9. Environmental Management

- Weather and climate
- Meteorology
- Solid waste management
- Disaster management

Can you recall.

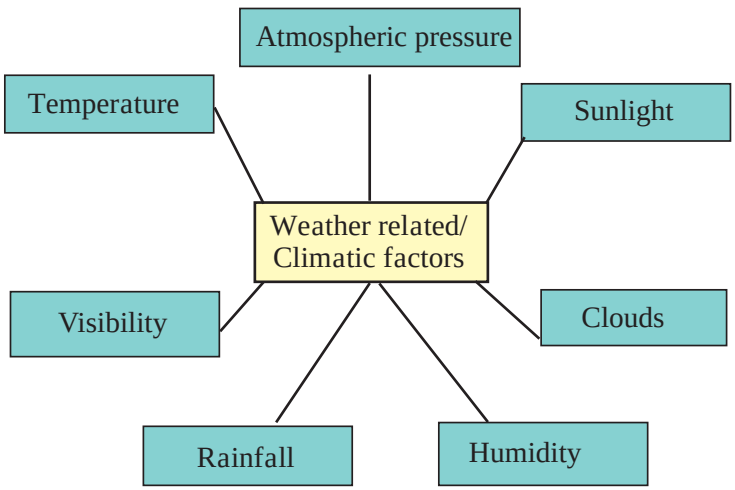
1. How does the atmosphere affect our daily life?
2. Forecasts about which weather related factors are given during the news bulletins on Doordarshan and Akashvani?

Weather and climate

Atmospheric conditions at a specific time at a particular place are referred to as weather. Atmospheric conditions depend upon a variety of factors. (Figure 9.1)

We frequently express our opinion about the weather by making statements like, 'Today, it is too cold' or 'It is very hot today.'

Weather depends upon the prevailing conditions of the air. The climate of a particular region is the average of daily readings of various weather-related parameters recorded for several years. Hence, climate is a long term predominant condition of the atmosphere.



9.1 Weather-related / climatic factors

Changes in weather

Climate does not change continuously. Climate is that which remains constant in a region for a long duration. Thus we see that weather is related to a specific location and specific time whereas climate is related to a longer duration and larger area. Changes in the weather may occur for short periods of time whereas changes in the climate take place slowly over a much long duration.

Climate plays a very important role in our day to day life. It influences our basic needs like food, clothing and shelter as well as our occupations. Climate is especially important for an agrarian country like India. Various climatic factors like direction and speed of wind, temperature, atmospheric pressure, etc. are considered during construction of runways, seaports, huge bridges and skyscrapers, etc.

Use your brain power !

Which factors are affected favourably or unfavourably by climate? What must we do to minimize this effect?

Think and discuss.

1. Human progress is related to a conducive climate and geography.
2. Human beings have designed a time schedule for their lives based upon centuries of climatic experiences.
3. Scientists find it necessary to study climate in view of its effect on agricultural production.

A special day

23rd March is observed as 'World Meteorological Day'.

Collect information about Meteorology and prepare charts to create awareness about it.

Importance of weather in the living world

1. Daily weather as also long term climatic conditions influence human lifestyle directly or indirectly. Land, water bodies, plants and animals collectively form the natural environment on earth. This environment is responsible for the development of organisms.
2. The climate of a particular region helps to determine the diet, clothing, housing, occupations and lifestyle of the people of that region. For example, the characteristic lifestyle of Kashmiri and Rajasthani people.
3. Salinity of marine water, formation of oceanic currents, water cycle, etc. are all related to various weather and climatic factors.
4. Various climatic factors bring about the weathering of rocks in the earth's crust.
5. Climate plays a very important role in the formation and enrichment of soil.
6. Microbes in the soil play an important role in formation of organic materials. This process depends upon various climatic factors.

Thus, it is very clear that the study of meteorology is very important from the view point of human life.

While ascertaining the climate of a particular region, a review of earlier studies of various aspects of climate is very important. Most countries in the world have established meteorology departments for making and recording such observations. These departments have 'observatories' which are equipped with modern instruments and technology.

