2. Environmental Pollution

Environmental pollution is one of the major threats to mankind. Population explosion, uncontrolled industrialization, urbanization and exploitation of natural resources lead to environmental pollution. The serious ecological imbalance is due to environmental pollution. The three basic amenities for all living organisms i.e. water, land and air become polluted because of various anthropogenic activities.

Pollution can be defined as, "An undesirable change in the physical, chemical or biological characteristics of air, water and soil that may harmfully affect life or create a potential health hazard for any living organism."

Do you know?

A new report by the World Health Organization (WHO) reveals that 24% of global diseases and 23% of all deaths are caused by environmental exposures. Many of these can be prevented by better environmental management. Four diseases most influenced by poor environment are diarrhea, respiratory infections, unintentional injuries and malaria.

An agent which causes pollution is termed as pollutant. Pollutants can be defined as, "Any solid, liquid or gaseous substance present in such concentration which may be or may tend to be injurious to the environment."

2.1 Air pollution

Air pollution is the entry of unwanted particulate matter, biomolecules or other harmful materials into the Earth's atmosphere. It causes diseases, death to humans and damage to other living organisms.

According to The Air (Prevention and Control of Pollution) Act, 1981, "Air pollution is the presence of any solid, liquid, or gaseous substances in the atmosphere in such concentration as may be or tend to be injurious to human beings or other living creatures or plants or property or environment."

Air Pollutants

The major air pollutants are as follows :

1) **Particulate matter -** Soot, smoke, tar or dust and domestic wastes.
2) **Toxic Gases -** Carbon Monoxide (CO), Oxides of Nitrogen (NOx) Oxides of Sulphur (SOx), Halogens (chlorine, bromine and iodine) and volatile organic compounds.
3) **Metals -** Lead, zinc, iron and chromium.
4) **Industrial pollutants -** Benzene, ether, acetic acid etc. and cyanide compounds.
5) **Agricultural pollutants -** Pesticides, herbicides and fungicides, Chemical fertilizers.

6) **Photochemical pollutants -** Ozone, Oxides of Nitrogen (Nox), aldehydes, ethylene, photochemical smog and Peroxy Acetyl Nitrate (PAN) and Oxides of Sulphur (SOx).

7) **Radiation pollutants -** Radioactive substances and radioactive fall-outs of the nuclear test.

Sources of air pollution

The basic sources of air pollution are natural and anthropogenic/man-made.

Natural sources of pollution are those that are caused due to natural phenomena such as volcanic eruptions, forest fires, biological decay, pollen grains, marshes, radioactive materials etc.

Anthropogenic/man-made sources of pollution are those which are created by human activities. These include indoor air pollutants, vehicular emissions, fossil fuel burning, agricultural activities, industrial emissions and thermal power plants etc.

Effects of Air Pollution

Table 2.1: Some major pollutants and their effects

Pollutants	Effects on human health	Effects on environment
Sulphur oxides (SOx)	Respiratory problems, heart and lung disorders, visual impairment	Chlorosis, death of plant tissues
Nitrogen oxides (NOx)	Generates PAN, Pulmonary disorders, Respiratory infections, very toxic at high concentrations	Acid rain reduces crop yields.
Aerosols (Dust, smoke, smog)	Interferes with ability of lungs to exchange gases	Influence climate by scattering light
Particulate matter (PM) $PM_{2.5}$ and PM_{10}	Respiratory problems, asthma, bronchitis, reduced lung function, lung/liver fibrosis, heart stroke, bone problems, cancer, heavy metal poisoning	Adverse effect on biodiversity Accumulation of soot or black layer on the leaves.
Carbon monoxide (CO)	Reduces oxygen carrying capacity of blood, cardiovascular problems. Infants, pregnant women, and elderly people are at higher risk.	Global warming
Ozone (O_3)	Tropospheric ozone causes respiratory problems such as throat irritation, asthma, bronchitis, chest pain, etc.	Adverse effects on plants. Assist in the formation of Peroxyacetyl nitrate (PAN), acts as green house gas.
Lead (Pb)	Affects blood, nervous system	Increase in atmospheric lead due to vehicular emissions
Ammonia (NH_3)	Burning of eyes, nose, throat and respiratory track. Prolonged effects result in blindness, lung damage or death.	Affects aquatic organisms

Air Quality Index (AQI)

Air Quality Index is the index used to show level of air pollution in particular area. It is used by goverment to communicate to public about the quality of air. Public health risks increase as AQI rises.

Table 2.2 Air Quality Index (AQI)

Air Quality Index (AQI)	
AQI Values	**Levels of health concern**
0-50	Good
51-100	Satisfactory
101-200	Moderately-polluted
201-300	Poor
301-400	Very poor
401-500	Severe

Control Measures of Air Pollution

Following measures have been suggested to control air pollution -

1) Avoid burning of fire wood, charcoal and garbage.
2) Use renewable energy resources.
3) Strict implementation of pollution control laws.
4) Height of chimneys should be increased to the highest possible level to reduce pollution at the ground level.
5) Development of green belt by tree plantation. The trees absorb polluting gases and particulate matter which settles on the leaf surface.
6) Strengthen and use public transport system.

Do you know?

The Government has taken following steps to control air pollution :

- Establishment of Ambient Air Quality Monitoring throughout India.
- Notification of Ambient Air Quality Standards under Environment (Protection) Act.
- Notification of vehicular emission norms for year 1990-91,1996, 1998, 2000, 2001.
- Improving fuel quality by phasing out lead from gasoline, reducing diesel Sulphur, reducing gasoline benzene etc. Blending of ethanol with petrol and diesel.
- Introduction of alternate fueled vehicles like electric, CNG/LPG and hybrid.
- Improvement in public transport system.
- Phasing out of grossly polluting commercial vehicles.
- Public awareness and campaigns.

The best method to control air pollution is ‘Pollution Prevention’, also known as 'source reduction,' is any practice which reduces, eliminates or prevents pollution at its source.

For every vehicle you must regularly obtain PUC (Pollution Under Control) certificate which is a Certification Mark issued to certify that motor vehicles in India meet emission and pollution control norms is necessary for every vehicle.

Do's

- Walk to work or ride a bicycle.
- Try to use public transportation whenever possible.
- Carpool - Two or four people can ride in one car.
- Get a valid pollution under control certificate (PUC) from authorized testing centre.
- Keep automobiles fuel filters clean and save the fuel.
- Maintain recommended tyre pressure.
- Use biofuels.

