrations carried from a noise source to the ear. Sound is typically described in terms of the loudness amplitude and the pitch of the wave. Loudness (also called sound pressure level, or SPL) is measured in logarithmic units called decibels (dB). The normal human ear can detect sounds that range between 0 dB (hearing threshold) and about 140 dB, with sounds between 120dB and 140 dB causing pain (pain threshold). The ambient SPL in a library is about 35 dB, while that inside a moving bus or subway train is roughly 85 dB; building construction activities can generate SPLs as high as 105 dB at the source. SPLs decrease with distance from the source.

2.4 Effect of Noise pollution

- 1. It interferes with speech. In the presence of noise we may not be able to follow what the other person is saying.*
- 2. Noise leads to emotional and behavioral stress. A person may feel disturbed in the presence of loud noise such as produced by beating of drums.*
- 3. Noise may permanently damage hearing. A sudden loud noise can cause severe damage to the eardrum.*
- 4. Noise increases the chances of occurrence of diseases such as headache, blood pressure, heart failure, etc.*
- 5. Noise leads to increased heart beat, constriction of blood vessels and dilation of pupil.*
- 6. Noise is a problem especially for patients who need rest.*
- 7. Noise may cause damage to liver, brain and heart.*
- 8. For some people working in Industry, noise could be a problem.*
- 9. For some people living in some neighbourhood where people party a lot, like college students, noise could be a problem too.*
- 10. Some people listen to music with amplifiers and big boom-boxes at a very high volume, and noise could be a problem too.*
- 11. It is scientifically known that frequent and long use of headphones at a loud volume for a prolonged period of time could affect one's hearing.*

Effects of noise pollution



2.5 Acceptable noise level

Noise levels

Noise	Average decibels (dB)
Leaves rustling, soft music, whisper	30
Average home noise	40
Normal conversation, background music	60
Office noise, inside car at 60 mph	70
Vacuum cleaner, average radio	75
Heavy traffic, window air conditioner, noisy restaurant, power lawn mower	80-89 (sounds above 85 dB are harmful)
Subway, shouted conversation	90-95
Boom box, ATV, motorcycle	96-100
School dance	101-105

<i>Chainsaw, leaf blower, snowmobile</i>	106-115
<i>Sports crowd, rock concert, loud symphony</i>	120-129
<i>Stock car races</i>	130
<i>Gun shot, siren at 100 feet</i>	140

2.6 Different methods of minimize Noise pollution.

Turn off Appliances at Home and offices

We can turn off home and office appliances when not in use such as TV, games, computers etc. it can create unnecessary stress on ears. We can save electricity also when we turn them off.



Shut the Door when using noisy Machines

We can shut the door after we turn on dishwashers or washing machines for rooms where it is kept or we can turn them on before leaving house so that overlapping of exposure to loud noises can be reduced

Use Earplugs

Use of earplugs or earmuffs can bring down loud noises to manageable level. Earplugs are small inserts that fit into out ear canal. And earmuffs fit over the entire outer ear to form an air seal keeping ears safe from loud noises.

Lower the volume

We can listen songs, radios, TVs in lower volume when listening from headphones or speakers.



Stay away from Noisy area

Noise producing industries, airports, vehicles should be far from residential areas as it very dangerous for infants and senior citizens.

Follow the Limits of Noise level

Community law should check use of loudspeakers, outdoor parties as well as political public announcements.

Control Noise level near sensitive areas

There should be control on noise level (Silent zones) near schools, hospitals. Place noise limits boards near sensitive areas.

Go Green by planning trees

We can plant more trees as they are good noise absorbents. According to studies it can reduce noise by 5 to 10 decibels Db around them.



Create Healthy noise to eliminate unwanted noise

If we can't eliminate unwanted noise coming from outside then we can create healthier noise such as music, singing birds or waterfalls in homes or offices.

Use Noise absorbents in noisy machineries

We can check for machineries which are creating noise due to vibrations and put some noise absorbents to reduce noise.

Use Proper Lubrication and Better maintenance

We can use proper lubrication as well as better maintenance of machines to reduce noise pollution and improve efficiency. It reduces friction between movable parts and helps to reduce noise.



Notify Authorities about Disobedience of Noise Rules

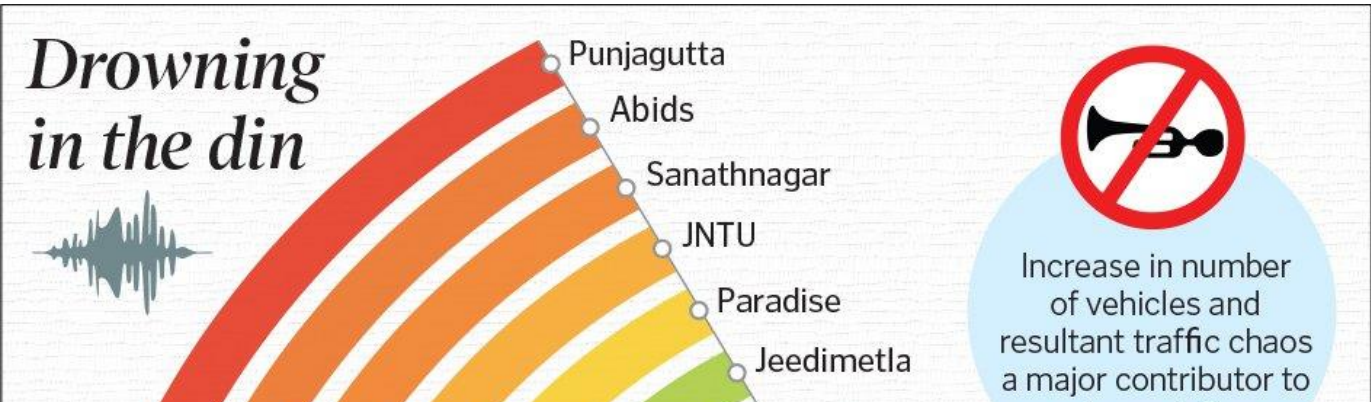
We can notify to government agencies if someone is not following rules and regulation regarding noise levels.

Regularly check noise levels

Regularly checking noise level in industrial complex and indoor to keep noise level within limit.



It is necessary to control noises created around us. It is necessary to aware people around us through various mediums. We can start from ourselves to spread awareness about noise pollution and its effects on human and environment. Limit for noise at daytime is 55 dB and in night it is 30 dB to avoid health effects.



