

# Resources

Mona and Raju were helping Amma to clean their house. “Look at all these things.... clothes, utensils, foodgrains, combs, this bottle of honey, books.....Each of these has a use,” said Mona. “That is why they are important,” said Amma. “These are resources.....”. “What is a resource?” was Raju’s question to Amma. “Anything that can be used to satisfy a need is a resource”, replied amma. “Look around you and observe, you will be able to identify many types of resources. The water you drink when you are thirsty, the electricity you use in your house, the rickshaw you use to get home from school, the textbook you use to study are all resources. Your father has prepared a tasty snack for you. The fresh vegetables he has used are also a resource”.

Water, electricity, rickshaw, vegetable and textbook have something in common. They have all been used by you, so they have **utility**. Utility or usability is what makes an object or substance a resource.

“How does something become a resource?” Raju now wanted to know. Amma told the children that things become resources only when they have a value. “Its use or utility gives it a value. All resources have some **value**.” said Amma.

**Value** means worth. Some resources have economic value, some do not. For example, metals may have an economic value, a beautiful landscape may not. But both are important and satisfy human needs.

Some resources can become economically valuable with time. Your grandmother’s home remedies have no commercial value today. But if they are patented and sold by a medical firm tomorrow, they could become economically valuable.

## Let's do

List out five resources you use in your home and five you use in your classroom.



## Glossary

**Patent:** It means the exclusive right over any idea or invention.



## Glossary

**Technology:** It is the application of latest knowledge and skill in doing or making things.



## Activity

Circle those resources from Amma's list that have no commercial value as yet.



### Amma's List

Cotton cloth
Iron ore
Intelligence
Medicinal plants
Medical knowledge
Coal deposits
Beautiful scenery
Agricultural land
Clean environment
Old folk songs
Good weather
Resourcefulness
A good singing voice
Grandmother's home remedies
Affection from friends and family

Time and technology are two important factors that can change substances into resources. Both are related to the needs of the people. People themselves are the most important resource. It is their ideas, knowledge, inventions and discoveries that lead to the creation of more resources. Each discovery or invention leads to many others. The discovery of fire led to the practice of cooking and other processes while the invention of the wheel ultimately resulted in development of newer modes of transport. The technology to create hydroelectricity has turned energy in fast flowing water into an important resource.

"So I am a resource too!"

"A very valuable one!"



## TYPES OF RESOURCES

Resources are generally classified into natural, human made and human.

### Natural Resources

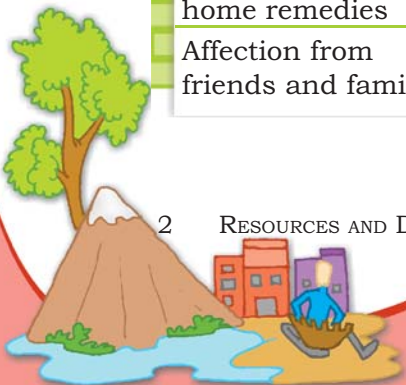
Resources that are drawn from Nature and used without much modification are called **natural resources**. The air we breathe, the water in our rivers and lakes, the soils, minerals are all natural resources. Many of these resources are free gifts of nature and can be used directly. In some cases tools and technology may be needed to use a natural resource in the best possible way.

Natural resources are classified into different groups depending upon their **level of development** and **use**; **origin**; **stock** and **distribution**.

On the basis of their development and use resources can be classified into two groups, **actual** resources and **potential** resources.

**Actual resources** are those resources whose quantity is known. These resources are being used in the present. The rich deposits of coal in Ruhr region of Germany and petroleum in the West Asia, the dark soils of the Deccan plateau in Maharashtra are all actual resources.

**Potential resources** are those whose entire quantity may not be known and these are not being used at



present. These resources could be used in the future. The level of technology we have at present may not be advanced enough to easily utilise these resources. The uranium found in Ladakh is an example of potential resource that could be used in the future. High speed winds were a potential resource two hundred years ago. Today they are an actual resource and wind farms generate energy using windmills like in Netherlands. You will find some in Nagercoil in Tamil Nadu and on the Gujarat coast.

Based on their **origin**, resources can be **abiotic** or **biotic**. Abiotic resources are non-living while biotic resources are living. Soils, rocks and minerals are abiotic but plants and animals are biotic resources.



**Fig. 1.1:** Windmills

Natural resources can be broadly categorised into **renewable** and **non-renewable** resources.

Renewable resources are those which get renewed or replenished quickly. Some of these are unlimited and are not affected by human activities, such as solar and wind energy. Yet careless use of certain renewable resources like water, soil and forest can affect their stock. Water seems to be an unlimited renewable resource. But shortage and drying up of natural water sources is a major problem in many parts of the world today.

**Non-renewable resources** are those which have a limited stock. Once the stocks are exhausted it may take thousands of years to be renewed or replenished. Since this period is much more than human life spans, such resources are considered non-renewable. Coal, petroleum and natural gas are some examples.

On the basis of their distribution resources can be **ubiquitous** or **localised**. Resources that are found everywhere like the air we breathe, are ubiquitous. But those which are found only in certain places are localised, like copper and iron ore.

The distribution of natural resources depends upon number of physical factors like terrain, climate and altitude. The distribution of resources is unequal because these factors differ so much over the earth.

#### Glossary

##### Stock of Resource

It is the amount of resources available for use.

