

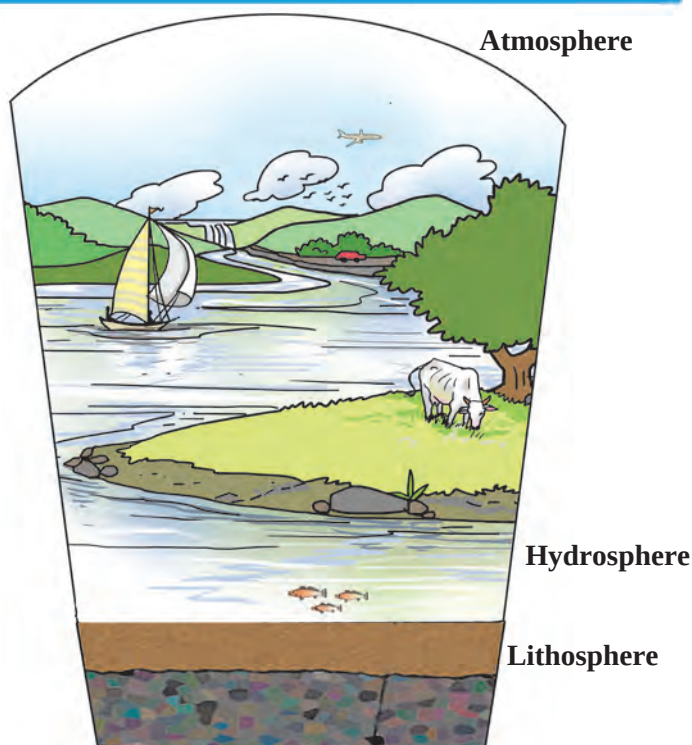
1. Natural Resources – Air, Water and Land



Observe.

Observe the picture alongside and answer the questions.

1. Where do we see the birds?
2. Where is the cow grazing?
3. Locate the trees and the road.
4. Where does the river come from? How does it flow?
5. Where is the aeroplane?
6. Where are the fish seen?
7. On what is the sailboat floating?



1.1 : Spheres of the earth

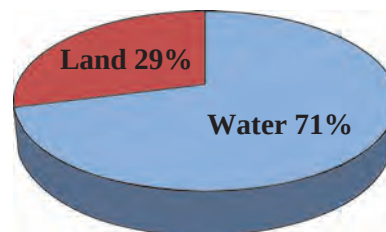
Natural resources

You can see that some things in the picture are in water, some on land, and some in the sky, that is, in the air. Thus, all things on the earth are associated with air, water and land. Air, water and land are called the earth's atmosphere, hydrosphere and lithosphere, respectively. Moreover, different living things occupy these three spheres of the earth. These living things and the parts of the lithosphere, hydrosphere and atmosphere which they occupy are together called the biosphere. These spheres have formed on the earth naturally. We have learnt all this in the previous standards.

The atmosphere is the layer of air that surrounds the earth. The surface of the earth comprises water and land, that is, the hydrosphere and lithosphere. Of these, the hydrosphere occupies a much larger part than the lithosphere. Figure 1.2 shows the proportion of land and water on the earth's surface.

We also look upon these natural components in solid, liquid and gaseous form as resources. In other words, we use them to fulfil our requirements. Let us now study all these three components in detail.

Air, water and land are the factors important for sustaining the living world on the earth and for fulfilling their basic needs. They are called natural resources.



1.2 : Proportion of land and water



Can you recall?

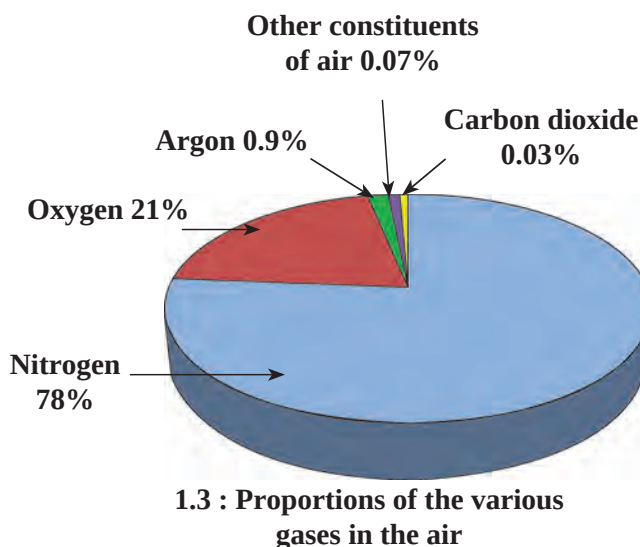
What are the five layers of the atmosphere?