If present climatic conditions are analysed with reference to the past climatic conditions, we can predict climatic changes of the future. However, as climate is the net result of a complex mixture of various atmospheric factors, forecasting it is very complicated and difficult. Forecasting is easy for places where climatic changes are slow and of a limited nature. However, where climatic changes are complex, interdependent and rapid, making forecasts is very difficult.

Meteorology

The science that studies the inter-relationships between the various components of air, natural cycles, geological movements of the earth and climate is called meteorology.

Meteorology includes the study of storms, clouds, rainfall, thunder, lightning, etc. Depending upon the study of such factors, weather forecasts are made. They are useful to common people, farmers, fisheries, aviation services, water transport and various other organizations.

Institutes at work

The World Meteorological Organization was established by the United Nations Organization on 23rd March 1950. This organization plays an important role in food security, water management, transportation and communication.

Using ICT

With the help of various search engines on the Internet, search for links giving information about the following institutes and prepare a report based upon the information obtained.

World Meteorological Organization (WMO)
Indian Institute of Tropical Meteorology (IITM)
National Oceanographic and Atmospheric Administration. (NOAA)

India Meteorological Department

The India Meteorological Department was founded by the British in 1875 at Shimla. Its head office is at Pune and its Regional Offices are at Mumbai, Kolkata, Chennai, Nagpur and Delhi. Maps are prepared every day which indicate the daily predictions about the weather. Such maps are prepared and published twice in every 24 hours. In this institute, research goes on continuously on various aspects like instruments for climatic readings, predictions about climate made using radar, predictions about climate related to siesmology, predictions regarding rainfall by satellites, air pollution, etc.

The India Meteorological Department provides important information regarding weather and climatic conditions to other departments like aviation, shipping, agriculture, irrigation, marine oil exploration and production, etc. Predictions regarding calamities like dust storms, sand storms, heavy rainfall, hot and cold waves, tsunami, etc. are communicated to various departments, all types of mass communication media and all citizens. For this purpose, India has launched several satellites equipped with highclass technology. Observatories at several locations are doing excellent work in the analysis of the information received from these satellites. (www.imdpune.gov.in)

Monsoon model and climate prediction

The tradition of forecasting the monsoon season in India is older than 100 years. After the famine of 1877, H. F. Blanford, the founder of IMD had made such a prediction for the first time taking the snowfall in the Himalayas as a parameter for this prediction. In the decade of the 1930's the then director of IMD, Sir Gilbert Walker had underlined the relationship between various worldwide climatic factors and the Indian monsoon, and, based on available observations and previous recordings related to this relationship he put forth a hypothesis regarding the nature of the monsoon. With the initiative of Dr Vasantrao Govarikar in the decade of the 1990's a monsoon model based upon 16 worldwide climatic parameters was developed. This model was in use from 1990 to 2002.

Mathematical model (Dynamic)

Forecasts are made with the help of mathematical models which take into account estimates of current weather related events and ongoing physical interactions between them. Data about current climatic parameters is mathematically analysed with the help of the Param supercomputer. Various mathematical models based upon daily geographic events are developed by supercomputer technology.

Presently, new models are being developed at the IITM. Work is in progress at two levels, namely, designing new models and developing new technology. The main focus is on development of the radar system and satellite technology.

Holistic model

In this model, predictions are based upon those parameters used in other models which have the greatest effect on the monsoon. Nowadays, predictions declared by IMD are the collective outcome of various models. This is called a holistic model.

Statistical model : In this model, current climatic observations in a region are compared with earlier parameters such as oceanic temperature, atmospheric pressure and the nature of the monsoon rainfall of several years. This data is comparatively analysed by statistical methods and predictions are made about the monsoon in the present conditions.

Always remember

Any meteorological model depends upon the inter-relationship between parameters used in that model and the results expected from it. However, as these inter-relationships with reference to the ocean and atmosphere are never constant, meteorological models need to be changed continually.

Solid waste management : need of the hour

Can you tell?