#### Let's do

Think of a few renewable resources and mention how their stock may get affected by overuse.





### Let's do

Make a list of five human made resources that you can observe around you.



### Do you know?

Human Resource refer to the number (quantity) and abilities (mental and physical) of the people. Though, there are differing views regarding treatment of humans as a resource, one cannot deny the fact that it is the abilities of human that help in transferring the physical material into valuable resource.



## Human Made Resources

Sometimes, natural substances become resources only when their original form has been changed. Iron ore was not a resource until people learnt to extract iron from it. People use natural resources to make buildings, bridges, roads, machinery and vehicles, which are known as **human made resources**. Technology is also a human made resource.

*"So people like us use natural resources to make human made resources," said Mona nodding in understanding. "Yes," said Raju.*

## Human Resources

People can make the best use of nature to create more resources when they have the knowledge, skill and the technology to do so. That is why human beings are a special resource. **People are human resources**. Education and health help in making people a valuable resource. Improving the quality of people's skills so that they are able to create more resources is known as **human resource development**.

"Crops ruined due to drought".  
"Can I find a solution?"



that's it!



"...its all thanks to the knowledge, education and skill... we could find a solution..."



*Read and Ponder:* Humans are interdependent on each other. Farmers provide food grains for every one. Scientists suggest various means to combat problems related to agriculture and improve farm production.





## CONSERVING RESOURCES

Mona had a nightmare. She dreamt that all the water on the earth had dried up and all the trees cut down. There was no shade and nothing to eat or drink. People were suffering and roaming around desperately looking for food and shade.

She told her mother about the dream. "Amma can this really happen?" she asked.

"Yes," Amma replied. "If we are not careful then even renewable resources can become very scarce and the non-renewable ones can definitely get exhausted". "What can we do about it," Raju asked. "Lots," replied Amma.

Using resources carefully and giving them time to get renewed is called **resource conservation**. Balancing the need to use resources and also conserve them for the future is called **sustainable development**. There are many ways of conserving resources. Each person can contribute by reducing consumption, recycling and reusing thing. Ultimately it makes a difference because all our lives are linked.

That evening the children and their friends made packets and shopping bags out of old newspapers, discarded clothes and baskets from bamboo sticks. "We will give a few to every family we know," said Mona. "After all it is for a very good cause," said Mustafa, "To save our resources and to keep our earth alive".

"I am going to be very careful not to waste paper," said Jessy. "Many trees are cut down to make paper," she explained.

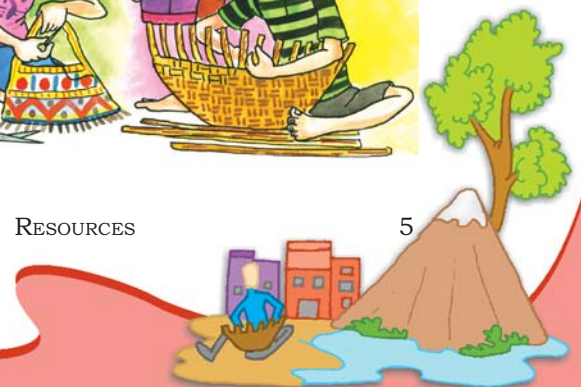
"I will see that electricity is not wasted in my house," shouted Mustafa. "Electricity comes from water and coal."



### Glossary

#### Sustainable Development

Carefully utilising resources so that besides meeting the requirements of the present, also takes care of future generations.



### Some Principles of Sustainable Development

- Respect and care for all forms of life
- Improve the quality of human life
- Conserve the earth's vitality and diversity
- Minimise the depletion of natural resources
- Change personal attitude and practices toward the environment
- Enable communities to care for their own environment.

*"I will make sure that water is not wasted at home," said Asha. "Every drop of water is precious"*

*"Together we can make a difference!" chorused the children.*

*These are some of the things Mona, Raju and their friends did. What about you? How are you going to help in conserving resources?*

The future of our planet and its people is linked with our ability to maintain and preserve the life support system that nature provides. Therefore it is our duty to ensure that.

- all uses of renewable resources are sustainable
- the diversity of life on the earth is conserved
- the damage to natural environmental system is minimised.



### Exercises

#### 1. Answer the following questions.

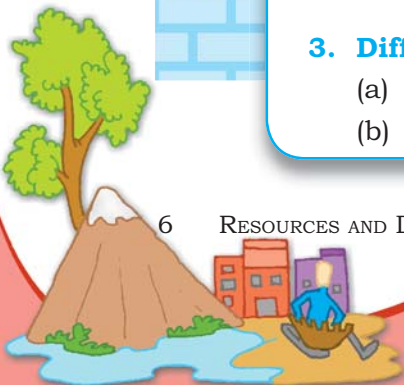
- Why are resources distributed unequally over the earth?
- What is resource conservation?
- Why are human resources important?
- What is sustainable development?

#### 2. Tick the correct answer.

- Which one of the following does NOT make substance a resource?  
(a) utility                      (b) value                      (c) quantity
- Which one of the following is a human made resource?  
(a) medicines to treat cancer  
(b) spring water  
(c) tropical forests
- Complete the statement.  
Biotic resources are  
(a) derived from living things  
(b) made by human beings  
(c) derived from non-living things

#### 3. Differentiate between the followings.

- Potential and actual resources
- Ubiquitous and localised resources



#### 4. Activity

*“Rahiman paani raakhiye,  
Bin paani sab soon.  
Paani gaye na ubere  
Moti, manus, choon...”*

[Says Rahim, keep water, as without water there is nothing. Without water pearl, swan and dough cannot exist. ]


These lines were written by the poet Abdur Rahim Khankhana, one of the nine gems of Akbar’s court. What kind of resource is the poet referring to? Write in 100 words what would happen if this resource disappeared?