Section A

Q.no:-1

Very Short type Q/A

- a) *Define soil pollution.*
- b) *Define solid waste.*
- c) *Define house hold waste.*
- d) *Define hospital waste.*
- e) *Give two examples of solid waste.*
- f) *Write any two causes of increase in solid waste.*
- g) *Define noise pollution.*
- h) *Give any two example of noise pollution.*
- i) *Wite any two source of noise acceptable level.*
- j) *Give a example of minimize noise pollution control.*

Section B

Q.no:-2

short type Q/A

- i. *Explain soil pollution in brief.*
- ii. *What are the causes of noise pollution.*
- iii. *What are the different source of noise pollution.*
- iv. *What are the effect of solid waste on soil.*
- v. *Explain hospital waste and house hold waste*
- vi. *Explain hazardous waste in detail.*
- vii. *What are the effects of noise pollution.*
- viii. *Explain Acceptable noise level.*
- ix. *Write the Unit of noise in brief.*
- x. *Write the disposal of solid waste.*

SECTION-C

Long type Q/A

Q.3 How do we control noise pollution?

Q.4 Write a short note on soil pollution.

Q.5 Write a short note on noise pollution.

Environmental Legislation

LEARNING OBJECTIVES:

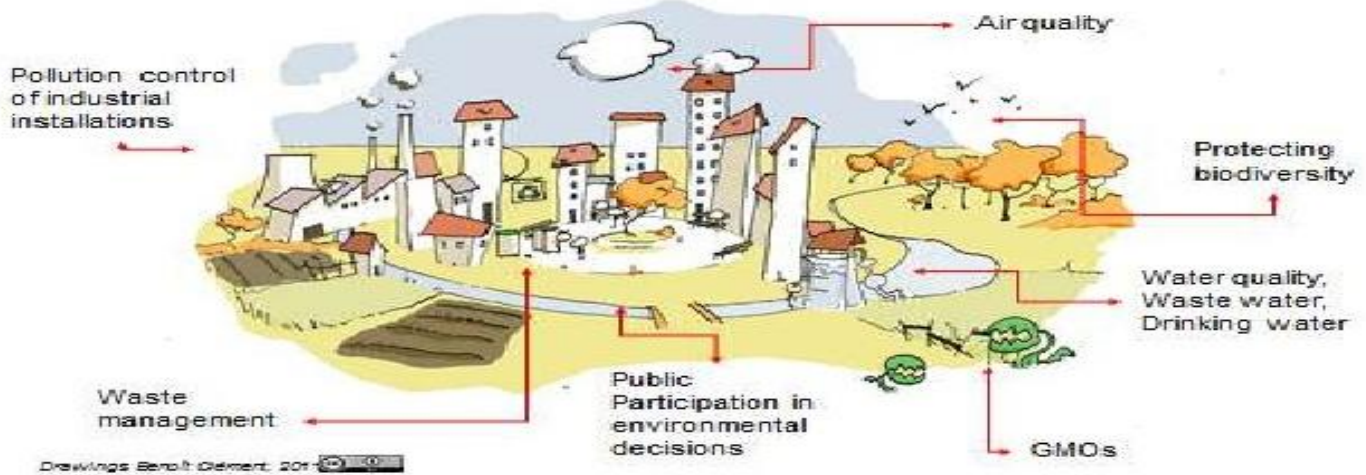
- *Introduction of Environmental Legislation*
- *Introduction to Water (Prevention and control of Pollution) act 1974*
- *Introduction to Air (Prevention and control of Pollution) act 1981*
- *Environmental Protection Act 1986*
- *Role and Function of State Pollution Control Board and National Green Tribunal(NGT)*
- *Environmental Impact Assessment (EIA).*

1.1 Environmental Legislation

The awareness and consideration for environment covers several environmental issues such as pollution of water, air and soil, land degradation, industrialization, urbanization, depletion of natural resources etc. The genesis of various legislations in the country lies in the environmental problems. There should be effective legislations to protect the environment or else the need for resources



EU environmental legislation



In the recent past, numerous environmental problems have become threatening for human welfare. An important aspect of environmental problems is that their impact is not confined to the source area but spills over far and wide area.

To curb the destructive practices of unscrupulous people, forest mafia groups, poachers, polluters and overexploitation of environmental resources, effective legislation is necessary. Pollution is an important factor and it does not observe political territories or legislative jurisdictions. Thus environmental problems are intrinsically global in nature. Therefore, to prevent such problems environmental legislation is not needed only at the national level but also at the international level.

1.2 The Water (Prevention and Control of Pollution) Act of 1974.

The main objective of this act is to provide prevention and control of water pollution and maintaining or restoring of wholesomeness and purity of water (in the streams or wells or on land). Some important provisions of this Act are given below:

The Act vests regulatory authority in State Pollution Control Boards and empowers these Boards to establish and enforce effluent standards for factories discharging pollutants into water bodies. A Central Pollution Control Board performs the same functions for Union Territories and formulate policies and coordinates activities of different State Boards.

The State Pollution Control Boards control sewage and industrial effluent discharges by approving, rejecting or impose conditions while granting consent to discharge.

The Act grants power to the Board to ensure compliance with the Act by including the power of entry for examination, testing of equipment and other purposes and power to take the sample for the purpose of analysis of water from any stream or well or sample of any sewage or trade effluents.

Prior to its amendment in 1988, enforcement under the Water Act was achieved through criminal prosecutions initiated by the Boards, and through applications to magistrates for injunctions to restrain polluters. The 1988 amendment strengthened the Act's implementation the pollution provisions. Board may close a defaulting industrial plant or withdraw its supply of power or water by an administrative order; the penalties are more stringent, and a citizen's suit provision supports the enforcement machinery.

The Water (Prevention and Control of Pollution) Act was enacted in 1974 to provide for the prevention and control of water pollution, and for the maintaining or restoring of wholesomeness of water in the country. The Act was amended in 1988. The Water (Prevention and Control of Pollution) Cess Act was enacted in 1977, to provide for the levy and collection of a cess on water consumed by persons operating and carrying

Water: Prevention and control of pollution act: 1974

■ Aims and objectives:

1. Prevention and control of water pollution
2. Maintaining and restoring the wholesomeness of water
3. Establishment of Boards of prevention and control of water pollution



on certain types of industrial activities. This cess is collected with a view to augment the resources of the Central Board and the State Boards for the prevention and control of water pollution constituted under the Water (Prevention and Control of Pollution) Act, 1974. The Act was last amended in 2003

1.3 The Air (Prevention and Control of Pollution) Act of 1981

To implement the decisions taken at the United Nations Conference on the Human Environment held at Stockholm in June 1972, Parliament enacted the nationwide Air Act. The main objectives of this Act are to improve the quality of air and to prevent, control and abate air pollution in the country. Important provisions of this Act are given below:

The Air Act's framework is similar to that of the Water Act of 1974. To enable an integrated approach to environmental problems, the Air Act expanded the authority of the central and state boards established under the Water Act, to include air pollution control.