1. What is meant by pollution?
2. In which different ways do our surroundings get polluted?

Try this

Observe the garbage collected in the dustbin of your classroom and make a list of the various materials in it. Discuss with your teacher, how these materials can be properly disposed of.

Can we do the same with the garbage generated in our house? Think about it.

9.2 Solid waste

Observe and discuss.

9.3 Area with garbage vs clean area

1. What is main difference between what we see in the two pictures alongside (9.2 A and B)?
2. What should we do to permanently maintain the condition seen in picture B?

Many waste materials are generated through the various daily human activities. This is called solid waste. If these waste materials are properly disposed of, they can be a valuable source of energy. Currently, solid waste is a serious world wide problem as it causes both water and soil pollution. Solid waste is also serious problem from the point of view of economic growth, environmental degradation and health. It has posed a serious threat to nature and human habitat because of the air, water and soil pollution it causes.

Do you know?

Garbage production per day

Solid waste generated in the main metro cities of the state is approximtely as follows- Mumbai: 5000 tons, Pune: 1700 tons, Nagpur : 900 tons.

On 26th July 2005, a serious flood calamity had arisen in Mumbai. Improper solid waste management was one of the main reasons behind that calamity. Thus we see that accumulation of solid waste can lead to various calamities.

Observe

Make a survey of the building or area where you live. Categorise the garbage as degradable and non-degradable waste. Approximately, how much solid waste is generated in a week? Make a list of the factors responsible for it.

Can you tell?

1. What is meant by solid waste?
2. What are the different things included in solid waste?

We make use of many materials and articles in our daily life. They are of different kinds. Some of them are reusable but others have to be discarded. However, if they are not properly disposed of, it affects the environment adversely.

Make a list and discuss

Read the following table carefully. What do you notice?

Classification	Source
Domestic waste	Waste food, paper, plastic paper, plastic bags, vegetable waste, fruit skins, glass and sheet metal articles, etc.
Industrial waste	Chemicals, pigments, sludge, ash, metals, etc.
Hazardous waste	Chemicals generated in various industries, radioactive materials, explosives, infectious materials, etc.
Farm/Garden waste	Leaves, flowers, branches of trees, crop residues like straw, animal urine and dung, pesticides, remains of various chemicals and fertilizers, etc.
Electronic waste	Non-functional TV sets, cell phones, music systems, computers and their parts, etc.
Biomedical waste	Bandages, dressings, gloves, needles, saline bottles, medicines, medicine bottles, test tubes, body parts, blood, etc. from clinics, hospitals, blood banks and laboratories.
Urban waste	Waste generated through household industries and large commercial and industrial establishments, carry bags, glass, metal pieces and rods, threads, rubber, paper, cans from shops, vegetable and meat markets, construction waste, etc.
Radioactive waste	Radioactive materials like Strontium-10, Cerium-141, Barium-140 and heavy water, etc. generated from atomic energy plants, uranium mines, atomic research centres, nuclear weapons testing sites, etc.
Mining waste	Remains of heavy metals like lead, arsenic, cadmium, etc. from mines.

Think about it.

Into which two categories can the waste materials in the lists above be classified?

Biodegradable waste : This type of waste is easily degraded by microbes. It mainly includes kitchen waste (spoiled food, fruits, vegetables) ash, soil, dung, parts of the plants, etc. This waste is mainly of organic type and is also called '**wet solid waste**' or '**wet garbage**'. If it is carefully decomposed, we can get compost and fuel of good quality from it. Such bio-fuel projects have been started in many cities.

Non-biodegradable waste : This type of waste is not easily degraded because it requires a very long period of time and the use of various techniques. It includes plastic, metal and other similar materials. This type of waste is also called **'dry solid waste'** or **'dry garbage'**.

Use your brain power !