#### For Fun

1. Pretend that you live in the prehistoric times on a high windy plateau. What are the uses you and your friends could put the fast winds to? Can you call the wind a resource?

Now imagine that you are living in the same place in the year 2138. Can you put the winds to any use? How? Can you explain why the wind is an important resource now?


2. Pick up a stone, a leaf, a paper straw and a twig. Think of how you can use these as resources. See the example given below and get creative!


You can use a stone... 	Use/Utility
To play <i>stapu</i>	toy
As a paper-weight	tool
To crush spices	tool
To decorate your garden/room	decoration piece
To open a bottle	tool
In a catapult	weapon

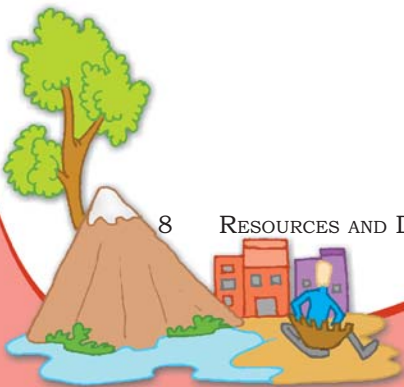
You can use a leaf... 	Use/Utility





You can use a straw... 	Use/Utility

You can use a twig... 	Use/Utility





## 2 Land, Soil, Water, Natural Vegetation and Wildlife Resources

*In a small village in Tanzania, Africa, Mamba gets up very early in the morning to fetch water. She has to walk a long way and returns after a few hours. She then helps her mother in the house and joins her brothers in taking care of their goats. All her family owns is a piece of rocky land around their small hut. Mamba's father can barely grow some maize and beans on it after toiling hard. This is not enough to feed their family for the whole year.*

*Peter lives in the heart of the sheep rearing region in New Zealand where his family runs a wool processing factory. Everyday when he returns from school, Peter watches his uncle taking care of their sheep. Their sheep yard is situated on a wide grassy plain with hills in the far distance. It is managed in a scientific way using the latest technology. Peter's family also grows vegetables through organic farming.*

Mamba and Peter stay in two different parts of the world and lead very different lives. This difference is because of the differences in the quality of land, soil, water, natural vegetation, animals and the usage of technology. The availability of such resources is the main reason places differ from each other.

### LAND

Land is among the most important natural resources. It covers only about thirty per cent of the total area of the earth's surface and all parts of this small percentage are not habitable.

The uneven distribution of population in different parts of the world is mainly due to varied characteristics of land and climate. The rugged topography, steep slopes of the mountains, low-lying areas susceptible to water

#### Let's do

Observe the land, type of soil and water availability in the region you live. Discuss in your class, how it has influenced the lifestyle of people there.



#### Do you know?

Ninety per cent of the world population occupies only thirty per cent of land area. The remaining seventy per cent of the land is either sparsely populated or uninhabited.



logging, desert areas, thick forested areas are normally sparsely populated or uninhabited. Plains and river valleys offer suitable land for agriculture. Hence, these are the densely populated areas of the world.

## LAND USE

Land is used for different purposes such as agriculture, forestry, mining, building houses, roads and setting up of



**Fig. 2.1:** Salzburg in Austria

Notice in how many ways the land has been used in the above picture.

industries. This is commonly termed as **Land use**. Can you list out the different ways in which Mamba's and Peter's family use their land?

The use of land is determined by physical factors such as topography, soil, climate, minerals and availability of water. Human factors such as population and technology are also important determinants of land use pattern.

**Table 2.1 : Land use in selected countries**

Countries	Percentage of area in			
	Cropland	Pasture	Forest	Other Use
Australia	6	<b>56</b>	14	24
Brazil	9	20	66	5
Canada	5	4	39	<b>52</b>
China	10	34	14	42
France	35	21	27	17
India	<b>57</b>	4	22	17
Japan	12	2	<b>67</b>	19
Russia	8	5	44	44
UK	29	46	10	16
USA	21	26	32	21
<b>World</b>	<b>11</b>	<b>26</b>	<b>31</b>	<b>32</b>

Study the above table and answer the following:

- Name the countries having the highest percentage of land under cropland, forest, pasture and other uses.
- How would you relate the land use patterns of these countries with the probable economic activities?