Don't

- Extensive use of private vehicles.
- Travel by congested road during rush hours.
- Keeping the engine running on for more than one minute at traffic signals.
- Use of clutch pedal as footrest.
- Use of leaded petrol.

Do you know

SAFAR

Govt. of India has introduced a major national initiative called **"System of Air Quality, Weather Forcasting and Reserch (SAFAR)** in greater metropolitan cities of India to provide location specific information on air quality in near real time. It is installed in four cities Delhi, Pune, Ahmedabad and Mumbai. This system beuefits the general population by increaring awareness on climate related events. Before the introduction of SAFAR there was no way to know the status of air quality.

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

The Air (Prevention and Control of Pollution) Act, 1981, was established to maintain the ambient air quality in the nation. The enactment regulates the emissions from the industries and factories so as to keep them below the harmful levels. The Air Act also has a provision under which Pollution Control Boards can earmark areas wherein no polluting industrial activity is allowed.

Violation of provisions of the Air (Prevention and Control of Pollution) Act, 1981 attracts criminal charges and such organisation or individuals have to face criminal trials for polluting air. The Act makes it mandatory for every occupier of the premises to furnish appropriate information, whenever asked for, to the pollution control board officials.

2.2 Climate change

Climate is the general average pattern of weather in a place over a period of years. Changes in environment are either natural or man-made. Man-made changes have greater and more serious impact on the climate. Human activities are leading to an unprecedented acceleration in climatic changes. It is predicted that by 2050, the world will be warmer by an average of 1.5 - 4.5°c. There are several reasons for these accelerated changes. The increase in some gases in the atmosphere, resulting from human activities such as burning of fossil fuels and deforestation are some of the reasons. As these emissions continue to rise, it is feared that they will lead to a substantial change in the climate.

Greenhouse effect

In the normal course of things, the earth surface absorbs solar radiations and gets warmer, while some of the heat is radiated back into atmosphere. Naturally occurring gases, present in the atmosphere trap a part of this outgoing heat and prevent it from escaping back into space.This leads to warming of the earth's surface and a substantial rise in temperature of the troposphere.

This phenomenon keeps the earth sufficiently warm; and the life on the earth survives at this temperature.

Gases like Carbon dioxide (CO_2), Oxides of Sulpher (SO_x), Oxides of Nitrogen (NO_x), Methane (CH_4) etc. are called greenhouse gases (GHGs), because they act like the glass of a greenhouse. Due to which the heat absorbed by the surface of the earth is retained and it can not escape into the space. This trapping of heat in the troposphere is called Greenhouse effect.

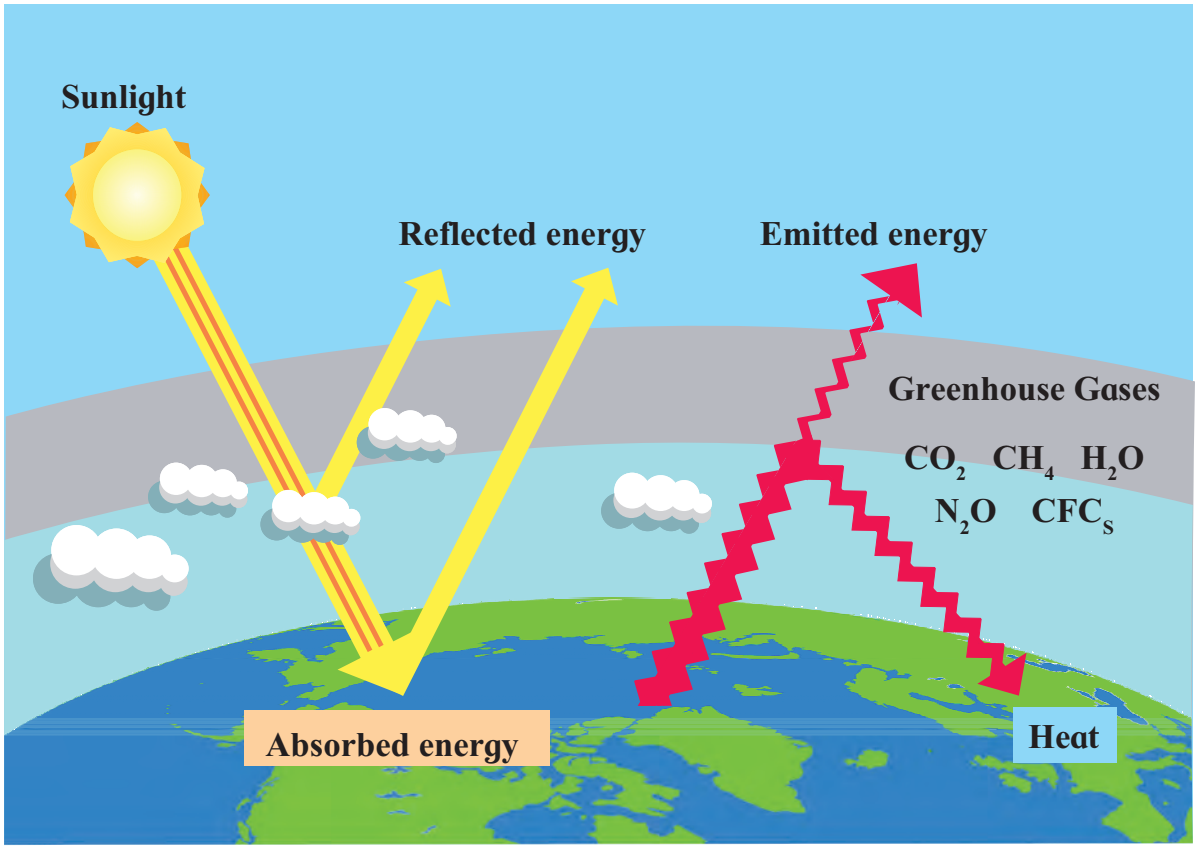


Figure 2.1 Greenhouse effect

Global Warming

Global climate is dependent on the concentrations of greenhouse gases present in earth's atmosphere. Today human activities leading to release of greenhouse gases are dramatically increasing. Vehicular and industrial pollution are adding gases like Carbon dioxide (CO_2), Sulpher dioxide (SO_x), (NO_x) and Carbon Monoxide (CO). Some new manmade gases such as CFC's are also resposible for increase in temperature. The gradual increase in the temperature of the earth atmosphere is referred to as Global Warming.