States not having water pollution boards were required to set up air pollution boards.

Under the Air Act, all industries operating within designated air pollution control areas must obtain a "consent" (permit) from the State Boards.

The states are required to prescribe emission standards for industry and automobiles after consulting the central board and noting its ambient air quality standards.

Act granted power to the Board to ensure compliance with the Act including the power of entry for examination, testing of equipment and other purposes and power to take the sample for the purpose of analysis of air or emission from any chimney, fly ash or dust or any other outlet in such a manner as may be prescribed.

Prior to its amendment in 1987, the Air Act was enforced through mild court-administered penalties on violations. The 1987 amendment strengthened the enforcement machinery and introduced stiffer penalties. Now, the boards may close down a defaulting industrial plant or may stop its supply of electricity or water. A board may also apply to the court to restrain emissions that exceed prescribed limits. Notably, the 1987 amendment introduced a citizen's suit provision into the Air Act and extended the Act to include noise pollution.



Air (Prevention & Control of Pollution) Act, 1981

Government of India enacted the **Air (Prevention and Control of Pollution) Act 1981** to arrest the deterioration in the air quality.

Main Function of CPCB under Air (Prevention and Control of Pollution) Act 1981:

- To **advise the Central Government** on any matter concerning the Improvement of the quality of the air and the prevention, control and abatement of air pollution.
- To plan and cause to **be executed a nation-wide programme** for the prevention, control and abatement of air pollution.
- To provide **technical assistance and guidance** to the State Pollution Control Board.
- To carry out and **sponsor investigations and research** related to prevention, control and abatement of air pollution.
- To collect, compile and publish **technical and statistical data** related to air pollution; and
- To lay down **standards for the quality of air**.

1.4 Environmental protection Act 1986

An Act to provide for the protection and improvement of environment and for matters connected there with:

WHEREAS the decisions were taken at the United Nations Conference on the Human Environment held at Stockholm in June, 1972, in which India participated, to take appropriate steps for the protection and improvement of human environment;

AND WHEREAS it is considered necessary further to implement the decisions aforesaid in so far as they relate to the protection and improvement of environment and the prevention of hazards to human beings, other living creatures, plants and property.

In this Act, unless the context otherwise requires,--

(a) "environment" includes water, air and land and the inter- relationship which exists among and between water, air and land, and human beings, other living creatures, plants, micro-organism and property;

(b) "environmental pollutant" means any solid, liquid or gaseous substance present in such concentration as may be, or tend to be, injurious to environment;

(c) "environmental pollution" means the presence in the environment of any environmental pollutant;

(d) "handling", in relation to any substance, means the manufacture, processing, treatment, package, storage, transportation, use, collection, destruction, conversion, offering for sale, transfer or the like of such substance;

(e) "hazardous substance" means any substance or preparation which, by reason of its chemical or physico-chemical properties or handling, is liable to cause harm to human beings, other living creatures, plant, micro-organism, property or the environment;

(f) "occupier", in relation to any factory or premises, means a person who has, control over the affairs of the factory or the premises and includes in relation to any substance, the person in possession of the substance;

(g) "prescribed" means prescribed by rules made under this Act.

1.5 Functions of State Board.

(1) Subject to the provisions of this Act, the functions of a State Board shall be -

(a) to plan a comprehensive programme for the prevention, control or abatement of pollution of streams and wells in the State and to secure the execution thereof;

(b) to advise the State Government on any matter concerning the prevention, control or abatement of water pollution;

(c) to collect and disseminate information relating to water pollution and the prevention, control or abatement thereof;

(d) to encourage, conduct and participate in investigations and research relating to problems of water pollution and prevention, control or abatement of water pollution;

(e) to collaborate with the Central Board in organizing the training of persons engaged or to be engaged in programmes relating to prevention, control or abatement of water pollution and to organize mass education programmes relating thereto;

(f) to inspect sewage or trade effluence, works and plants for the treatment of sewage and trade effluents and to review plans, specifications or other data relating to plants set up for the treatment of water, works for the purification thereof and the system for the disposal of sewage or trade effluents or in connection with the grant of any consent as required by this Act;

(g) to lay down, modify or annual effluent standards for the sewage and trade effluents and for the quality of receiving waters (not being water, in an inter-State stream) resulting from the discharge of effluents and to classify waters of the State;

(h) to evolve economical and reliable methods of treatment of sewage and trade effluents, having regard to the peculiar conditions of solids, climate and water resources of different regions and more especially the prevailing flow characteristics of water in streams and wells which render it impossible to attain even the minimum degree of dilution;

(i) to evolve methods of utilization of sewage and suitable trade effluents in agriculture;

(j) to evolve efficient methods of disposal of sewage and trade effluents on land, as are necessary on account of the predominant conditions of scant stream flows that do not provide for major part of the year the minimum degree of dilution;

(k) to lay down standards of treatment of sewage and trade effluents to be discharged into any particular stream taking into account the minimum fair weather dilution available in that stream and the tolerance limits of pollution permissible in the water of the stream, after the discharge of such effluents

Functions of the state Pollution Control Board:

- 1) To collect information relating water/air pollution and to encourage, conduct, participate in investigations and research relating to problems of water pollutions.
- 2) To plan a comprehensive programme through mass media for prevention, control or abatement of air /water pollution.
- 3) To advice the Central and State Government, in any matter concerning the prevention, control or abatement of air/water pollution.