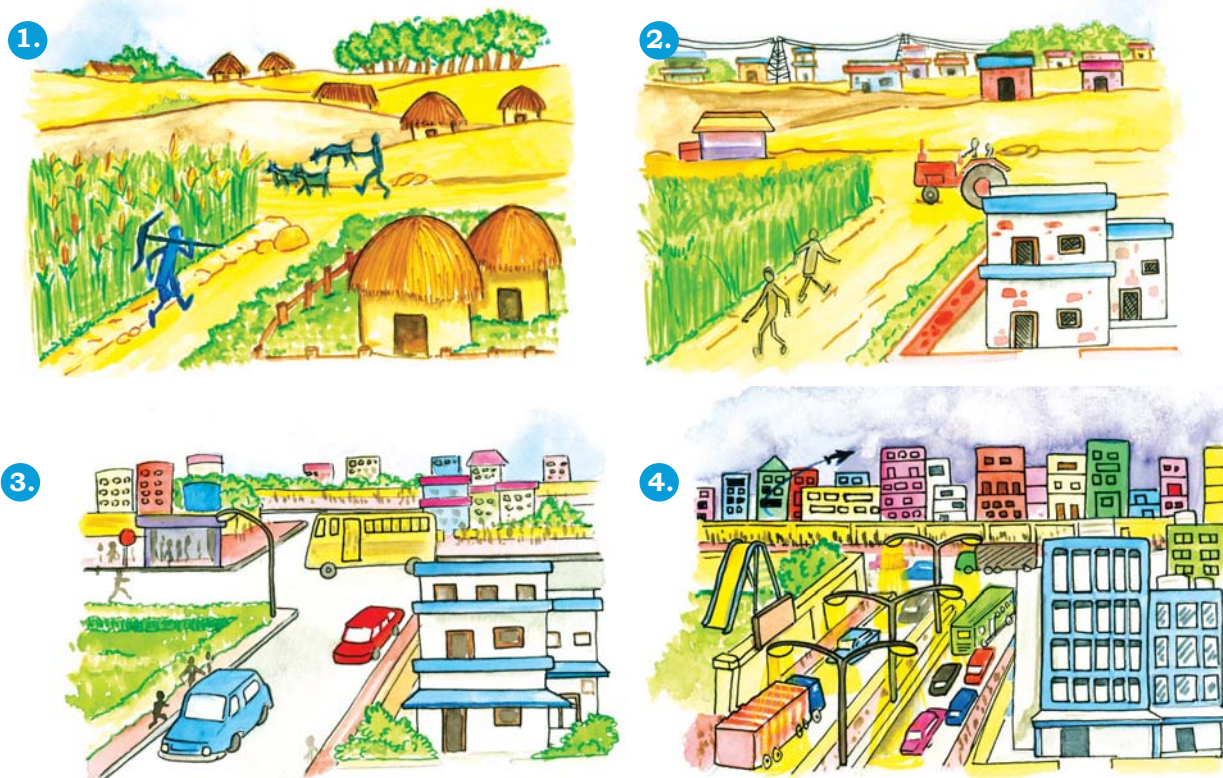


Land can also be divided on the basis of private land and community land. Private land is owned by individuals whereas, community land is owned by the community for common uses like collection of fodder, fruits, nuts or medicinal herbs. These community lands are also called **common property resources**.

People and their demands are ever growing but the availability of land is limited. The quality of land also differs from place to place. People started encroaching the common lands to build up commercial areas, housing complexes in the urban areas and to expand the agricultural land in the rural areas. Today the vast changes in the land use pattern also reflect the cultural changes in our society. Land degradation, landslides, soil erosion, desertification are the major threats to the environment because of the expansion of agriculture and constructional activities.

### Let's do

Talk to some elderly person in your family or neighbourhood and collect information about changes in the land use over years, where you live. Display your findings on a bulletin board in your classroom.



**Fig. 2.2:** Change in land use over time

## CONSERVATION OF LAND RESOURCE

Growing population and their ever growing demand has led to a large scale destruction of forest cover and arable land and has created a fear of losing this natural



resource. Therefore, the present rate of degradation of land resources must be checked. Afforestation, land reclamation, regulated use of chemical pesticide and fertilisers and checks on overgrazing are some of the common methods used to conserve land.

### Landslides

Landslides are simply defined as the mass movement of rock, debris or earth down a slope. They often take place in conjunction with earthquakes, floods and volcanoes. A prolonged spell of rainfall can cause heavy landslide that can block the flow of river for quite some time. The formation of river blocks can cause havoc to the settlements downstream on its bursting. In the hilly terrain landslides have been a major and widely spread natural disaster that often strike life and property and occupy a position of major concern.



*A Landslide*

#### A Case Study

A massive landslide hit Pangti village near Reckong Peo in Kinnaur district of Himachal Pradesh and damaged a 200-meter stretch of old Hindustan-Tibet road, National Highway - 22. This landslide was triggered by intense blasting at Pangti village. Due to the blasting this weak zone of slope collapsed and caused intense damage to the road and nearby villages. The Pangti village was completely vacated to avoid any possible loss of life.

#### Mitigation Mechanism

Advancement in scientific techniques has empowered us to understand what factors cause landslides and how to manage them. Some broad mitigation techniques of landslide are as follows:

- Hazard mapping locate areas prone to landslides. Hence, such areas can be avoided for building settlements.
- Construction of retention wall to stop land from slipping.
- Increase in the vegetation cover is an effective way to arrest landslide.
- The surface drainage control works are implemented to control the movement of landslide along with rain water and spring flows.



*Retention Wall*



## SOIL

The thin layer of grainy substance covering the surface of the earth is called soil. It is closely linked to land. Landforms determine the type of soil. Soil is made up of organic matter, minerals and weathered rocks found on the earth. This happens through the process of weathering. The right mix of minerals and organic matter make the soil fertile.