Table 2.3 : Activities responsible for climate change

Activity	Greenhouse gas
Industrial emissions	NO_x CO CO_2 SOx
Vehicular emission	CO CO_2 SOx
Fossil Fuel burning	CO CO_2
Cow dung, ruminant animals, paddy fields	CH_4
Sewage, Landfill	CH_4
Refrigeration, foams and aerosols	CFC's
Fertilizers	NOx

Impact of climate change

What will happen if the earth's temperature rises by a small amount? Is it something to worry about? Let us look at some of the impacts :

1. Temperature increase -

If input of greenhouse gases continues to rise at the present rate; earth's mean temperature will rise by 1.5-4.5°C by 2050. This would disrupt crop growth and cause loss in agricultural production.

2. Rise in sea level

Over the last century, the global sea level has risen by 10-30 cm. due to melting of glaciers. If this situation continues, this would submerge small islands. The republic of Maldives is an example of a nation, which is very vulnerable to sea level rise. Delta regions are also at high risk.

3. Agricultural production

Changes in weather pattern would have far reaching effects on agriculture. Some places would get drier, some wetter, some get hotter and other cooler. This will affect the crop production and yield.

4. Loss of ecosystem and biodiversity

Due to large scale felling of trees and high level of dryness, large forests may catch fire. Indonesia and Brazil forests are the recent examples of forest fires. Large areas of forests would disappear, so animal species would be forced to migrate.

5. Adverse effects on human health

Deaths due to heat waves and other extremes of climatic conditions, water and air borne diseases like Malaria, Encephalitis and Dengue etc. would be more.

2.3 Soil pollution

Soil is like water and air, equally important for living organisms. It supports plants on which all other living organisms depend. The process of soil formation is so slow that the soil is considered as a non-renewable source. Therefore, the study and control of soil pollution is important.

Sources of soil pollution

There are several materials, which adversely affect physical, chemical and biological properties of the soil and thus reduce its quality. These are -

1. Pesticides and insecticides that are sprayed on crops.
2. Fertilizers and manures that are added to the soil to increase the crop yield.
3. Over irrigation.

Effects of soil pollution

- The productivity of soil is reduced due to the addition of harmful substances like chemicals, pesticides and herbicides.
- Chemicals and pesticides affect the structure and fertility of soil by killing the soil microorganisms.
- Faulty sanitation and unhygienic practices of the people add to the soil pollution.
- Pathogens present in wastes and excreta contaminate the soil and vegetable crops grown in that soil causes diseases in humans and domesticated animals.
- Increase in the concentration of soluble salts is called **salinization**. This adversely affects the quality and productivity of soil. It takes place due to accumulation of salts on soil surface and over irrigation. Saline soil becomes unfit for growth of vegetation.

Soil fertility ratings

Available nutrient status in the soils is generally classified as low, medium and high; which are followed at national level and are as follows :

Table 2.4 : Soil fertility

Sr. No	Soil Nutrients	Soil Fertility Ratings		
		Low	Medium	High
1	Organic carbon as a measure of available nitrogen (%)	< 0.5	0.5 - 0.75	> 0.75
2	Available nitrogen (kg/ha)	< 280	280 - 560	> 560
3	Available Phosphorus (P)(in alkaline soil) (kg/ha)	< 10	10 - 24.6	> 24.6
4	Available Potassium (K) (kg/ha)	< 108	108 - 280	> 280

Source : Ministry of Agriculture, Govt. of India

Control of soil pollution

Various measures to control soil pollution are

1. Use of chemical fertilizers should be reduced by using more of bio-fertilizers and green manures.
2. Use of pesticides can be reduced by adopting biological control of pests.
3. Use of cattle dung and agricultural wastes in biogas plants should be encouraged.
4. Plantation can check soil erosion to a great extent.

2.4 Noise pollution

The word noise is derived from a Latin word 'nausea' which means unwanted or unpleasant sound that causes discomfort. Noise can be defined as "wrong sound, in the wrong place at the wrong time."

When the sound becomes noise it adversely affects the auditory system of human beings, animals and birds. All over the world, in urban localities, noise pollution has been recognized as a major factor affecting public health and well-being.

Sound is measured in decibels (dB). Sound beyond 80dB becomes noise, as it harms auditory system. The World Health Organization (WHO) has fixed a limit of 45 dB as the safe noise level for a city. According to international standards a noise level up to 65 dB is considered tolerable.

Noise standards

According to the living style and standards, the different countries of the world have their own noise pollution standards. In India, the Bureau of Indian standards (BIS) has recommended noise level between 45 and 60 dB in an industrial area. The Threshold Limit Value (TLV) which is accepted everywhere under the occupational safety and health act is 90 dB for 9 hours, 95 dB for 4 hours, 100 dB for 2 hours and 115 dB for 15 minutes per day.

Do you know?

The Central Pollution Control Board (CPCB) India, has conducted noise pollution survey in eight major cities of India like Delhi, Chennai, Kolkata, Bangalore, Mumbai, Hyderabad, Kanpur, Jaipur and found that their noise pollution level is much higher than the prescribed limit. Similar situation is seen in almost every part of the world and is worsening day by day.

Table 2.5 : Intensity of some sound sources on Decibel Scale

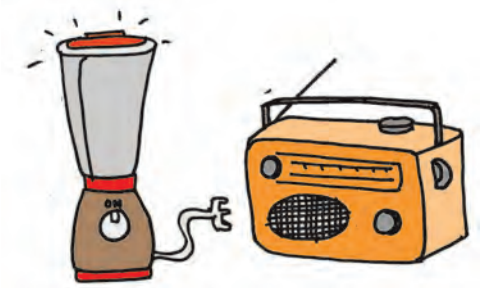
Sr. no.	Source	Approximate Intensity (dB)
1	Breathing	10
2	Soft whisper	20 – 30
3	Library	30-35
4	Low volume radio	35 – 40
5	Normal conversion	35 – 60
6	Office noise	60 – 80
7	Traffic noise	50 – 90
8	Running motorcycle	115 – 120
9	Jet plane takeing off	140 – 150
10	Launching of space rocket	160 - 180

Source : cpcb.gov.in

Causes of noise pollution

- The ambient noise level in urban area is increasing mainly by man-made sources.
- The major disadvantage of technological development is noise pollution.
- The intensity of noise is high in densely populated area viz. metropolitan cities, industrial area, airports, railway stations and bus stations.