1.5 Environmental Impact Assessment (EIA)

1. *The purpose of Environmental Impact Assessment (EIA) is to identify and evaluate the potential impacts (beneficial and adverse) of development and projects on the environmental system. It is a useful aid for decision making based on understanding of the environmental implications including social, cultural and aesthetic concerns which could be integrated with the analysis of the project costs and benefits. This exercise should be undertaken early enough in the planning stage of projects for selection of environmentally compatible sites, process technologies and such other environmental safeguards.*
2. *While all industrial projects may have some environmental impacts all of them may not be significant enough to warrant elaborate assessment procedures. The need for such exercises will have to be decided after initial evaluation of the possible implications of a particular project and its location. The projects which could be the candidates for detailed Environment Impact Assessment include the following:-*
 - *Those which can significantly alter the landscape, land use pattern and lead to concentration of working and service population;*
 - *Those which need upstream development activity like assured mineral and forest products supply or downstream industrial process development;*
 - *Those involving manufacture, handling and use of hazardous materials;*
 - *Those which are sited near ecologically sensitive areas, urban centers, hill resorts, places of scientific and religious importance.*
 - *Industrial Estates with constituent units of various types which could cumulatively cause significant environmental damage.*
3. *The Environmental Impact Assessment (EIA) should be prepared on the basis of the existing background pollution levels vis-a-vis contributions of pollutants from the proposed plant. The EIA should address some of the basic factors listed below:*
 - *Meteorology and air quality*
Ambient levels of pollutants such as Sulphur Dioxide, oxides of nitrogen, carbon monoxide, suspended particulate matters, should be determined at the center and at 3 other locations on a radius of 10 km with 120 degrees angle between stations. Additional contribution of pollutants at the locations are required to be predicted after taking into account the emission rates of the pollutants from the stacks of the proposed plant, under different meteorological conditions prevailing in the area.
 - *Hydrology and water quality*
 - *Site and its surroundings*
 - *Occupational safety and health*
 - *Details of the treatment and disposal of effluents (liquid, air and solid) and the methods of alternative uses*
 - *Transportation of raw material and details of material handling*
 - *Control equipment and measures proposed to be adopted*
4. *Preparation of Environmental Management Plan is required for formulation, implementation and monitoring of environmental protection measures during and after commissioning of projects.*

What is an Environmental Impact Assessment (EIA)?

- ▶ EIA is a legal procedure in which a project developer is required to provide environmental information to a consenting body so that this information can be used for better informed decision making.
- ▶ Usually also involves publication and public comment / disclosure (consultation)
- ▶ This information is usually provided in an EIA Report (also called Environmental Impact Statement (EIS), Environmental Social (Health) Impact Assessment (ES(H)IA) etc).
- ▶ EIA procedures vary widely from one jurisdiction to another.



Impact of Energy Usage on Environment

LEARNING OBJECTIVES:

- *Impact of energy usage on environment*
- *Global warming*
- *Green house effect*
- *Depletion of ozone layer*
- *Acid Rain*
- *Eco-Friendly Materials*
- *Recycling Of materials*
- *Concept of Green Buildings*

1.1 Impact of energy usage on environment

All energy sources have some impact on our environment. Fossil fuels—coal, oil, and natural gas—do substantially more harm than renewable energy sources by most measures, including air and water pollution, damage to public health, wildlife and habitat loss, water use, land use, and global warming emissions.

However, renewable sources such as wind, solar, geothermal, biomass, and hydropower also have environmental impacts, some of which are significant. The exact type and intensity of environmental impacts varies depending on the specific technology used, the geographic location, and a number of other factors. By understanding the current and potential environmental issues associated with each renewable energy source, we can take steps to effectively avoid or minimize these impacts as they become a larger portion of our electric supply.

1.2 Global Warming

Global warming is a long-term rise in the average temperature of the Earth's climate system, an aspect of climate change shown by temperature measurements and by multiple effects of the warming. The term commonly refers to the mainly human-caused observed warming since pre-industrial times and its projected continuation, though there were also much earlier periods of global warming. In the modern context the terms global warming and climate change are commonly used interchangeably, but climate change includes both global warming and its effects, such as changes to precipitation and impacts that differ by region. Many of the observed warming changes since the 1950s are unprecedented in the instrumental temperature record, and in historical and paleoclimate proxy records of climate change over thousands to millions of years.

In 2013, the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report concluded, "It is extremely likely that human influence has been the dominant cause of the observed warming since the mid-20th century." The largest human influence has been the emission of greenhouse gases such as carbon dioxide, methane, and nitrous oxide. In view of the dominant role of human activity in causing it, the phenomenon is sometimes called "anthropogenic global warming" or "anthropogenic climate change." Climate model projections summarized in the report indicated that during the 21st century, the global surface temperature is likely to rise a further 0.3 to 1.7 °C (0.5 to 3.1 °F) to 2.6 to 4.8 °C (4.7 to 8.6 °F) depending on the rate of greenhouse gas emissions. These findings have been recognized by the national science academies of the major industrialized nations and are not disputed by any scientific body of national or international standing.

1.3 Greenhouse Effect

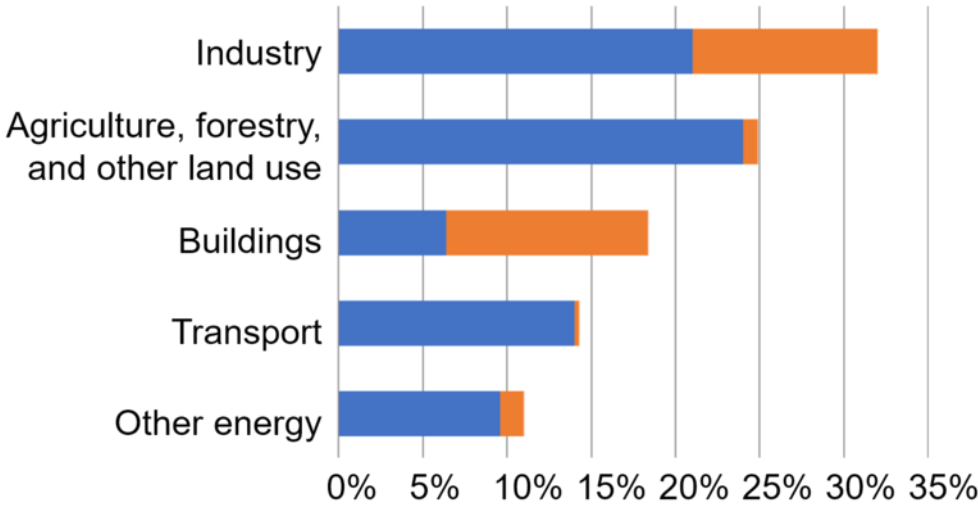
The greenhouse effect is the process by which absorption and emission of infrared radiation by gases in a planet's atmosphere warm its lower atmosphere and surface. It was proposed by Joseph Fourier in 1824,

discovered in 1860 by John Tyndall, was first investigated quantitatively by Svante Arrhenius in 1896, and the hypothesis was reported in the popular press as early as 1912. The scientific description of global warming was further developed in the 1930s through 1960s by Guy Stewart Callendar.

On Earth, an atmosphere containing naturally occurring amounts of greenhouse gases causes air temperature near the surface to be warmer by about 33 °C (59 °F) than it would be in their absence. Without the Earth's atmosphere, the Earth's average temperature would be well below the freezing temperature of water.[72] The major greenhouse gases are water vapour, which causes about 36–70% of the greenhouse effect; carbon dioxide (CO₂), which causes 9–26%; methane (CH₄), which causes 4–9%; and ozone (O₃), which causes 3–7%.