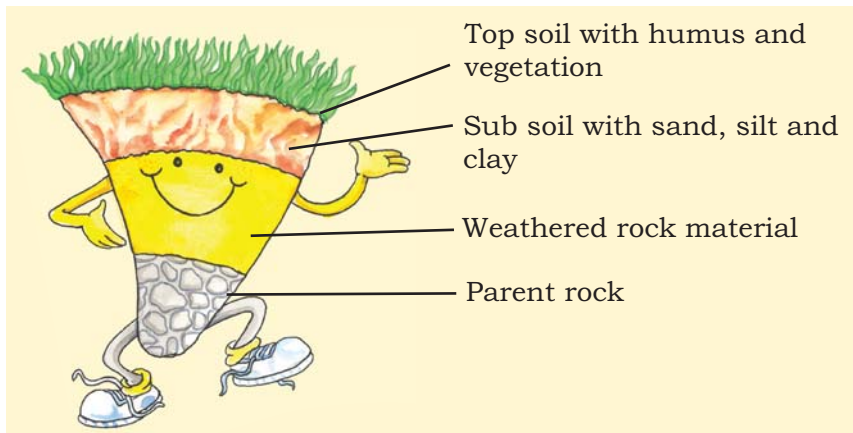


Fig. 2.3: Soil Profile

### Glossary

#### Weathering

The breaking up and decay of exposed rocks, by temperature changes, frost action, plants, animals and man.

### Do you know?

It takes hundreds of years to make just one centimetre of **soil**.

## FACTORS OF SOIL FORMATION

The major factors of **soil formation** are the nature of the parent rock and climatic factors. Other factors are the topography, role of organic material and time taken for the composition of soil formation. All these differ from place to place.

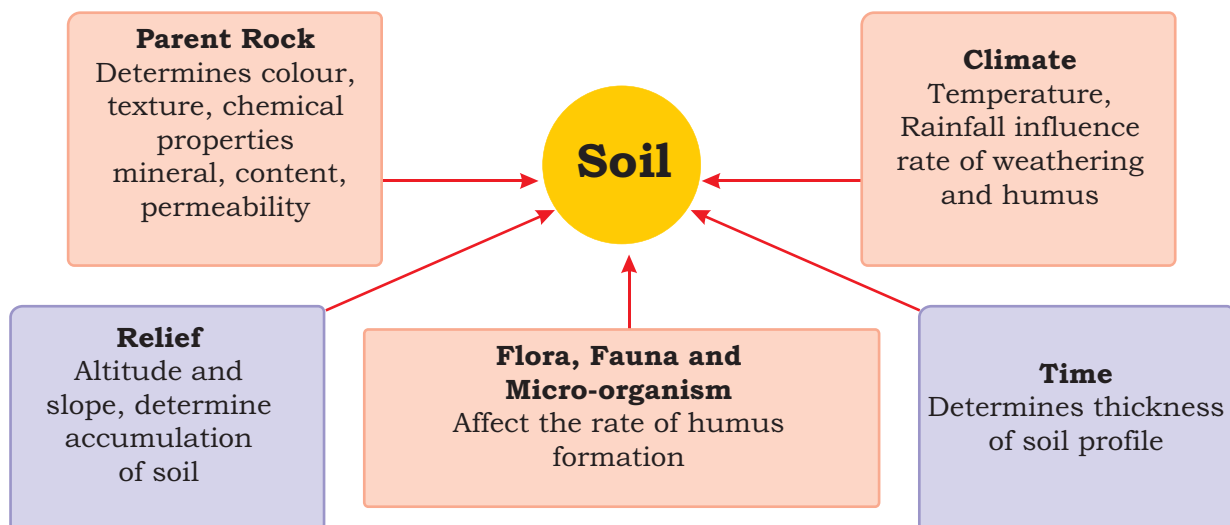
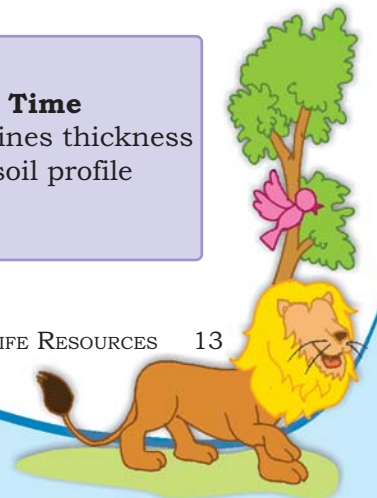


Fig. 2.4: Factors affecting soil formation





### Activity

In India soils could be alluvial, black, red, laterite, desertic and mountain soil. Collect a handful of different types of soil and observe how they are different?



## DEGRADATION OF SOIL AND CONSERVATION MEASURES

Soil erosion and depletion are the major threats to soil as a resource. Both human and natural factors can lead to degradation of soils. Factors which lead to soil degradation are deforestation, overgrazing, overuse of chemical fertilisers or pesticides, rain wash, landslides and floods.

Some methods of soil conservation are

**Mulching:** The bare ground between plants is covered with a layer of organic matter like straw. It helps to retain soil moisture.

**Contour barriers:** Stones, grass, soil are used to build barriers along contours. Trenches are made in front of the barriers to collect water.

**Rock dam:** Rocks are piled up to slow down the flow of water. This prevents gullies and further soil loss.



Fig 2.5: Terrace Farming



Fig 2.6: Contour Ploughing



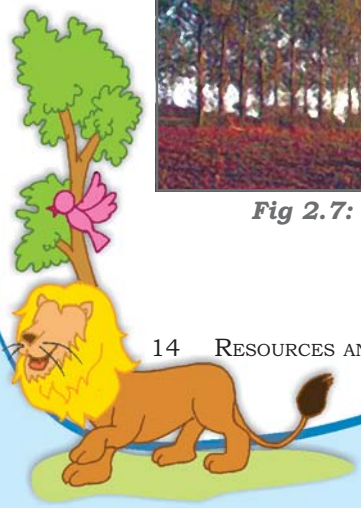
Fig 2.7: Shelter Belts

**Terrace farming:** These are made on the steep slopes so that flat surfaces are available to grow crops. They can reduce surface run-off and soil erosion (Fig. 2.5).