Air

The air in the atmosphere around the earth contains nitrogen, oxygen, carbon dioxide, six inert gases, nitrogen dioxide, sulphur dioxide, water vapour and dust particles. The troposphere contains about 80% of the total mass of gases in the air, while this proportion is about 19% in the stratosphere. Further, in the mesosphere and ionosphere, the proportion of the mass of gases goes on decreasing. Gases are not found in the exosphere and beyond.

You can see that air is a mixture of several gases and is the chief constituent of the earth's atmosphere. Besides these gases, air also contains water vapour and dust particles. The amount of the gases in the air is the greatest near the surface and decreases as we go higher and higher from the surface. That is, air becomes rarer at higher altitudes.

The proportions of the constituents of air and some of their uses are given here.



Some uses of gases in air

- **Nitrogen** – Helps living things to build the necessary proteins. It is useful in the production of ammonia and in airtight packaging of foodstuffs.
- **Oxygen** – Necessary for respiration in living things and for combustion.
- **Carbon dioxide** – Plants use it for producing their food. Used in fire extinguishers.
- **Argon** – Used in electric bulbs.
- **Helium** – Used for obtaining low temperature and also for generating lift in airships.
- **Neon** – Used in decorative lights and for street lighting.
- **Krypton** – Used in fluorescent tubes.
- **Xenon** – Used in flash photography.



Always remember...

The living world on the earth is sustained due to the balance between various gases and other constituents of air. The atmosphere is a very important filter. It allows the light and heat of the sun to reach the earth, which is necessary for life. But it prevents the harmful elements from reaching the earth. It is in the atmosphere that fog, clouds, snow and rain are produced.



Observe and discuss.

What is the similarity in the three pictures below?



1.4 : Air pollution

All the above pictures show large scale emission of smoke through different agencies. This smoke directly mixes with the atmosphere, disturbing the balance between the constituents of air. This is called **air pollution**. Harmful gases are given out through combustion of fuels in vehicles and in big industries and also through incomplete combustion of fuels like wood and coal. As a result, air pollution is increasing day by day.

Harmful substances released in air through combustion of fuels

- Nitrogen dioxide
- Carbon dioxide
- Carbon monoxide
- Sulphur dioxide
- Soot

Ozone layer – the protective shell

There is a layer of ozone (O_3) gas in the lower part of stratosphere. Ozone gas is not directly useful for the survival of living things, yet it is very important for living things to have this layer of ozone at a high altitude around the earth. The ultra violet rays coming from the sun are very harmful for living things. The ozone gas absorbs these rays. As a result, life on earth is protected.

The ozone layer is destroyed if chemical gases like carbon tetrachloride or the chlorofluorocarbons used in air conditioners and refrigerators mix with the air.

The 16th of September is celebrated as ‘Ozone Protection Day’ all over the world to make everyone aware of the importance of ozone.



Do you know?

In metropolitan cities like Mumbai, Pune or Nagpur boards are displayed at places of heavy traffic to show the proportions of the various constituents of the air at that place. Due to these boards, we can see the amount of harmful elements in the air.



Use your brain power!

What would have happened if there were no air on the earth?

Water



Try this.

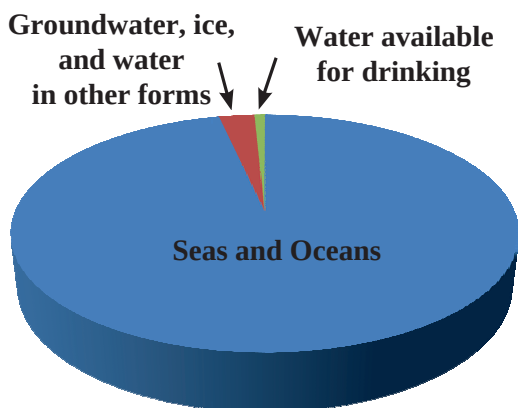
Observe how much water is used and for what purposes it is used in your house for a whole day. Record it in a chart like the one shown here. Discuss this data in the class. Divide the total amount of water used in your house by the number of persons to find out how much water each person needs.

You will see that it is almost impossible for us to spend even a single day without water. We need to drink three to four litres of water every day so that all our bodily functions run smoothly. Other living things also require water although the amount of water they need may vary according to the size of their body. Thus, we see that water is very important.

If hydrogen gas burns in air, it combines with oxygen and water is formed. We have learnt about some characteristics of water in the previous standards.



Observe and discuss.



1.5 : Distribution of water on the earth



Find out.

In what ways is the water in seas and oceans useful even though it is salty?

Purpose for which water is used	Amount of Water (approx.) in litres
- Bath	
- Brushing teeth	
- Washing clothes and utensils	
- Mopping the floor	
- Drinking	
- Cooking	
Total use of water	

In nature, water occurs in three states. Water does not have colour, taste or odour. Many substances readily dissolve in water. Therefore, water is a universal solvent.