Human activity since the Industrial Revolution has increased the amount of greenhouse gases in the atmosphere, leading to increased radiative forcing from CO₂, methane, tropospheric ozone, CFCs, and nitrous oxide. According to work published in 2007, the concentrations of CO₂ and methane had increased by 36% and 148% respectively since 1750. These levels are much higher than at any time during the last 800,000 years, the period for which reliable data has been extracted from ice cores. Less direct geological evidence indicates that CO₂ values higher than this were last seen about 20 million years ago

Greenhouse Gas Emissions by Economic Sector

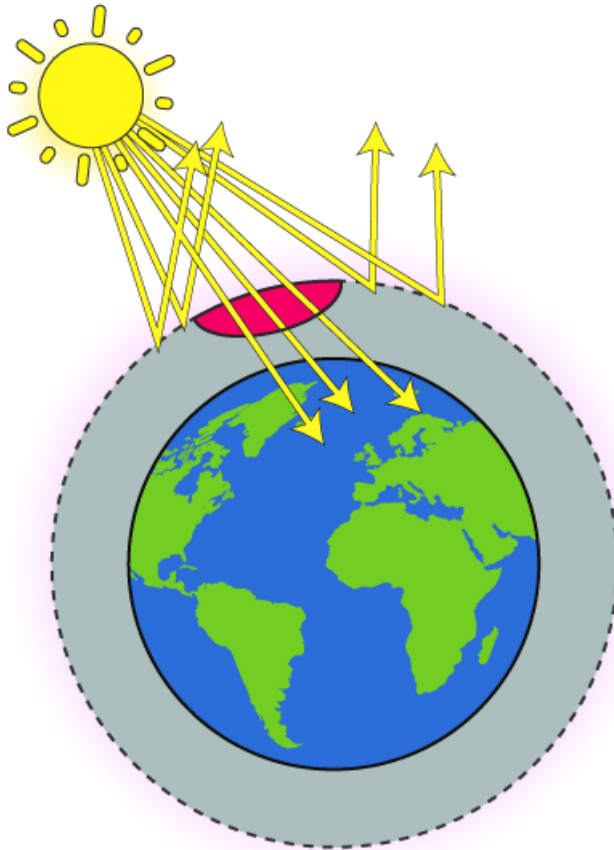


- Direct emissions (75% of total)
- Emissions from electricity and heat production used by economic sector (25% of total)

1.4 Depletion of Ozone layer

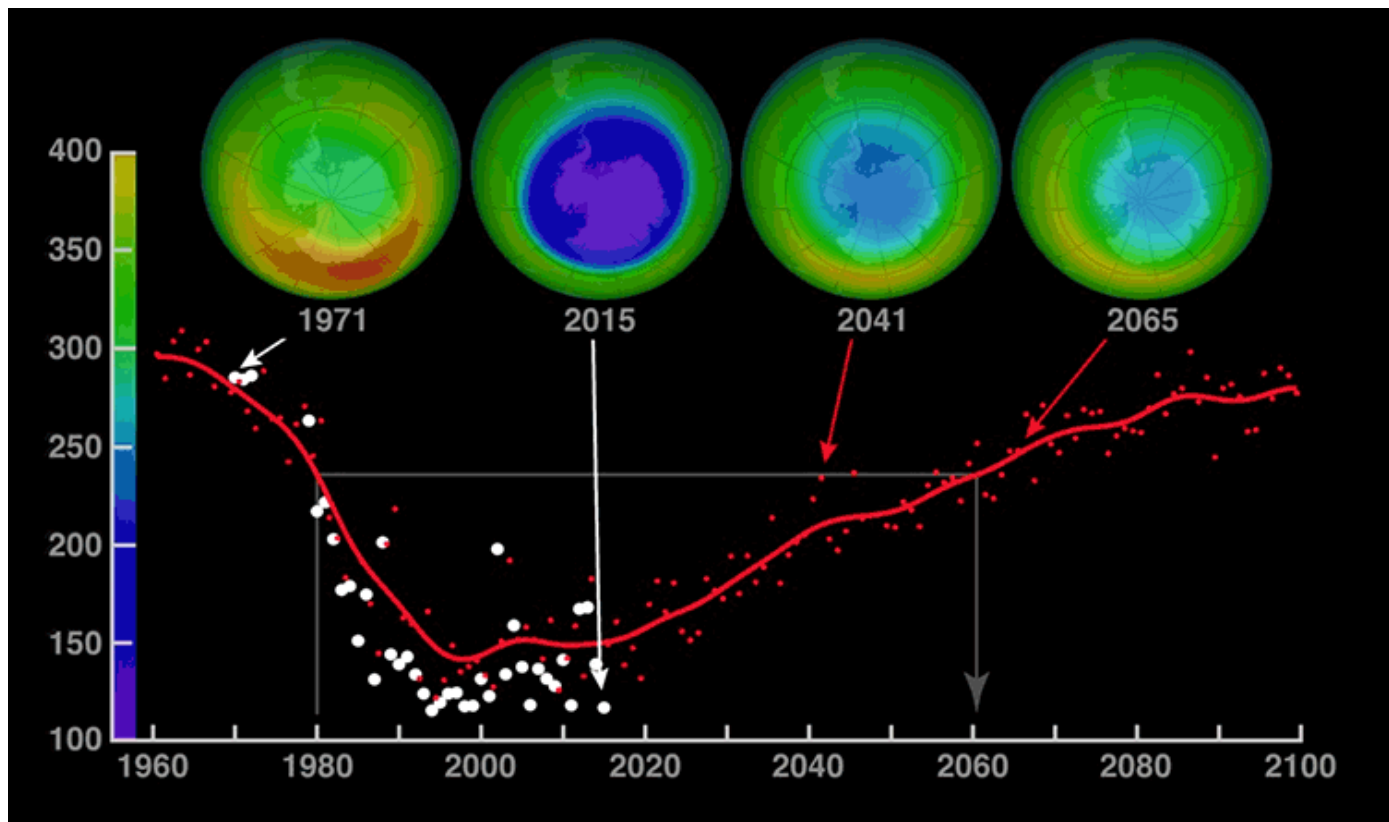
The ozone layer is a thin layer in the atmosphere at an altitude of about 20-30 km that has a high concentration of ozone gas. It is made up of three atoms of oxygen and is represented as O_3 . Ozone (O_3) is formed by the absorption of Ultra-Violet (UV) light by oxygen (O_2) molecules. These molecules react with each other and form ozone (O_3). In this process, they absorb the UV rays from the sun and prevent it from reaching the earth's surface. This layer acts as UV filter – the earth's natural sunscreen!