- House hold gadgets like television, radio, kitchen appliances, washing machine, mixer, grinders and fire crackers etc. are also responsible for noise pollution.



- In industrial areas, gigantic machinery running at high speed produces sounds of different intensities. These sounds add to noise pollution.
- Machinery used at construction sites, automobiles, blowing horns of vehicles are also responsible for noise pollution.

Effects of noise pollution :

- The disastrous effect of noise pollution on the health of people and animals is well reported. Constant noise affects a man physically and mentally.
- A child's physical and psychological health is hampered by noise. Noise pollution affects elderly persons by increase in blood pressure.
- Other physiological effects seen in humans due to noise pollution are loss of hearing, hypertension, stress diseases etc.
- Noise pollution is also responsible for pain, nausea, vomiting. Many behavioural changes are noticed in people working in factories that produces a huge noise are nervousness, irritation, headache, giddiness etc.
- Significant adverse effects of noise pollution also reported in animals.
- High intensity sound by industries, supersonic aircrafts when continued for a long period of time can permanently damage hearing.

Control measures of noise pollution :

- The noise pollution should be checked at the source only.
- Replacement of noisy devices / parts, effective cushioning to minimize vibrations, proper greasing and oiling to avoid frictions and using of proper silencers are effective ways to minimize noise pollution at source level.
- The noise of factories can be minimized by construction of proper sound-proof walls, doors, ceilings etc.
- The factory workers should be provided with proper ear plugs.
- Construction of residential complexes near railway station, bus station, airports and busy industrial areas should be avoided.
- Loud speakers should be regulated in public places. Periodic servicing and pollution tests of buses, trucks and cars should be mandatory to minimize noise from the engine.
- Stringent action should be taken against people who are violating rules of Environmental Protection Act.
- Proper development of green belts, plantation of specific species of trees helps to absorb excessive noise from industrial and other noisy areas.

Particular plant species used for green belt development are - *Azadirachta indica (Neem), Acacia auriculiformis, Mangifera indica (Mango), Pongamia pinata (Karanj), Dendrocalamus Spp (Bamboo), Ficus Spp (Banyan, Pimpal), Bauhinia Spp etc.*

Figure 2.2 : Green belt development

The Noise Pollution Control Rules of 2017

The rules have established the parameters for maximum sound limits in various zones defined by the government. Under the amended rules, now the State Governments can notify the 100 meters area around hospitals, educational institutions and courts as a silent zone.

These rules are framed under the Air Act and noise pollution is considered as a type of air pollution.

Violation of these rules attracts punishments under the Air Act. The nodal agency to monitor noise pollution is respective police station.

Table 2.6 : Noise level standards in dB

Sr. no.	Category of Area/ Zone	Day time (6.00 am. - 10.00 p.m.)	Night time (10.00 pm. - 6.00 a.m.)
1	Industiral Area	75	70
2	Commercial Area	65	55
3	Residential Area	55	45
4	Silence Zone (Area around hospitals, educational institutes etc.)	50	40

Source : cpcb.gov.in

2.5 Solid waste management

Solid waste

Solid waste consists of household waste, commercial waste, institutional waste, construction and demolition debris, sanitation residue, e-waste, industrial waste etc.

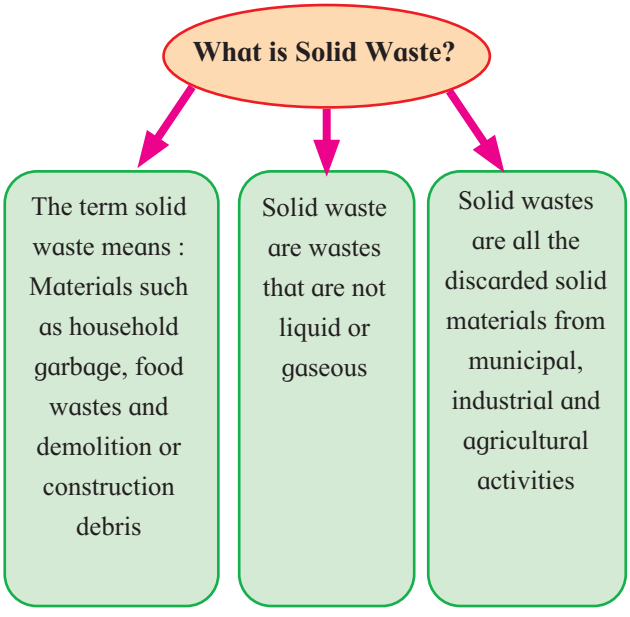


Figure 2.3 : What is solid waste?

Figure 2.4 : Know your waste

Types of solid wastes

1) Biodegradable waste
2) Non-biodegradable waste

1) Biodegradable waste - Biodegradable waste is a type of waste, typically originating from plant or animal sources, which are degraded by micro organisms along with other living organisms.

Biodegradable waste is commonly found in municipal solid waste as green waste, food waste, paper waste and garden waste etc. Other biodegradable wastes includes sewage sludge, slaughterhouse waste etc.

2) Non-biodegradable waste - Wastes which do not decompose naturally in the environment causes pollution and are also harmful to the living being and environment are called the non-biodegradable waste eg. plastic, rubber, glass, metals, thermocol, e-waste etc.

Solid waste is further clasified as -

- **Wet waste -** Wet waste is biodegradable waste which includes cooked and uncooked food, fruits, vegetable peels, garden waste and other organically decomposable waste. It is used to make compost and biogas.
- **Dry waste -** Items like aluminum foils, tetra packs, glass, paper, plastics, metals etc. come under the dry waste category. It is mostly used for recycling.

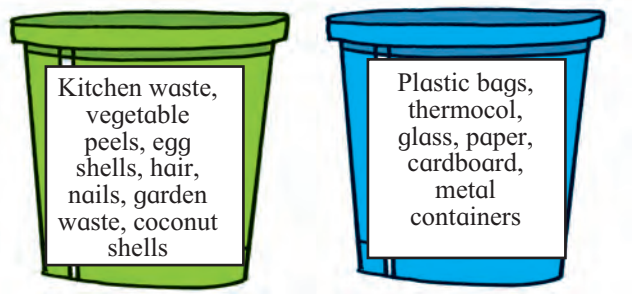


Figure 2.5 :- Wet waste and Dry waste

Remember it !