The blood of animals and the sap in plants contain a very high proportion of water. No living thing can survive without water. Therefore it is said that 'Water is life.'

Water available on earth	Percentage
Seas, Oceans	97%
	2.7%
Water available for drinking (fresh water)	
Total	100%

We cannot use all the water on earth because seawater is salty. Some water is in the frozen state. A very small quantity of water is available for drinking. Yet it is enough for all living things.



Observe and discuss.

For which purposes is water being used?



1.6 : Uses of water on the earth

Do other living things use water like we do?

We use water in large quantities. We have learnt that water on the earth is regulated through the water cycle. The water vapour formed from oceans is the main source of water in the water cycle. It gets converted into rain, creating fresh water sources on earth.

We get water from natural sources such as streams, rivers, ponds, springs and lakes. Man also digs wells and borewells to lift ground water. Apart from this, man has also constructed bunds and dams of various sizes on rivers.

Due to the uncontrolled use of water for an increasing population, industry and farming, it is now in short supply. Water scarcity has become a serious problem.



Always remember...

1. Use water sparingly.
 2. Block water, let it percolate.
 3. Store water wherever possible.
 4. Reuse water wherever possible.
- Remember, stored water does not become stale at once.



Can you tell?

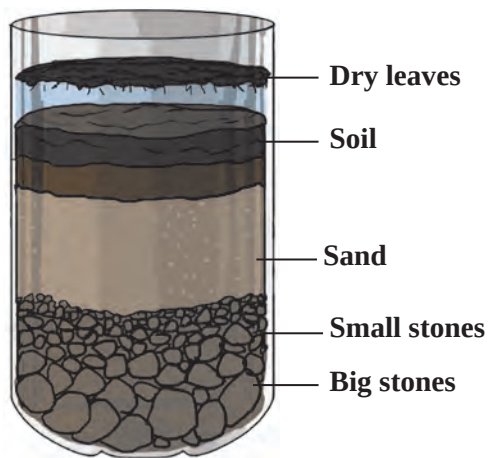
- What is land made of ?
- What do you see on land ?
- What has man created on land ?
- If a deep pit is dug in the ground, what do you find there?
- Is land flat everywhere ?
- Does man produce soil/land ?

Land

Land is seen in the form of stones, soil, big rocks. It is not flat everywhere. It is hilly in some places and flat in others. All terrestrial animals including man live on land. Some terrestrials dig burrows in the ground for shelter. This means that they use land for fulfilling their need. We also use land for farming and for building houses and roads. We make use of plants and animals in the forests that grow on land. The minerals, crude oil and natural gas obtained from the earth (land) are very important for us. It means that land is an important resource. Let us see exactly what land is made of.



Let's try this.



1.7 : Layers of the mixture in the bottle

The land on earth also looks like this. If a pipeline is being laid in your neighbourhood, observe carefully the pits dug for this purpose. You will see some layers under the land surface, as shown in the accompanying figure.

If the land has mature soil, the topmost layer is formed by the decomposition of the remains of plants and animals. This layer is called 'humus'. It is usually found in dense forests. The land below this is full of sand, soil, small stones, worms, and insects. Soil and pieces of bedrock are found below this layer of land. This soil is immature. Further below this layer the proportion of soil decreases and that of rock increases. This is the layer of bedrock. The main minerals in the soil are derived from these rocks. That is why, soil in different regions is different. The colour and texture of soil are both determined by the bedrock.