OZONE LAYER DEPLETION



UV rays are very harmful to living things. It can cause diseases like skin cancer and can also alter the climate drastically. The ozone layer protects us from these harmful rays and is essential for life on earth.

The ozone layer is not uniform throughout the earth; it is found in a thick layer at some places and a thin layer at others. If this layer becomes too thin, it cannot stop the UV rays from entering the earth and we say that a hole is formed in the ozone layer. Antarctica has the biggest ozone hole followed by the Arctic region and the Tibetan plateau. In these places, the layer was naturally thin, but over the years due to air pollution, these holes have grown bigger and thinner. They are a serious cause of worry across the world.



1.5 Acid rain

Acid rain, or acid deposition, is a broad term that includes any form of precipitation with acidic components, such as sulfuric or nitric acid that fall to the ground from the atmosphere in wet or dry forms. This can include rain, snow, fog, hail or even dust that is acidic.

What Causes Acid Rain?

Acid rain results when sulfur dioxide (SO_2) and nitrogen oxides (NO_x) are emitted into the atmosphere and transported by wind and air currents. The SO_2 and NO_x react with water, oxygen and other chemicals to form sulfuric and nitric acids. These then mix with water and other materials before falling to the ground. While a small portion of the SO_2 and NO_x that cause acid rain is from natural sources such as volcanoes, most of it comes from the burning of fossil fuels. The major sources of SO_2 and NO_x in the atmosphere are:

Burning of fossil fuels to generate electricity. Two thirds of SO_2 and one fourth of NO_x in the atmosphere come from electric power generators.

Vehicles and heavy equipment.

Manufacturing, oil refineries and other industries.

Winds can blow SO_2 and NO_x over long distances and across borders making acid rain a problem for everyone and not just those who live close to these sources.

Forms of Acid Deposition

Wet Deposition

*Wet deposition is what we most commonly think of as **acid rain**. The sulfuric and nitric acids formed in the atmosphere fall to the ground mixed with rain, snow, fog, or hail.*

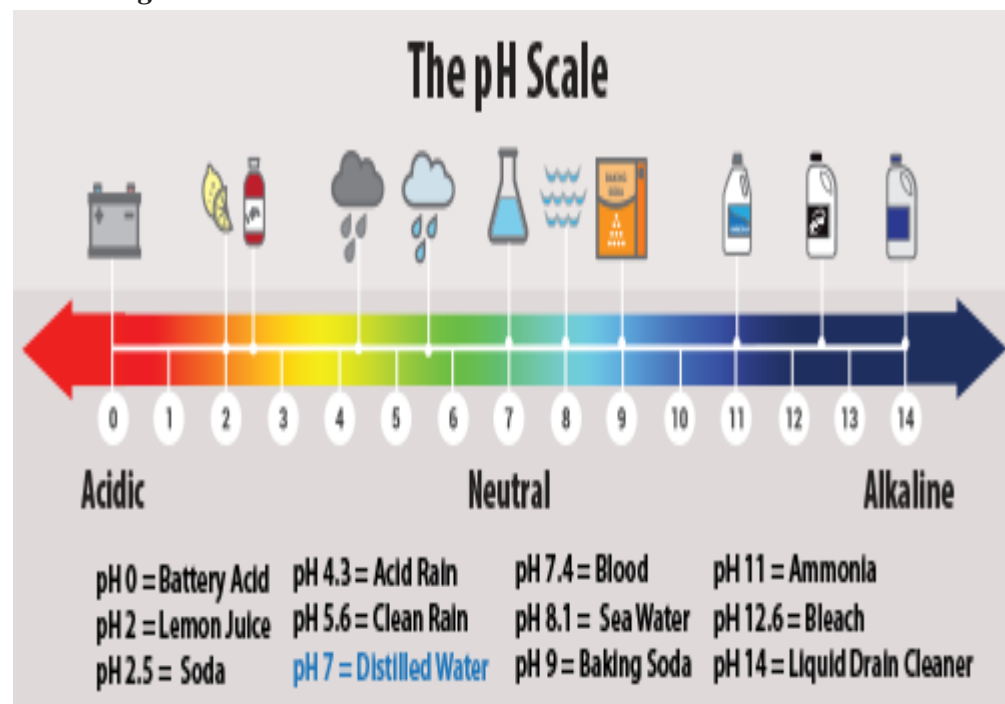
Dry Deposition

*Acidic particles and gases can also deposit from the atmosphere in the absence of moisture as **dry deposition**. The acidic particles and gases may deposit to surfaces (water bodies, vegetation, buildings) quickly or may react during atmospheric transport to form larger particles that can be harmful to human health. When the accumulated acids*

are washed off a surface by the next rain, this acidic water flows over and through the ground, and can harm plants and wildlife, such as insects and fish.

The amount of acidity in the atmosphere that deposits to earth through dry deposition depends on the amount of rainfall an area receives. For example, in desert areas the ratio of dry to wet deposition is higher than an area that receives several inches of rain each year.

Measuring Acid Rain



Acidity and alkalinity are measured using a pH scale for which 7.0 is neutral. The lower a substance's pH (less than 7), the more acidic it is; the higher a substance's pH (greater than 7), the more alkaline it is. Normal rain has a pH of about 5.6; it is slightly acidic because carbon dioxide (CO_2) dissolves into it forming weak carbonic acid. Acid rain usually has a pH between 4.2 and 4.4.

Policymakers, research scientists, ecologists, and modelers rely on the National Atmospheric Deposition Program's (NADP) National Trends Network (NTN) for measurements of wet deposition. The NADP/NTN collects acid rain at more than 250 monitoring sites throughout the US, Canada, Alaska, Hawaii and the US Virgin Islands. Unlike wet deposition, dry deposition is difficult and expensive to measure. Dry deposition estimates for nitrogen and sulfur pollutants are provided by the Clean Air Status and Trends Network (CASTNET). Air concentrations are measured by CASTNET at more than 90 locations.

When acid deposition is washed into lakes and streams, it can cause some to turn acidic. The Long-Term Monitoring (LTM) Network measures and monitors surface water chemistry at over 280 sites to provide valuable information on aquatic ecosystem health and how water bodies respond to changes in acid-causing emissions and acid deposition.

1.6 Eco-Friendly materials

True, we are still living in a material world, but cotton grown with pesticides is no longer the fabric of our lives.

The green movement is making huge strides replacing toxins and waste in the marketplace with organic fibers like bamboo and hemp, as well as good old corn starch, throw-away cork and used paper.