**Intercropping:** Different crops are grown in alternate rows and are sown at different times to protect the soil from rain wash.

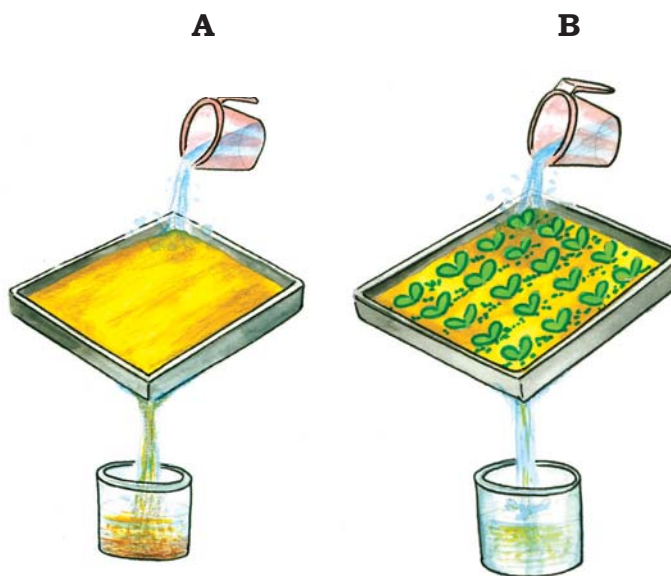
**Contour ploughing:** Ploughing parallel to the contours of a hill slope to form a natural barrier for water to flow down the slope (Fig. 2.6).

**Shelter belts:** In the coastal and dry regions, rows of trees are planted to check the wind movement to protect soil cover (Fig. 2.7).



### Activity

Take two trays A and B of same size. Make six holes in the end of these trays and then fill them with the same amount of soil. Leave the soil in tray A bare while grow grass in tray B. When the grass in tray B has grown few centimetres high, place both the trays in such a way that they are on a slope. Pour one mug of water from the same height into trays. Collect the muddy water that trickles down the holes of both trays in two separate containers and compare how much soil is washed out of each tray?



## WATER

Water is a vital renewable natural resource. Three-fourth's of the earth's surface is covered with water. It is therefore appropriately called the 'water planet'. It was in the primitive oceans that life began almost 3.5 billion years back. Even today, the oceans cover two-thirds of the earth's surface and support a rich variety of plant and animal life. The ocean water is however saline and not fit for human consumption. Fresh water accounts for only about 2.7 per cent. Nearly 70 per cent of this occurs as ice sheets and glaciers in Antarctica, Greenland and mountain regions. Due to their location they are inaccessible. Only 1 per cent of freshwater is available and fit for human use. It is found as ground water, as surface water in rivers and lakes and as water vapour in the atmosphere.

Fresh water is therefore, the most precious substance on earth. Water can neither be added nor subtracted from the earth. Its total volume remains constant. Its abundance only seems to vary because it is in constant motion, cycling through the oceans, the air, the land and back again, through the processes of evaporation, precipitation and run-off. This as you already know is referred to as the 'water cycle'.

### Do you know?

In 1975, the consumption of water for human use was 3850 cu km/year. It soared to more than 6000 cu km/year in the year 2000.



### Do you know?

A dripping tap wastes 1200 litres in a year.





Humans use huge amounts of water not only for drinking and washing but also in the process of production. Water for agriculture, industries,



generating electricity through reservoirs of dams are the other usages. Increasing population, rising demands for food and cash crops, increasing urbanisation and rising standards of living are the major factors leading to shortages in supply of fresh water either due to drying up of water sources or water pollution.

### Activity

An average urban Indian uses about 135 litres of water every day.

Use	Litres per person per day
Drinking	3
Cooking	4
Bathing	20
Flushing	40
Washing clothes	40
Washing utensils	20
Gardening	23
<b>Total</b>	<b>135</b>

Can you suggest some ways to bring down this use?

### Do you know?

Have you ever heard about a water market? Amreli city in Saurashtra region with a population of 1.25 lakhs is completely dependent on purchasing water from the nearby talukas.



## PROBLEMS OF WATER AVAILABILITY

There is scarcity of water in many regions of the world. Most of Africa, West Asia, South Asia, parts of western USA, north-west Mexico, parts of South America and entire Australia are facing shortages in fresh water supply. Countries located in climatic zones most susceptible to droughts face great problems of water scarcity. Thus, water shortage may be a consequence of variation in seasonal or annual precipitation or the scarcity is caused by over-exploitation and contamination of water sources.

## CONSERVATION OF WATER RESOURCES

Access to clean and adequate water sources is a major problem facing the world today. Steps have to be taken to conserve this dwindling resource. Even though water is a renewable resource, its overuse and pollution make it unfit for use. Discharge of untreated or partially treated sewage, agricultural chemicals and industrial effluents in water bodies are major contaminants. They pollute water with nitrates, metals and pesticides.