What can you do to segregate the waste at home?

- Keep separate containers for dry and wet waste.
- Keep a paper bag for throwing the sanitary waste.
- Food containers should be cleared and then should be dropped into dry waste bin.
- Use wet waste for making compost and give dry waste for recycling.

Sources of solid waste

1. **Domestic waste** – Waste from home includes organic matter like vegetable peels, spoiled food, glass products, packaging material like cardboard, plastic bags, foam, electronic waste and furniture etc.
2. **Agricultural waste** – Crop residue, waste from processing of crops, excreta of animals.
3. **Commercial waste** – This consists of packaging material, discarded office equipments, furniture, e-waste etc.
4. **Biomedical waste –** It comes from clinics, pathology labs and hospitals. It mainly consists of infectious waste, sharps like needles, knives, dressings, body parts and expired medicines etc.
5. **E-waste -** E-waste is generated from used electronic devices and household appliances. E-waste has been categorized into three main categories, viz. large household appliances, IT telecom and consumer equipments. Refrigerators and washing machines represent large household appliances. Personal computer, monitor and laptop represent IT and telecom, while television, mobile phones represents consumer equipments.
6. **Industrial waste** - It is produced by industrial activities. It includes material rendered useles during manufacturing processes.

Waste generation and its management is becoming a universal problem. Waste accumulation leads to spoilage of landscape and creation of health hazards. It has adverse impacts on terrestrial and aquatic life. Lack of space for disposal of garbage leads to air pollution, water pollution, soil pollution, affecting life on earth.

Thus there is a need for more sustainable ways for management of waste to save the environment.

There are two ways to solve the problem -

1. To reduce generation of waste.
2. To extract maximum benefit from the waste generated or produced.

Do You Know

NIMBY stands for NOT IN MY BACKYARD. The NIMBY attitude prevents us from cooperating effectively to deal with the waste. It is the NIMBY attitude keeps our surroundings dirty. We could organise a separate bin for each type of waste and keep the garbage area clean. Scrap collectors could take away all the recyclable waste.

Remember it !

Reduce generation of waste

- Print if and only if utmost necessary. Print double sided copies, reuse envelopes.
- Carry a cloth bag when you shop.
- Prepare compost from grass clipppings and kitchen waste.
- Buy products that are DURABLE and REUSABLE glass, plastic or aluminum bottles.
- Don't discard clothes or household items; donate to charities.
- Refuse to accept plastic bags in shops and markets.

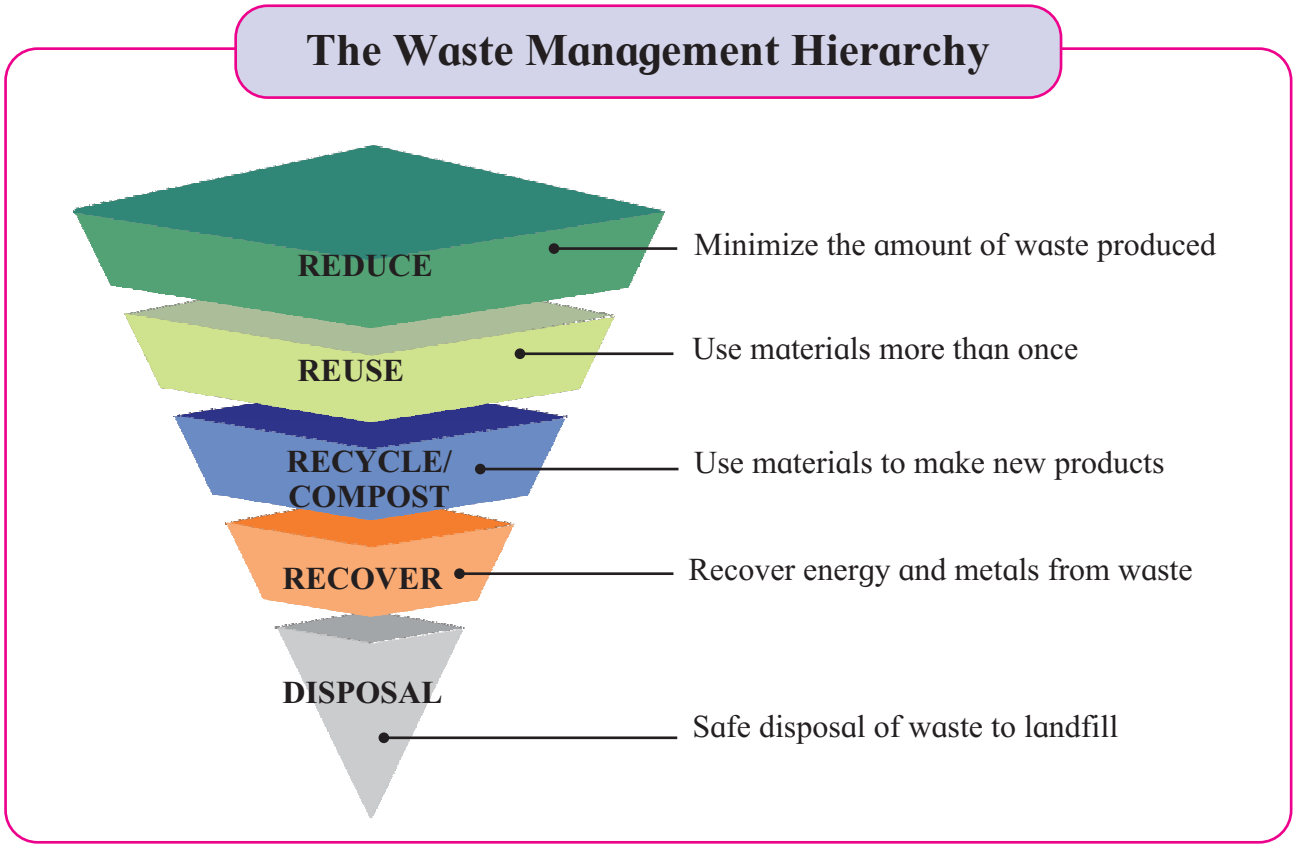


Figure 2.6 : Waste Management Hierarchy

Solid waste management

It is a purposeful and systematic control of waste from its generation to disposal. **Segregating the waste at the source is the basis of waste management.**

Solid waste management is based on 4 'R's principle - Reduce, Reuse, Recycle, Recover.