The brave, new soldiers of eco industry believe enough is enough when it comes to creating more waste and adding to our grossly overflowing landfills and plastic islands. Bet you do, too!

Instead, the trend has been to meet a growing consumer demand for renewable and reusable resources, seeking out the scraps of industry (glass, cork and plastic bottles) and growing plants without pesticides to make healthy fibers with no trace of petroleum.

Here is a go-to list of the friendliest materials that have our planet covered.

1. Bamboo Fiber

The eco fiber option of choice, bamboo is woven into everything from fashionable dresses like those made by Spun in Seattle and other respected labels, to towels, totes and interior elements such as window treatments. This natural textile is made from the pulp of the bamboo grass and is best in the organic form – pure and unbleached. It is a strong fabric, considered more durable and sustainable than conventional textile fiber.

2. Bamboo Hardwood

Considered a renewable resource, bamboo is a grass that thrives quickly. Oak trees can take 120 years to grow to maturity while bamboo can be harvested in three. It also regenerates without need for replanting, and requires minimal fertilization or pesticides. The jury is still out on whether or not bamboo flooring is as durable as traditional European hardwoods. As Tree Hugger points out, now all bamboo products are alike. Since it is mostly shipped from China, you have to determine if the product is treated according to environmental standards. Companies like Teragren are careful about adhering to strict environmental specifications.

3. Cork

Got a surface that needs covering? Put a cork on it. Whether molded into mosaics for floors by Mod Walls or adapted as a textile for chic handbags by Shop Cork Design, cork is a renewable resource from the industry's by-products. It can be waterproofed to extend the life of the surface and also applied to walls as an unexpected modern surface.

4. Plantation Grown Teak

Teak is a deciduous hardwood tree from the highlands of southeast Asia and is considered a sustainable timber for indoor-outdoor furniture, as well as decking. The Maku Chaise, below, is an example of outdoor designs sold by Design Public and other vendors. Teak has a naturally high oil content which makes it both stable and resistant to rotting when exposed to extreme climates. Much of it comes to us from the island of Java. The Dutch started plantations there about 150 years ago. The Indonesian government agency, Perum Perhutani, now manages the plantations, enforcing a strict policy regarding the size and quantity of trees felled each year together with annual replanting.

5. Corn Starch Biocompostables

Corn: it's what's for dinner and so much more. These utensils from the Biodegradable Store made of sugar cane fiber, corn and potato starch are the green alternative to petroleum-based plastics and styrofoam materials which

take thousands of years to degrade. Thankfully, the new biocompostables are not restricted to the home pantry but are showing up at shopping mall food courts and school events where large crowds gather and consume disposables in bulk. Corn has also been used for library cards in San Francisco and ringtone downloader cards. And don't forget ethanol, a fuel helping to reduce greenhouse emissions and slow global warming.



1.7 Recycling of materials

Recycling has become the major process going on in the industries. Anything that can serve as the source to make other things is called recyclable materials. The materials that can be recycled are glass, aluminum, plastic water bottles, metal scrap, different kinds of paper, electronics –computers, cellular phones, keyboards, batteries and other small electronic equipment, textile, wood, wire, cables, plastic product, rubber etc.

Apart from this industrial recycling, all the leaves, food leftovers, waste, twigs and other garden waste are decomposed by worms and saprobes and are converted into fertilizers.

Best and the most economic materials to recycle



As already told that recycling saves energy (almost 70% less energy is required in recycling) and money, so it is the most economic process. Industrialists are focusing on making the products that can be recycled later. A great percentage of materials are being recycled and are being used as households and their number is increasing day by day. The most important recyclable materials are:

1. **Plastic recycling:** Many plastic products and bags are in use nowadays. Plastic recycling serves as a solution to the earthly pollution. Plastics are polymers and are resinous and they are melted down to make other products.

Most importantly plastic container like water bottles, beverage containers, milk bottles, soap boxes etc. are recycled. Along with it grocery bags and plastic sacks are also recycled.

2. Electronics recycling: *In this world of technology where the gadgets are rapidly advancing and each new gadget has features different from the old ones, so people buy new gadget as soon as it appears in the market. The question arises: what to do with the old electronic? They should be given to other people so that the cycle continues.*



Electronics have some toxic and explosive matter in them and they have to be disposed of properly. So rather than throwing them, we should get them recycled and let their explosive matter be removed. All the electronics like televisions, monitor, printers, keyboards, scanner, cell phones, fax machine etc. are recycled.

3. Clothing and paper recycling: *Clothes are recycled in industries on a great scale and quality need not to be compromised. Brand new and good quality clothing is made from old clothing. Similarly, paper products are recycled to save deforestation and pollution.*

4. Vehicles: *Big and expensive vehicles are recycled in industries which assist the economy a lot .*

5. Batteries recycling: *Rechargeable batteries can be recycled only. The batteries are first separated from their plastic and insulation coverings then they are heated in large furnaces and large energy is consumed.*

6. Aluminum cans recycling: *Aluminum cans are used for preserving or canned food. As they are in great use now, so they occupy a great part of the waste. There is a great need of recycling them which not only reduces land pollution but is also an energy saver.*

If the industrialists all around the globe aim to make products that can be recycled later and recreate products from used materials, it will surely decrease problems like pollution and global warming. The right disposal of materials should be checked. The economy will surely be supported and money would be saved. So everybody should make sure that their products are recycled by some means because for the survival on earth, the cycle should be completed.

1.8 Concept of Green Buildings

Definition of Green Building

Green building is the practice of creating structures and using processes that are environmentally responsible and resource-efficient throughout a building's life-cycle from siting to design, construction, operation, maintenance, renovation and deconstruction. This practice expands and complements the classical building design concerns of economy, utility, durability, and comfort. Green building is also known as a sustainable or high performance building.