1. Why is it necessary to recycle non-degradable waste?
2. Which materials are included in solid dry waste?

Make a list of various waste materials and articles in your area and prepare a chart as follows

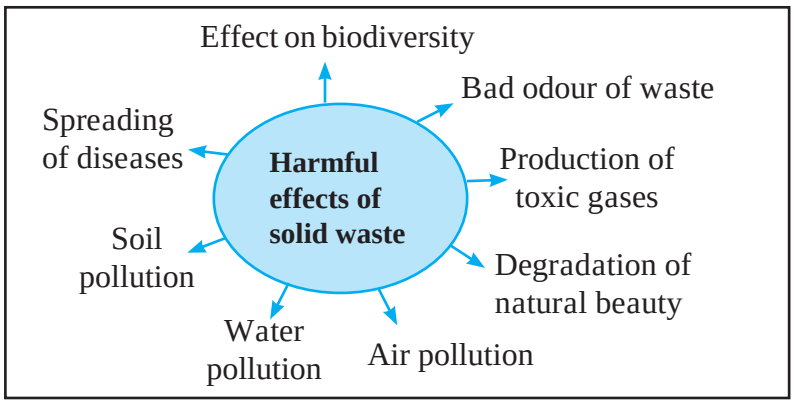
Material	Degradable (Organic)	Non-degradable (Inorganic)	Recycling	Reuse	Toxic
Plastic bottle	No	Yes	Yes	Yes	Yes

Find out

Nowadays, an electronic device – the cell phone – is very popular. From a mobile shop near your house, find out how they dispose of old and broken down cell phones.

Using ICT

Carefully observe figure 9.4 alongside. Based on it, send an e-mail to your friend explaining the importance of solid waste management.

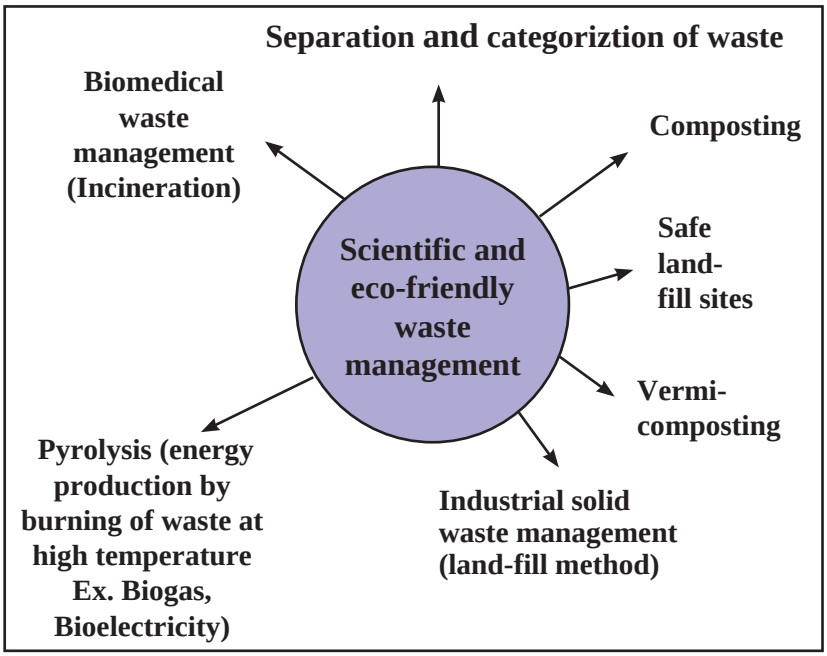


9.4 Harmful effects of solid waste

Necessity of solid waste management :

1. For preventing environmental pollution and to keep the surroundings clean.
2. For energy as well as fertilizer production and through that to generate work and employment opportunities.
3. To reduce the strain on natural resources through treatment of solid waste.
4. To improve the health and quality of life and to maintain environmental balance.

It is the need of the hour to implement solid waste management practices to avoid the possible problems due to solid waste generated from urban and industrial areas and to maintain a clean environment. For this purpose, we should implement measures like increasing the efficiency of production processes so that minimum waste will be generated, reducing garbage production by recycling and reuse of waste materials.



9.5 Solid waste management

7 Principles of solid waste management -

Reuse

After use materials should be reused for some other proper purposes.