**Fig 2.8:** Yamuna is getting polluted due to sewage, industrial effluents and garbage





Most of these chemicals being non-biodegradable reach human bodies through water. Water pollution can be controlled by treating these effluents suitably before releasing them in water bodies.

Forest and other vegetation cover slow the surface runoff and replenish underground water. Water harvesting is another method to save surface runoff. Water is used for irrigating fields. The canals should be properly lined to minimise losses by water seepage. Sprinklers effectively irrigate the area by checking water losses through seepage and evaporation. In dry regions with high rates of evaporation, drip or trickle irrigation is very useful. The valuable water resource can therefore be conserved by adopting these means of conservation.



**Fig 2.9:** A Water Sprinkler

## NATURAL VEGETATION AND WILDLIFE

*Some school children were visiting an exhibition on handicrafts. The articles in the exhibition were collected from different parts of the country. Mona picked up a bag and exclaimed, "This is a beautiful handbag!" "Yes, it is made from Jute," the teacher said. "Do you see those baskets, lamp shades and chairs? Those are made of canes and bamboos. In the eastern and north eastern humid regions of India, bamboo grows in plenty." Jassy was excited to see a silk scarf. "See this beautiful scarf". The teacher explained that silk is obtained from silk worms that are bred on Mulberry trees. The children understood that plants provide us with many different products that we use in our day-to-day life.*

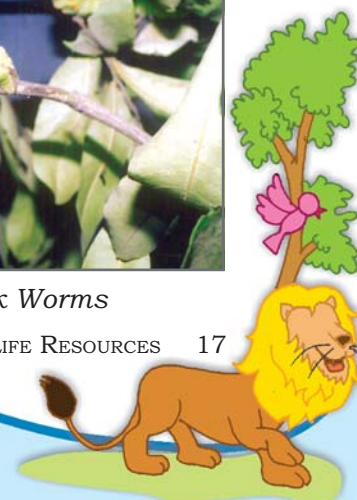
Natural vegetation and wildlife exist only in the narrow zone of contact between the lithosphere, hydrosphere and atmosphere that we call **biosphere**. In the biosphere living beings are inter-related and interdependent on each other for survival. This life supporting system is known as the **ecosystem**. Vegetation and wildlife are valuable resources. Plants provide us with timber, give shelter to animals, produce oxygen we breathe, protects soils so essential for growing crops, act as shelter belts, help in

### Do you know?

Rain water harvesting is the process of collecting rain water from roof tops and directing it to an appropriate location and storing it for future use. On an average, one spell of rain for two hours is enough to save 8,000 litres of water.



**Fig 2.10:** Silk Worms



### Do you know?

Vultures in the Indian subcontinent were dying of kidney failure shortly after scavenging livestock treated with diclofenac, a painkiller that is similar to aspirin or ibuprofen. Efforts are on to ban the drug for livestock use and breed vultures in captivity.



storage of underground water, give us fruits, nuts, latex, turpentine oil, gum, medicinal plants and also the paper that is so essential for your studies. There are innumerable uses of plants and you can add some more.

Wildlife includes animals, birds, insects as well as the aquatic life forms. They provide us milk, meat, hides and wool. Insects like bees provide us honey, help in pollination of flowers and have an important role to play as decomposers in the ecosystem. The birds feed on insects and act as decomposers as well. Vulture due to its ability to feed on dead livestock is a scavenger and considered a vital cleanser of the environment. So animals big or small, all are integral to maintaining balance in the ecosystem.



**Fig 2.11:** *Brahma Kamal*  
a Medicinal Herb



**Fig 2.12:** A Blue Kingfisher

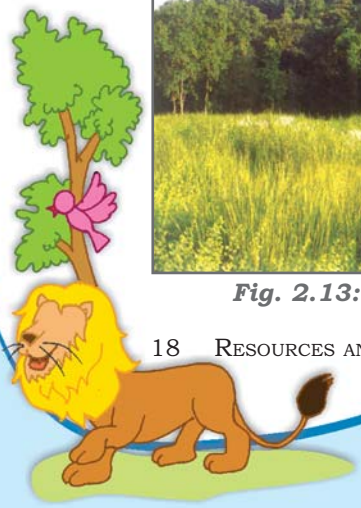
## DISTRIBUTION OF NATURAL VEGETATION

The growth of vegetation depends primarily on temperature and moisture. The major vegetation types of the world are grouped as forests, grasslands, scrubs and tundra.

In areas of heavy rainfall, huge trees may thrive. The forests are thus associated with areas having abundant water supply. As the amount of moisture decreases the size of trees and their density reduces. In the regions of moderate rainfall short stunted trees and grasses grow forming the grasslands of the world. In dry areas of low rainfall, thorny shrubs and scrubs grow. In such areas plants have deep roots and



**Fig. 2.13:** Grassland and Forest





leaves have thorny and waxy surface to reduce loss of moisture by transpiration. Tundra vegetation of cold Polar Regions comprise of mosses and lichens.

Forests are broadly classified as **evergreen** and **deciduous** depending on when they shed their leaves. Evergreen forests do not shed their leaves simultaneously in any season of the year. Deciduous forests shed their leaves in a particular season to conserve loss of moisture through transpiration. These forests are further classified as tropical or temperate based on their location in different latitudes. You have learnt in detail about the various forest types, their distribution and the associated animal life in the previous class.

Today there are many more people in the world than there were two centuries back. To feed the growing numbers, large areas of forests have been cleared to grow crops. Forest cover all over the world is vanishing rapidly. There is an urgent need to conserve this valuable resource.