- **Reducing the generation of waste**

Waste generation is product of human activity, hence the quantity of waste produced can be controlled by people. If everyone buys only things which are needed and uses items for longer period, waste generation will also be less.

Source reduction is also known as **waste prevention.** It can be achieved through behavioural changes in all citizens. Waste reduction cuts the municipal costs involved in waste collection and disposal.

- **Reusing the waste**

We should not throw away things that can still be used to the extent possible. We should repair and reuse things with little changes.

Activity 1

Find 10 reusable things at home. Make a list how it can be reused.

Sr. No	Name of reusable thing	How it can be reused
1	Old Plastic bucket	Used as dustbin
2		
3		

Activity 2

- Make new notebooks from unused pages of old notebooks.
- Use old pieces of cloth for making cushion covers and doormats etc. Use plastic bottles for gardening.

Plastic bottles used for gardening and used pieces of cloth for making bags and doormats.

- **Recycling of waste**

Recycling is the process of converting waste materials into new materials and other useful products. Recycling is the most widely recognized form of source reduction. It involves the process of segregation, collection, processing of a new product and marketing it effectively. It uses the material that would have otherwise been discarded or dumped.

It is the fundamental part of a modern waste management plan. It can divert a significant portion of a waste stream from disposal in landfill and combustion facilities. Recycling is possible only if the waste is segregated at source.

Commonly Recycled Materials

Paper

Paper recycling is the process of recovering waste paper and remaking it into new paper products. Paper and cardboard form the second largest component of domestic waste. Paper recycling is practiced extensively as it reduces the demand for wood and energy.

Activity 3

- Make a visit to handmade paper industry to understand process of paper recycling.

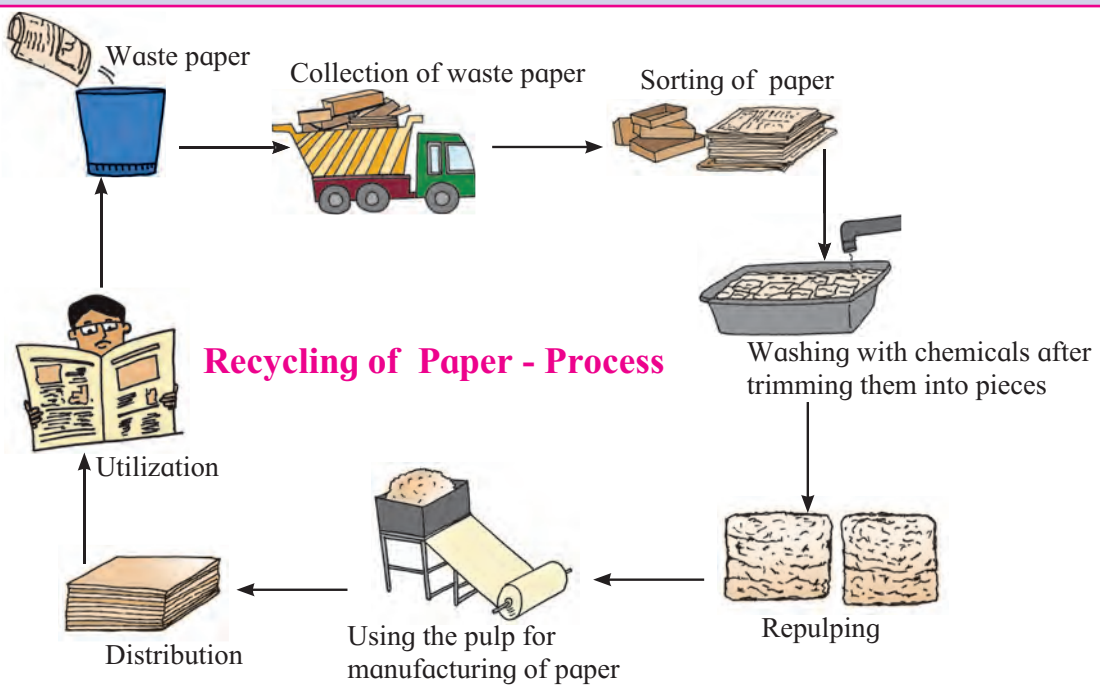


Figure 2.7 : Recycling of Paper

Glass

Glass is a commonly recycled material. Recycling of broken glass reduces the risk of hazard. Recycled glass has economic value only when it can be separated by colour.

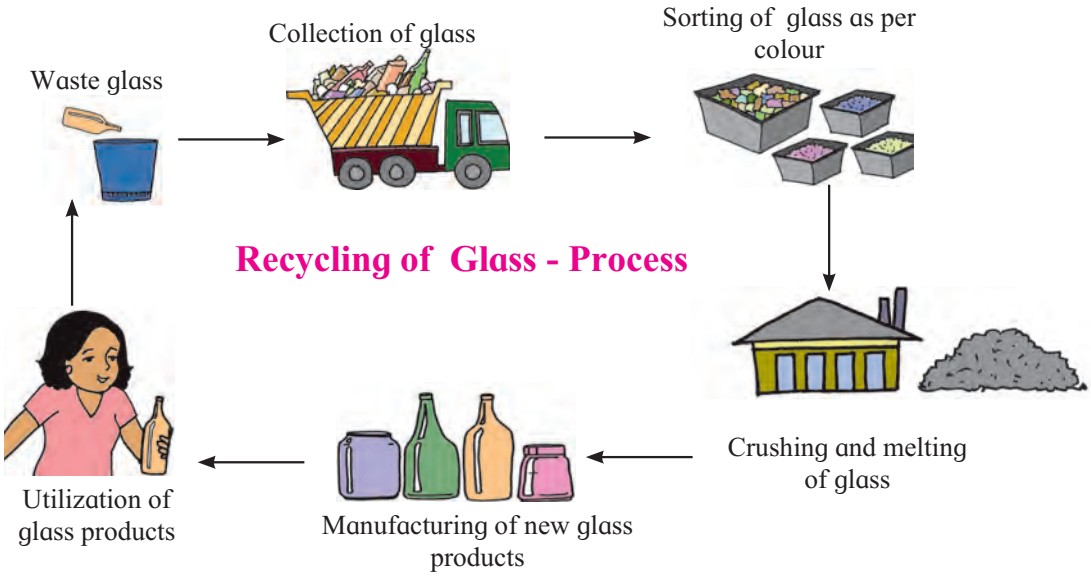


Figure 2.8 : Recycling of Glass

Metal

Metals can be used in several ways. Metals can be used for industrial purposes and domestic items as well. The good thing about metal recycling is that metal can be recycled over and over. The most common recyclable metals include aluminum and iron.