Refuse

Refusal to use articles made from non-degradable articles like plastic and thermocol.

Recycle

Production of useful articles by recycling solid wastes. For example, paper and glass can be recycled.

Rethink

Rethinking our habits, activities and their consequences in connection with the use of various articles of daily use.

Reduce

Restriction on the use of resources to avoid their wastage. Old materials should be reused. One thing should be shared by many. Use and throw type of objects should be avoided.

Research

Conducting research related to reuse of materials that are temporarily out of use.

Regulation and public awareness

Following the laws and rules related to waste management and motivating others to do the same.

Think about it.

Some habits are described below. Do we have those habits? If so, how does it help in waste management?

1. Following the 3 R 'mantra': Reduce (reducing the waste), Reuse (reuse of waste) and Recycle (recycling of waste).
2. Throwing plastic wrappers of chocolates, ice-creams, biscuits, etc. into dustbins. Avoiding littering.
3. Avoiding the use of plastic bags and instead using cloth bags or bags prepared from old sarees, bed-sheets, curtains, etc.
4. Using both sides of a paper for writing. Reusing greeting cards and gift papers.
5. Avoiding use of tissue paper and preferring to use ones own handkerchief.
6. Using rechargeable batteries instead of lead batteries.
7. Implementing various programmes of solid waste management and educating, encouraging the family and society in this regard.
8. Avoiding 'use and throw' type of articles like pens, canned cold drinks, tetra-packs should be strictly avoided.

America is the largest producer of electricity from solid waste. Japan has developed the projects of production of threads, paper and other useful materials from banana peelings. Find out about such projects in our region.

Find out

Which waste management processes are used in your village / town / city?

Period required for degradation of waste–

Waste Material	Period of Natural Degradation
Banana peelings	3 – 4 weeks
Cloth bags	1 month
Rags	5 months
Woollen socks	1 year
Wood	10 – 15 years
Leather shoes	40 – 50 years
Tin cans	50 – 100 years
Aluminium cans	200 – 250 years
Certain plastic bags	10 lakh years
Thermocol/styrofoam cup	Infinite duration

If the time required for degradation of the solid waste generated around us is long, it seriously affects other environmental factors. What care will you take to avoid this?

Figure 9.5 A, below shows a method of storing waste and 9.5 B, shows the use of specific dustbins as per the type of waste. Think about how such eco-friendly waste management can be achieved by following these methods in our homes, too.

A B

9.5 Methods of storing solid waste

A peep into the past.

Ever since ancient times, special attention has been given to garbage disposal. In the Greek city of Athens, in 320 BCE, a law had been enacted regarding garbage disposal. It made throwing garbage in the open an offence.

Disaster management

Can you recall?

1. Which natural calamities have you experienced? How did they affect the conditions in your surroundings?
2. How will you make a plan to be safe from calamities or to minimize the damage?

Various natural disasters like thunderbolts (lightning), floods, fire and man-made disasters like accidents, bomb explosions, chemical accidents in industries, stampedes in mass gatherings, riots, etc. occur around us from time to time. They cause large scale damage to life and property.

Can you tell?

What are the types of casualties that are seen to occur in differant types of disasters?

First aid to disaster victims :

The main objective of first aid is prevention of death, preventing deterioration of health and starting the process of rehabilitation. Hence, it is important to know about the emergency measures or first aid practices to be followed

Basic principles of first aid :

Life and Resuscitation - ABC

1. **Airway :** If the victim has difficulty breathing, the head should be held in a backward sloping position or the chin should be raised so that the respiratory passage remains open.
2. **Breathing :** If breathing has stopped, the victim should be given artificial ventilation by mouth to mouth resuscitation.
3. **Circulation :** If the victim is unconscious, then after giving mouth to mouth respiration twice, the heart should by pressed down hard by pressing the chest with both the palms. These two actions should be repeated alternately about 15 times. This is called cardio-pulmonary resuscitation (CPR). It helps to bring the circulation back to normal.