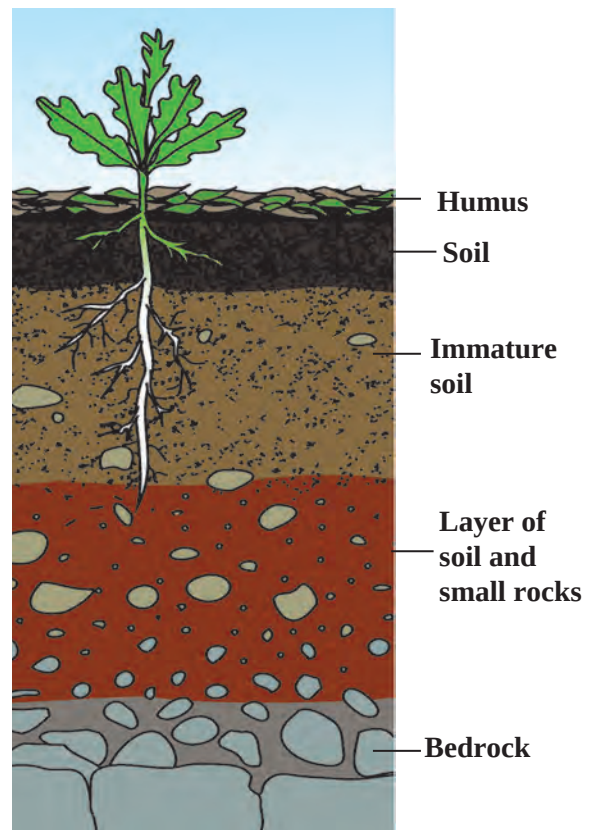
The process of soil formation

The soil on the land is formed by a natural process. The abiotic components of soil are supplied through the weathering of the bedrock. Due to the heat, cold and water of the sun, wind and rain respectively, the bedrock breaks down into pieces. Stones, sand and soil are formed from these pieces. Microbes, worms and insects are found among them. Rodents like mice and rats are also found here. The roots of trees growing on the land also help weathering of rocks. The process of soil formation is slow and continuous. It takes about a thousand years for a 2.5 cm thick layer of mature soil to form.

1. Take a transparent plastic bottle, a handful of soil, some stones, sand, some dry leaves and water.
2. Cut off the upper tapering part of bottle. Put the rest of the materials in the lower part and add water.
3. Stir the mixture thoroughly and put it aside.

Observe it the next day and answer.

- How does the mixture in the bottle look now?
- Do you see layers in it?
- What is seen in the different layers from top to bottom?



1.8 : Layers of land

Soil can get destroyed in a short period due to floods, storms and human activities such as mining. That is why, it is necessary to conserve soil and to prevent erosion of land. The best remedy for this is to increase the green cover of the land. Erosion of land is reduced if grass, trees and bushes are grown in it.



Try this.

Obtain specimens of soil from various places in your surroundings such as your own yard, a garden, hills, river banks, fields and rocky ground. Note the differences in the specimens with respect to colour, feel, texture and the size of the particles.



Do you know?

Humus is the layer formed on soil due to the decomposition of dead plants and animals by microbes. Humus supplies nutrients to the soil. Humus is also important for aerating the soil and for holding water in the soil. The proportion of humus in the upper layer of good fertile soil is about 33% to 50%.



Use your brain power!

What are the constituents of soil? Classify them as biotic and abiotic constituents.



Forests on land got buried underground due to the great upheavals that took place on the earth many ages ago. After that, the process of formation of fossil fuels from the remains of living things took place underground. We get fuels like petrol, diesel, kerosene, paraffin and other useful materials like tar and wax from the fossil fuel called crude oil.

Living things use land, water and air available on earth and so does man. However, the portions of these resources that are actually put to use are very small as compared to the whole earth. Look at the following table.

Land	29%
Potable water / fresh water	0.3%
Oxygen	21%

Even in these small proportions, the resources shown in the above table are sufficient for all living things. Only, it is very necessary for man to control his greed. In other words, he must use these resources judiciously, with the awareness that they are meant for all other living things and not just for mankind.

Institutes at work

India Meteorological Department (IMD) was established in 1875 for studying the weather in the Indian subcontinent. The main function of this institute is to observe the weather and to make weather forecasts. This institute also conducts research related to changes in weather, makes forecasts about rains and studies the developments related to global warming.



What we have learnt–

- The elements available in nature which fulfil the basic needs of living things are called natural resources.
- Air, water and land are important natural resources.
- Soil has both biotic and abiotic constituents.
- There are many constituents of air such as nitrogen, oxygen, carbon dioxide, inert gases, water vapour and dust particles.
- The ozone layer is a protective shell of the earth.
- Natural resources should be used carefully and sparingly.



1. Fill in the blanks.

- The layer of ozone gas absorbs rays that come from the sun to the earth.
- Of the total water available on the earth, fresh water forms percent.
- Both and constituents are present in the soil.

2. Why is it said that – ?

- The ozone layer is a protective shell of the earth.
- Water is life.
- Seawater is useful even though it is not potable.

3. What will happen if –

- Microbes in the soil get destroyed.
- The number of vehicles and factories in your surroundings increases.
- The total supply of potable water is finished.

4. Match the following.

Group 'A'

- Carbon dioxide
- Oxygen
- Water vapour
- Microbes

Group 'B'

- Generation of soil
- Rain
- Plants and food production
- Combustion

5. Name the following.

- Constituents of the biosphere
- Biotic constituents of soil
- Fossil fuel
- Inert gases in air
- Gases that are harmful to the ozone layer

6. True or false?

- Land and soil are the same thing.
- The water in a lake is called ground water.
- It takes about 1000 years to form a 25 cm thick layer of soil.
- Radon is used in decorative lights.

7. Answer in your own words.

- Explain with the help of a diagram how soil is formed.
- Why is there a shortage of water even though it occupies about 71% of the earth's surface?
- What are the various constituents of air? Write their uses.
- Why are air, water and land considered to be valuable natural resources?

Activity :

- Obtain detailed information about the work of the India Meteorological Department.
- Find a remedy for water scarcity.

