



5

POLLUTION AND PURIFICATION

In ancient times humans used to live along river banks. They live in rural areas, economy was agrarian and basic needs could be fulfilled directly from natural resources. Most of the human activities were in harmony with nature and did not affect natural environment adversely. With passage of time, humans enhanced their knowledge and resultant in technological advancements and hence growing industrialization, population explosion and desire to live a comfortable life have degraded our natural environment because we are used to living in our environment.

Any change in the environment around us which is not favourable troubles us. There are some changes that are not suitable to life, and they pollute our environment. Protection of environment is very essential. We should protect our air, water, soil and forests in order to conserve environment. We also have to see that the balance between natural things and living beings is maintained. We will discuss ancient traditional practices which was used in India as remedy for pollution and waste.



Notes



OBJECTIVES

After studying this lesson, you will be able to:

- explain the types and causes of pollution;
- identify the traditional techniques for purifying environment; and
- traditional practices to use waste material in domestic needs.

5.1 POLLUTION AND CAUSES OF POLLUTION

I. What is pollution

Vedic scriptures also mentioned the occurrence of environmental pollution including air, water and soil pollution because of artificial equipments, machines and toxic unnatural substances (synthesized chemical). So human life involves a number of daily activities. Bathing and washing of clothes with soaps and detergents add some chemical residue to water and change its quality. Cooking of food by using firewood may give out smoke in the air. Agricultural activities may dump fertilizers and pesticides in the environment in modern world.



Fig. 5.1 Pollution



The presence of unwanted substances in a concentration which can have an adverse effect on organisms and environment is called pollution.

II. Types of Pollution

Depending upon the area or the part of environment affected, pollution may be of the five types as shown in Figure 5.2

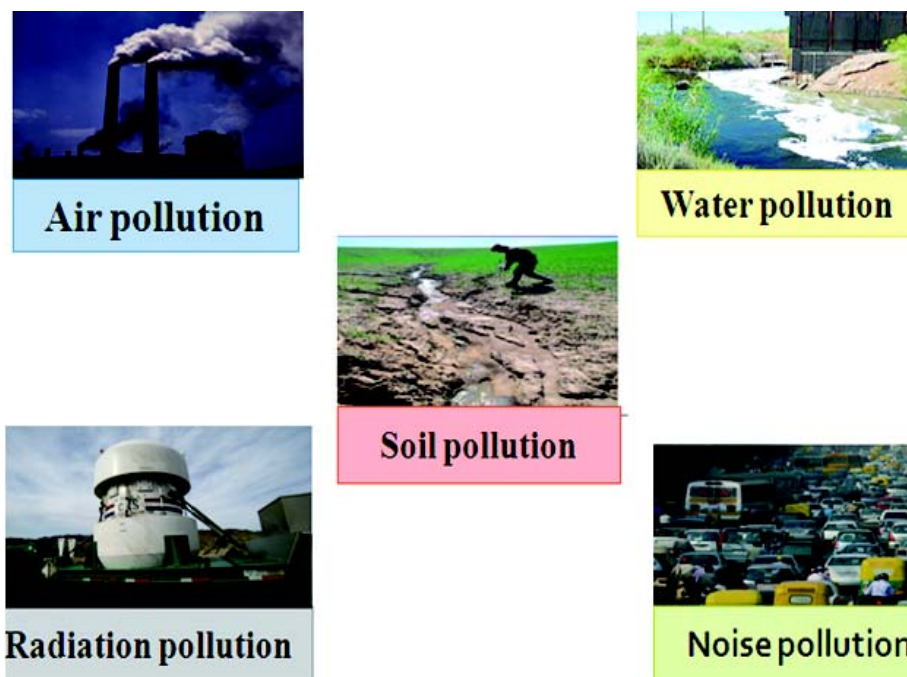


Fig. 5.2 Types of Pollution

a. Air Pollution

We all feel and breathe air. Sometimes, we feel very happy and remark about the fresh air around us. The pollution in air may not be noticed until we see dust or smoke coming out from some source or some foul smell present all around.