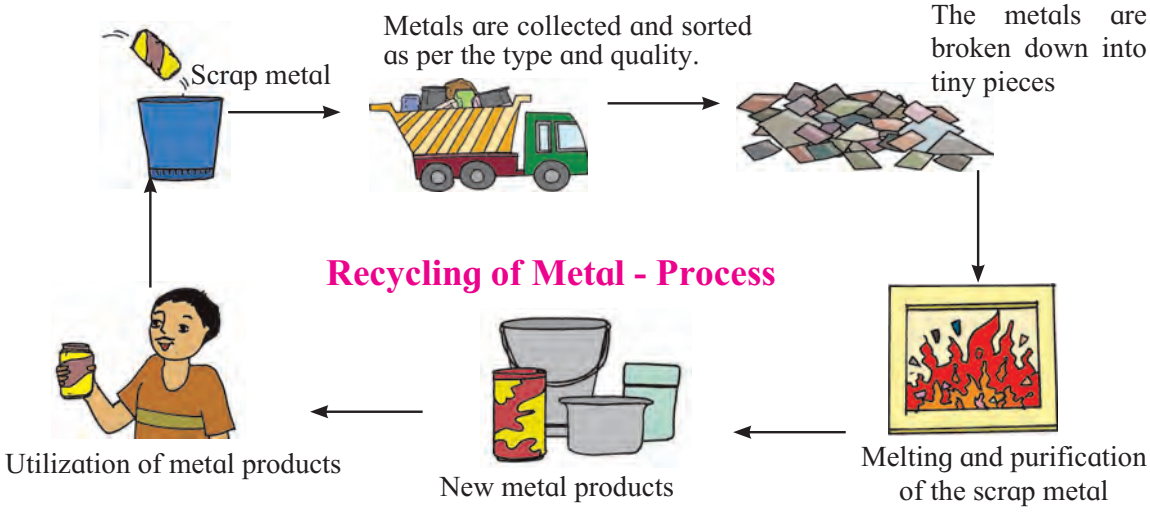


Figure 2.9 : Recycling of Metal

Plastic -

Plastic is among the most popular and important materials used in the modern world. However, its popularity is part of the huge problem and reason why plastics should be recycled. Instead of throwing them away and polluting the terrestrial and aquatic environment, plastics can be recycled and reused. Plastic recycling refers to the process of recovering plastic waste or scrap plastic and reprocessing it into useful product.

Activity 4

Examine every item of waste that is generated at your home. Find out where it came from and what is its fate.

Arrange interviews of kabadiwala, ragpicker and local recycler. Make a questionnaire for the interview based on points like type of waste collected, which type of waste is not accepted and why?

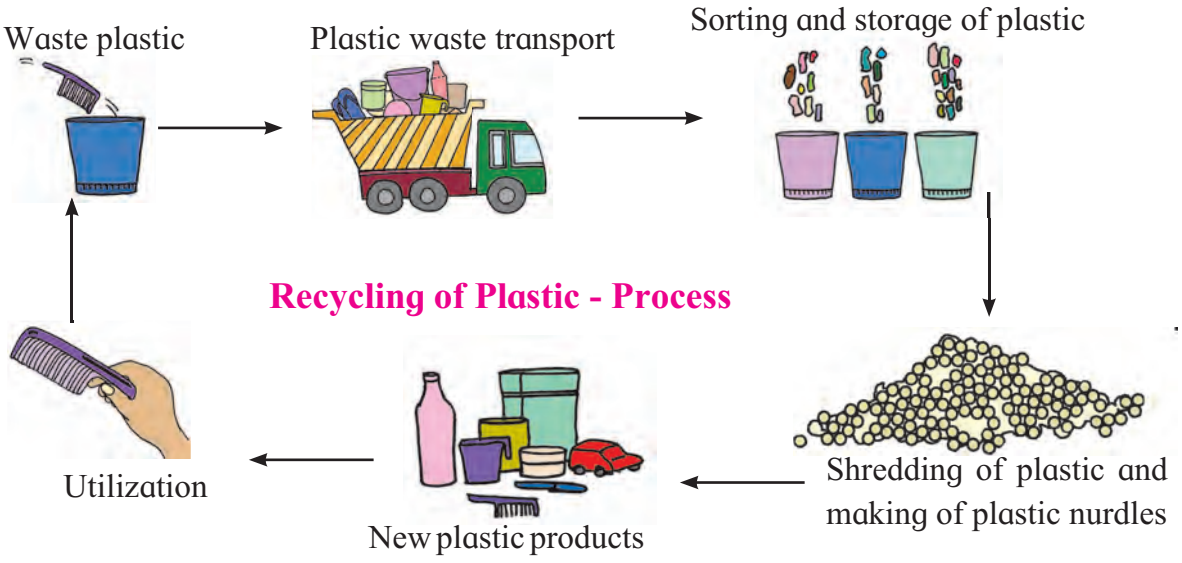


Figure 2.10 : Recycling of plastic

Activity 5

Examine your buying habits. Make a list of recycled products.

Composting -

Composting is an easy way of recycling organic waste. It is the biological decomposition of wet organic matter in the presence of oxygen. It converts everyday kitchen waste into manure.

Table 2.7 : Simple steps to turn your garbage into compost.