Disaster management is action implemented through proper planning, organized activitiy and co-ordination. It includes the following -

1. Prevention of losses and danger.
2. Improving tolerance.
3. Providing relief from disaster, minimising the intensity and extent of harm.
4. Preparation to face the disaster.
5. Immediate action in the disaster situation.
6. Assessment of damages and intensity of the disaster.
7. Arranging for rescue work and help.
8. Rehabilitation and rebuilding.

9.6 Artificial breathing

Bleeding : If the victim is injured and bleeding through the wound, then the wound should be covered with an antiseptic pad and pressure applied on it for 5 minutes with either thumb or palm.

Fracture and impact on vertebrae : If any bone is fractured, it is essential that the fractured part be immobilized. It can be done with the help of any available wooden rods/batons/rulers. If there is an impact on the back or vertebral column, the patient should be kept immobile on a firm stretcher.

Burns : If victims have burn injuries, it is beneficial to hold the injured part under clean and cold flowing water for at least 10 minutes.

For injuries like sprains, twisting and contusion, the 'RICE' remedy should be applied :

Rest : Allow the victim to sit in a relaxed position.

Ice : Apply an ice-pack to the injured part.

Compression : After the ice-pack treatment, the injured part should be massaged gently.

Elevate : The injured part should be kept in a raised / elevated position.

How to transport victims / patients?

Cradle method : Useful for children and under-weight victims.

Human crutch method : If one of the legs is injured, the victim should be supported with minimum load on the other leg.

Carrying on four-hand chair : This is useful when support is needed for the part below the waist.

Methods used by the fire-brigade

Carrying piggy back : Useful for carrying patients who are unconscious.

Pulling or lifting method : This is used for carrying an unconscious patient, through a short distance.

Carrying on two-hand chair : Useful for those patients who cannot use their hands but can hold their body upright.

Stretcher : In an emergency, if a conventional stretcher is not available, then a temporary stretcher can be made using bamboos, blanket, etc.

Other emergency measures: Boats are used by the civil administration to rescue people trapped in a flooded area. As an emergency measure, wooden boards, bamboo floats, air-filled rubber tube from a tyre can be used to advantage.

Find out

A fire-extinguisher is a portable appliance that can be easily carried anywhere. Various appliances are used to put out a fire. Visit the fire department in your city and collect detailed information. (For more information, refer to lesson 13.)

Exercises

1. Match the items in column 'A' with the proper ones in coloum 'B' and explain their impact on the environment.

Column 'A'	Column 'B'
1. Harmful waste	a. Glass, rubber, carry bags, etc.
2. Domestic waste	b. Chemicals, pigments, ash, etc.
3. Biomedical waste	c. Radioactive material
4. Industrial waste	d. Leftover food, vegetables, peelings of fruits.
5. Urban waste	e. Bandages, cotton, needles, etc.

76M6Q3

2. Complete the statements using the given options and justify those statements.

(Geographic favourability, climate, weather, observatory)

a. Of the abiotic factors that affect biodiversity by far the most important is ..... .

b. A description of the climatic conditions of short duration in a particular area is ..... .

c. Irrespective of the progress of human beings, we have to think about ..... .

d. Establishments where various climatic factors are recorded are called ..... .

3. Answer the following questions.

a. How is first aid provided to victims of disasters who are injured?

b. State the scientific and eco-friendly methods of waste management.

c. Explain with suitable examples, the relationship between weather forecasting and disaster management.

d. Why is e-waste harmful? Express your opinion about this.

e. How will you register your individual participation in solid waste management?

4. Write notes.

Meteorology, Climatic factors, Monsoon model, Industrial waste, Plastic waste, Principles of first aid.

5. Give examples of the importance of climate in the living world with explanations, in your own words.

6. Explain with suitable examples, the care to be taken when using the methods of transporting patients.

7. Explain the differences.

a. Weather and climate

b. Degradable and non-degradable waste

Activity :

1. Visit a nearby hospital and collect information about how waste is managed.
2. Establish a vermi compost project in your school under the guidance of your teachers.