Impacts of the built environment:

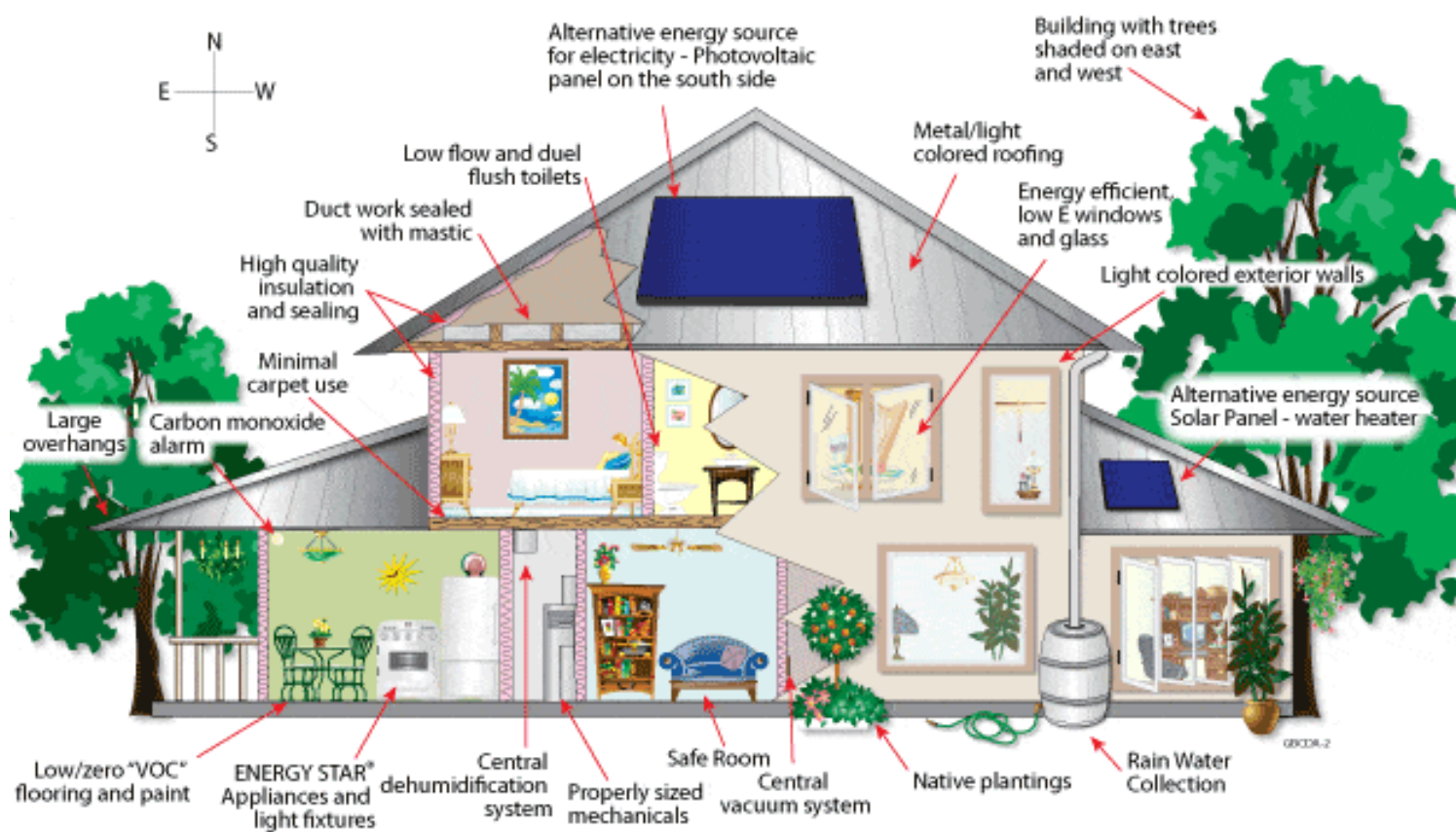
uilt Environment:	n:	tal Effects:	ects :
Siting Design Construction Operation Maintenance Renovation Deconstruction	Energy Water Materials Natural Resources	Waste Air pollution Water pollution Indoor pollution Heat islands Stormwater runoff Noise	Harm to Human Health Environment Degradation Loss of Resources

Green buildings are designed to reduce the overall impact of the built environment on human health and the natural environment by:

- *Efficiently using energy, water, and other resources*
- *Protecting occupant health and improving employee productivity*
- *Reducing waste, pollution and environmental degradation*

For example, green buildings may incorporate sustainable materials in their construction (e.g., reused, recycled-content, or made from renewable resources); create healthy indoor environments with minimal pollutants (e.g., reduced product emissions); and/or feature landscaping that reduces water usage (e.g., by using native plants that survive without extra watering).

There are a number of reasons to build green, including potential environmental, economic and social benefits.



Enviourmental Legislation

Section A

Q.no:-1

Very Short type Q/A

- a) *Define Enviourmental legislation.*
- b) *Define water act 1974.*
- c) *Define Air act 1981.*
- d) *What is Enviournment protection act 1986.*
- e) *Give two examples of function of SPCB.*
- f) *Define EIA.*
- g) *Write the two Example of Enviournment Protection act Role.*
- h) *Give any two example of Legislation.*
- i) *Wite any two Work of Water Act 1974.*
- j) *Give a example of minimize state pollution control Board.*

Section B

Q.no:-2

short type Q/A

- i. *Explain Enviournmental legislation in brief.*
- ii. *What are the causes of produced Water act 1974.*
- iii. *What are the Air act 1981.*
- iv. *What are the effect of state pollution control Board in Legislation.*
- v. *Explain Enviournment protection act.*
- vi. *Explain Function of state board in pollution control.*
- vii. *What are the Enviournment Impact Assessment.*
- viii. *Explain Enviournment protection projects.*
- ix. *Write the Factors of EIA in pollution.*
- x. *Describe EIA in detail.*

SECTION-C

Long type Q/A

- Q.3 *How do we control Air pollution?*
- Q.4 *Write a short note on Water act 1974 .*
- Q.5 *Write a short note on EIA.*

Impact of Energy usage on Environment

Section A

Q.no:-1

Very Short type Q/A

- a) *Define Energy impact on environment.*
- b) *Define global Warming.*
- c) *Define Effect of Global warming in environment.*
- d) *What is Green house effect.*
- e) *Give two examples of forms of acid deposition.*
- f) *Define Depletion of ozone layer.*
- g) *Write the Causes of Acid rain.*
- h) *Give any two example of Eco friendly materials.*
- i) *Write the method of measuring of acid or alkaline.*
- j) *Give two example of Recycling materials.*

Section B

Q.no:-2

short type Q/A

- i. *Explain Global Warming in detail.*
- ii. *What are the causes of Global warming.*
- iii. *What are the causes of depletion of ozone layer.*
- iv. *What are the effect of Acid rain on Environment.*
- v. *Explain Eco Friendly materials.*
- vi. *Explain Recycling materials.*
- vii. *What are the Green House.*
- viii. *Explain Green house Effect on Environment.*
- ix. *Write the Names of Eco friendly or recycling materials.*
- x. *Describe the concept of Green Buildings.*

SECTION-C

Long type Q/A

- Q.3 *Write a short note on Eco friendly materials?*
- Q.4 *Write a short note on Green house Effect on Environment .*
- Q.5 *Write a short note on Recycling materials.*