Causes of Air Pollution

All human activities from cooking at home to the working of highly mechanized industries contribute to air pollution. Air



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pollution is the introduction of harmful chemicals, biological wastes, and particulate matter into the atmosphere. Pollution has harmful effects on humans as well as on all other living beings

Pollutant gases cause irritation in eyes, throat and lungs. Liver, kidney, spleen and nervous system too are affected. Also causes gastroenteritis. Heart related diseases tend to increase. Many people tend to develop terminal ailments such as cancer.

b. Water Pollution

Fig. 5.3 Water pollution

Water pollution is the contamination of water bodies like lakes, rivers, ground water and oceans. It occurs due to the discharge of untreated pollutants into water bodies. It not only affects plants and organisms living near the location of discharge but also travels to other locations through transportation of polluted water.



Causes of water pollution

Various sources of water pollution are

- Silt,
- Pesticides,
- Heavy metals
- Organic wastes
- Domestic sewage
- Radioactive wastes
- Detergents and fertilizers
- Mining and Industrial waste

c. Soil pollution and land pollution

Soil pollution is caused by the addition of chemicals or other unwanted substances in the natural soil environment. As you can see in the pictures, soil pollution results in land degradation. Don't you think here again we humans are responsible for the increase in soil pollution.



Fig. 5.4 Soil pollution



Addition of substances that change the quality of soil by making it less fertile and unable to support life is called soil pollution

Sources of soil pollution

- o Domestic sources: plastic bags, kitchen waste, glass bottles and other solid waste.
- o Industrial sources: chemical residue, fly ash, metallic waste.
- o Agricultural residues: fertilizers and pesticides Soil erosion also leads to the degradation of soil due to uprooting of plants and over-grazing.

d. Noise pollution

Noise can be simply defined as "unwanted sound". It is generally higher in urban and industrial areas than in rural areas. Workers



Fig. 5.5 Noise pollution (a)

using heavy machinery are exposed to high noise levels for long period of work hours everyday. Intensity of sound is measured in a unit called decibel or dB. The lowest intensity of sound that human ear can hear is 10 dB.



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Sources of Noise Pollution

Look at the figure , some sources of noise pollution is seen there . observe these sources.



Fig. 5.5 Noise pollution (b)

Effects of noise pollution

Few harmful effect of noise pollution are mention in the figure,



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Insomnia / lack of sleep

Aggression

Some times may cause coronary heart disease deaths.

Annoyance and Irritation

Increased mental stress and frustration

Psychological effects

Loss of hearing

Interference with communication

Hypertension / High blood pressure

Fig. 5.6 Effects of Noise pollution

e. Radiation Pollution

Radiation is a form of energy travelling through space. Radiation pollution is the increase in over the natural back ground radiation. There are many sources of radiation pollution such as

- o nuclear wastes from nuclear plants
- o mining and processing of nuclear material

the worse case of nuclear pollution was the Chernobyl disaster in Russia occurred in 1986 but the effects still longer today.



INTEXT QUESTIONS 5.1

1. Define pollution.
2. Name different types of Pollution.
3. Name any two sources of water pollution.

5.2 TRADITIONAL TECHNIQUES (ANCIENT INDIAN COMMON PRACTICES) FOR PURIFYING ENVIRONMENT

Emphasis was given to respect for natures and concept of environment harmony. Vedas, Puranas and great epics also learnt to respect tress and rivers, kindness to birds and animals and reverence for the presence of divinity in nature.

Atrharva veda instructs 'Apo Vata Ashadhayah' means air and water are sacred and like natural medicines and so it is very important to keep clean and pure.

Another hymns of Rigveda says - if the forests/plants are destroyed, it will adversely affect the clean air and also the mineral wealth as trees and plants are also the saviors of the precious



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wealth contained inside the earth. Other religions too enshrine respect for nature and environmental protection (plants and trees), sunlight, morning atmosphere etc are referred as purifiers of environment.

I. Control of Air pollution

The Vedas also mention about the ozone layer as earth is surrounded by a membrane which is very thick. the function of this layer is to protect earth from harmful rays or radiations.