1	**Segregate Waste**	**Container 1** - kitchen waste - vegetable peels, fruit peels, wasted cooked food, etc. **Container 2**- dry organic waste like dried leaves, sawdust, newspaper chunks, packaging material etc.
2	**Composting Spot**	Kitchen, balcony, terrace or roof etc.
3	**Construct Composting Bin**	Take/ choose a bucket, normal dustbin or a garden pot. Drill around 4-5 holes around the container at different levels so as to let some air in easily. To avoid any spills place a newspaper or tray underneath the container.
4	**Initiate the Composting Process**	Make alternate levels of dry organic waste and wet waste in the bin to maintain the balance of moisture. To speed up the process, add compost culture available in the market.
5	**Maintain the compost bin**	If compost smells due to imbalance of waste in the bin increase the components of dry leaves or newspapers or add extra holes to the compost bin. Sprinkle some water if the compost turns too dry. After every 4-5 days, turn the waste upside down for aeration.

Vermicomposting

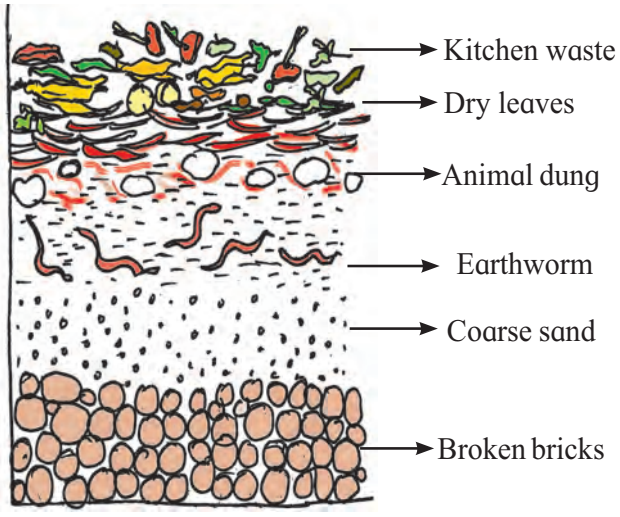


Figure 2.11 : Layers of Vermicomposting

It is the process of decomposition of organic waste and converting it into compost with the help of various species of earthworms. The excreta of earthworm makes the compost very rich in nutrients. The commonly used varieties of earthworms are *Eisenia fetida* and *Pheritima elongata.*

- **Recovering energy from waste**

Anaerobic Digestion

It is an anaerobic treatment in which organic waste is degraded and biogas is produced. The gas provides energy and thus economic benefits. Sludge from biogas plants is used as fertilizer.

Refused Derived Fuel (RDF)

When the solid waste contains large amount of combustibles it can be used as a fuel. Waste containing paper, plastic, leather etc. is suitable for making of RDF. Agrowaste can be used for making charcoal brickets.

- **Incineration**

It is a waste treatment technology which includes the combustion of waste at high temperature. Incineration plants generate energy

from waste. This energy can be used to produce electricity. In the absence of effictive pollution control measures, incineration plants produce wide variety of pollutants.

Landfill

Waste remaining after using 4 'R's is disposed in landfill. Sanitary landfill is an engineered facility for the disposal of municipal solid waste. It is designed and operated to minimize public health hazards and environmental impacts. Solid waste is placed in a suitably selected and prepared i.e. lined landfill site in a carefully prescribed manner.

Journey of solid waste

For the better management of solid waste every citizen should understand the life cycle i.e journey of solid waste from its collection to disposal of waste. This helps in minimizing the impacts of waste on the environment, people and economy.

Ministry of Environment Forests and Climate Change (MoEF and CC). For better waste management in India, Municipal solid waste management Rules 2000 by MOEF and CC are the main guiding source. In 2016 the Environment Ministry has revised Solid Waste Management Rules.

Do You Know?

Ash from thermal power plants is used as cement substitute, for making roads and bricks.

Salient features of solid waste management rules 2016

1. No person should throw, burn or bury the solid waste generated by him on streets, open public spaces outside his premises, or in the drain or water bodies.
2. Generator will have to pay 'User Fee' to waste collector and 'Spot Fine' for littering and non-segregation.
3. All hotels and restaurants should segregate biodegradable waste and set up a system of collection or follow the system of collection set up by local body to ensure that such food waste is utilized for composting / biomethanation.
4. Every street vendor should keep suitable containers for storage of waste generated during the course of his activity such as disposable plates, cups, leftover food etc. and deposit such waste at waste storage depot or container or vehicle as notified by the local authority.

Activity 6

Read the following rules related to solid waste management from the website http://cpcb.nic.in

1. Plastic waste management
2. E-waste management
3. Construction and Demolition wastes management
4. Biomedical waste management

Maharastra plastic ban

The Maharashtra government began enforcing a ban on single use plastic to beat plastic pollution from 23rd March 2018. Urban and rural civic bodies, forest officers, police authorities and Maharashtra Pollution Control Board officials have been empowered to implement the ban and take legal action. The penalty for violating the ban starts from ₹5,000 (first offence), ₹10,000 (second time) and ₹25,000 (third time) with three months in jail.

Items banned

- Plastic bags (less than 50 microns)
- Disposable plastic items like spoons, forks, cups, glasses etc.
- Disposable thermacol items like plates, glasses, bowls, containers, decoration articles etc.
- Plastic wrap used for packaging or storing products

Items Exempted

- PET bottles (> 500 ml)
- Packaging material for medicines, solid waste, agriculture sector
- Bags/Sheets used in plant nurseries
- Food grade virgin plastic bags over 50 microns
- Milk pouches over 50 microns

Do you Know?

(A waste management model for small towns)

Vengurla in Sindhurdurg district of Maharashtra, is a town which generates revenue from its waste.

The state government conferred Vengurla the Vasundhra Award, 2017 for its green initiatives. It is a successful model for 100 per cent solid waste management under the Swachh Bharat Abhiyaan.

Vengurla has achieved 95 per cent waste segregation at source.

It is one of the only towns in India to convert a landfill into a waste management park, called the Swachh Bharat Waste Park. The park now hosts a biogas plant, a briquette-making plant, a segregation yard and a plastic crusher unit. It also has fruit trees and an organic farm. The idea was to make waste management look hygienic and pristine.

Exercise for Journal Assignment

1) Write down the journey of dry waste from your house to the place where it goes.
2) Write down plastic recycling rules and e-waste recycling rules.
3) What are the sources of noise pollution? Explain the ways to reduce it.
4) What is global warming? What you can do to reduce it.
5) What are the sources of air pollution in metropolitan cities in India? Explain with examples.
6) Explain the impacts of climate change.
7) Explain the problems related to use of fossil fuels.
8) Explain impacts of fertilizers used in agriculture.