Yagya (yajna) is a scientific process of sublimation and transformation of healthy constituents of plants/herbal medicines into vapor phase and their expansion and dissipation in the surrounding air. It also helps in maintaining balance of oxygen, carbon-dioxide and reducing the harmful growth of poisonous and ozone layer depleting gases and radiations etc.

Yagya (yajna) is also the source of shower of water and air purifying and vital elements from the upper layer of earth's atmosphere and space beyond. Fire ritual of yagya has power to remove all the faults, impurities and pollution and purifies everything around. It is also most effective eco-friendly methods of removing harmful germs, bacteria and other carriers of infections and diseases.

It is mentioned in yajurveda, yagya best means of purification of environment, maintenance of ecological balance and healthy and happy survival and all round well beings of all living beings and plants and trees.

II. Control of water Pollution

Water is a powerful medium of purification and also source of energy. A narration in Manu Smriti suggests that One should not



cause urine, stool and cough in water. Anything which is mixed with these unclean objects, food and poison, should not be thrown into water. It means we should not pollute our water resources.

Vedic period people took precautions to use water free from all sorts of impurities and that great care was taken for an adequate supply of unpolluted water. They must have had a plentiful supply of water for drinking, cooking, washing and other purposes. People of ancient and medieval India put great efforts to test and analyse different types of water collected in different places and in different seasons.

Susruta has explained the six types of pollutants and has given the ill-effects caused by consuming or using water with these doshas. He has prescribed a few substances like clearing nuts, gomedaka, lotus-bulbs, moss, pearls, thick cloth etc, with which impurities including suspended ones can be removed from water.

Boiling, making sunlight fall on the water, adding fragrance by dropping flowers in the water, dropping red hot iron balls, sand, lump of mud(alum) in the water and allowing it to clear are some methods prescribed for purification of water.

Water heated by the sun's rays is considered to be very good like gangam water, when heated by the sun, the bacteria etc. are destroyed and when cooled in night, water becomes soft and light.

If the water gets polluted and becomes pungent, bitter, tasteless, saline or malodorous, it is advised that arjuns, musta, ustra, nagakesara, koshalaka, amalaka together with ketakaphala should be thrown in the water. This will make the foul water transparent, tasteful and fragrant and in addition will confer on it many other good qualities



Notes

A lump of earth (alum), well-mixed with phana, mustaka, ela, ustra and chandana should be baked well in the fire of khadira and then dropped in water,

Water should be brought in containers made of coconut shells or in earthen or copper pots. Water from the containers should be poured out through tubes. The containers may be wrapped in wet cloths or kept on clean sand to maintain the coolness of water.



INTEXT QUESTIONS 5.2

1. How many Pollutants observed by Susruta in water?
2. What is the best way to purify atmospheres in Vedic period

5.3 TRADITIONAL PRACTICES TO USE WASTE MATERIAL IN DOMESTIC NEEDS

Earth, water, fire, air ether mind and false ego all together these eight constitute my separated material energies.

BHAGVAD GITA 74

Do not disturb the sky and do not pollute the atmosphere.

YAJUR VEDA 5:43

Ancient India civilization always believed to live in harmony with nature and traditionally toned hygienic environment as described in Vedas, Upnishads, Smiritis and Dharamstras. Worshipping nature as deity and recognizing earth as mother as they are the basic necessities of human kind to exist on earth shows a kind of conservation ethics. From our ancient literatures and kautila's Arthshastra, it was mentioned that maintaining sanitation of habitat was essential and inevitable. In the vedic



period, India was rural and pastoral and even Rigveda there is no mention urban life.

Later on some examples are seen in Mohenjo-Daro and Harappa. The sanitization and waste management techniques spread through trade route around India. Drainage systems are considered as a corner stone of urbanism development in the history of India.

Recent excavations at Harappa have shown to have flushed toilets in almost every house and were linked to the respective city's central drainage network and the solid waste was discharged into a rectangular jar soak pit for collection .

The waste management techniques used in ancient India were successful enough to recycle the household wastage. Burning of wood or coal was used for cooking purpose and the carbon was decomposed underground.

Used to consume freshly prepared food so no packaging was done to pollute the environment.

Villagers dug a small hole in the backyard to collect daily household waste and covered it with mud/sand till pit got levelled. After a few months, this land was used in the farms as compost.

Some big holes were made near a big tree and the waste was collected in it. The waste contents were mixed with the mud during watering of the tree and were slowly converted into compost. Returning of food waste to soil was a common practice since vedic times, sustainably recycling nutrients and micronutrients.

The real problem of waste started through the invention of plastic in the name of modernization.



Notes

The most favoured waste management is prevention and the least favoured is disposal of waste by storing or burying waste. Reuse and recycling of waste material is an effective way of reducing air pollution. Segregation of waste, pre-treatment at source, sterilization of rooms will help in checking indoor pollution. Disposal of waste should be done in a scientific way.

Let the 4 R's of conservation - Reduce, Reuse, Repair and Recycle be our guiding principles for reducing waste generation.

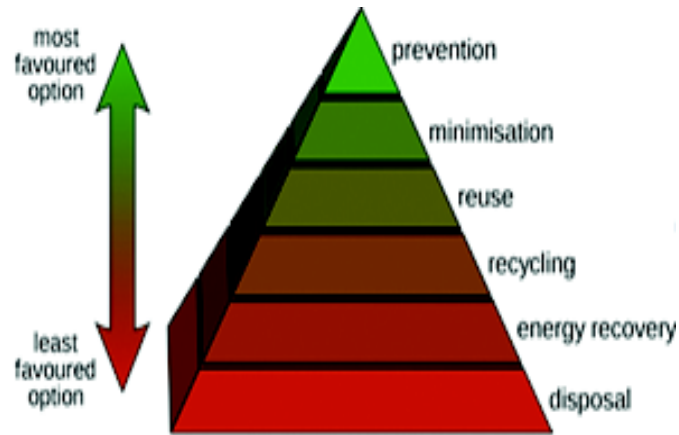


Fig. 5.7 Four R's



INTEXT QUESTIONS 5.3

1. First drainage system was found in India during-----
2. Write Full forms of 4R's



WHAT HAVE YOU LEARNT

- Vedic scriptures also mentioned the occurrence of environmental pollution including air, water and soil pollution because of artificial equipments, machines and toxic 'unnatural substances.



- The presence of unwanted substances in a concentration which can have an adverse effect on organisms and environment is called pollution.
- All human activities from cooking at home to the working of highly mechanized industries contribute to air pollution.\
- Water pollution is the contamination of water bodies like lakes, rivers, ground water and oceans
- Soil pollution is caused by the addition of chemicals or other unwanted substances in the natural soil environment
- Arharva veda instructs 'Apo Vata Ashadhayah' means air and water are sacred and like natural medicines and so it is very important to keep clean and pure.
- Boiling, making sunlight fall on the water, adding fragrance by dropping flowers in the water, dropping red hot iron balls, sand, lump of mud(alum) in the water and allowing it to clear are some methods prescribed for purification of water.
- The waste management techniques used in ancient India were successful enough to recycle the household wastage. Burning of wood or coal was used for cooking purpose and the carbon was decomposed underground.
- Reuse and recycling of waste material is an effective way of reducing air pollution Segregation of waste, pre-treatment at source, sterilization of rooms will help in checking indoor pollution.
- Reduce, Reuse, Repair and Recycle be our guiding principles for reducing waste generation.



Notes

**TERMINAL QUESTIONS**

1. Define Pollution. Give any two examples of pollution.
2. Name the types of pollution. Mention 2 examples for each.
3. Explain any 2 traditional techniques to purify environment.
4. Suggest any one measure according to our ancient practices to purify water.

**ANSWERS TO INTEXT QUESTIONS****5.1**

1. The presence of unwanted substances in a concentration which can have an adverse effect on organisms and environment is called pollution
2. Air, water, Soil, Noise and Radiation
3. Silt, Pesticides, Heavy metals, Organic wastes, Domestic sewage, Radioactive wastes, (Any two)

5.2

1. Six(6)
2. Yagya

5.3

1. Mohenjo-Daro and Harappa
2. Reduce, Reuse, Repair and Recycle