**Fig. 2.14:** A Python in a forest



**Fig. 2.15:** A collage of a forest made by school students

## CONSERVATION OF NATURAL VEGETATION AND WILDLIFE

Forests are our wealth. Plants give shelter to the animals and together they maintain the ecosystem. Changes of climate and human interferences can cause the loss of natural habitats for the plants and animals. Many species have become vulnerable or endangered and some are on the verge of extinction. Deforestation, soil erosion, constructional activities, forest fires, tsunami and landslides are some of the human made and natural factors which



**Fig. 2.16:** Loss of rainforest in Great Nicobar after Tsunami







**Fig. 2.17:** Black buck also needs protection

together accelerate the process of extinction of these great natural resources. One of the major concerns is the increasing incidents of poaching that result in a sharp decline in the number of particular species. The animals are poached for collection and illegal trade of hides, skins, nails, teeth, horns as well as feathers. Some of these animals are tiger, lion, elephant, deer, black buck, crocodile, rhinoceros, snow leopard, ostrich and peacock. These can be conserved by increasing awareness.

### Forest Fire

The collage features several news articles and images related to forest fires. Key headlines include:
 

- As California fires rage for fourth day, hopes rest on winds easing**: A large article with a photo of firefighters battling a fire.
- Forest fires kill 41 in Greece**: A smaller article with a photo of a fire.
- 500,000 flee California fires**: An article about mass evacuations.
- California wildfires spread, nearly a million told to flee**: A large article with a photo of a fire and a headline about 200 homes burned.
- California wildfires spread, nearly a million told to flee**: Another headline about 200 homes burned.
- Kid with matches started massive US fire**: An article about a boy starting a fire with matches.
- Did global warming fan the wildfire?**: An article with a 'CLIMATE WATCH' graphic.
- High-tech firefighter**: A diagram showing a firefighting plane with various sensors and equipment.

### Activity

Read the news item and find out how fire started in California ? Could it be avoided?

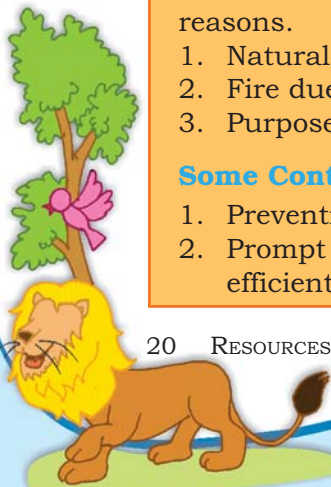
### Know More

Forest fire is a threat to entire region of fauna and flora. It occurs mainly due to three reasons.

1. Natural fire due to lightening etc.
2. Fire due to heat generated in the litter due to carelessness of people.
3. Purposely caused fire by local inhabitants.

### Some Control Measures

1. Prevention of human-caused fires through education.
2. Prompt detection of fires through well co-ordinated network of observation points, efficient ground patrolling and communication network.



National parks, wildlife sanctuaries, biosphere reserves are made to protect our natural vegetation and wildlife. Conservation of creeks, lakes, and wetlands is necessary to save the precious resource from depletion.

There is a balance in the environment if the relative number of species is not disturbed. Human activities in several parts of the world have disturbed the natural habitats of many species. Due to indiscriminate killings, several birds and animals have either become extinct or are on the verge of extinction.

Awareness programmes like social forestry and *Vanamohatasava* should be encouraged at the regional and community level. School children should be encouraged for bird watching and visiting nature camps so that they appreciate the habitat of varied species.

Many countries have passed laws declaring that the trades as well as killing of birds and animals are illegal. In India, killing of lions, tigers, deers, great Indian bustards and peacocks have been banned.

An international convention CITES has been established that lists several species of animals

and birds in which trade is prohibited. Conservation of plants and animals is an ethical duty of every citizen.



**Fig. 2:19:** Elephant herd in Kaziranga National Park



**Fig. 2:18:** Herd of Cheetals

### Glossary

#### National Park

A natural area designated to protect the ecological integrity of one or more ecosystems for present and future generations

### Glossary

#### Biosphere reserves

Series of protected areas linked through a global network, intended to demonstrate the relationship between conservation and development.

### Do you know?

CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora) is an international agreement between governments. It aims to ensure that international trade in specimens of wild animals and plants does not threaten their survival. Roughly 5,000 species of animals and 28,000 species of plants are protected. Bears, dolphins, cacti, corals, orchids and aloes are some examples.







## Exercises

### 1. Answer the following questions.

- (i) Which are the two main climatic factors responsible for soil formation?
- (ii) Write any two reasons for land degradation today.
- (iii) Why is land considered an important resource?
- (iv) Name any two steps that government has taken to conserve plants and animals.
- (v) Suggest three ways to conserve water.

### 2. Tick the correct answer.

- (i) Which one of the following is NOT a factor of soil formation?  
(a) time                      (b) soil texture                      (c) organic matter
- (ii) Which one of the following methods is most appropriate to check soil erosion on steep slopes?  
(a) shelter belts                      (b) mulching                      (c) terrace cultivation
- (iii) Which one of the following is NOT in favour of the conservation of nature?  
(a) switch off the bulb when not in use  
(b) close the tap immediately after using  
(c) dispose polypacks after shopping

### 3. Match the followings.

- |                  |  |
|------------------|--|
| (i) Land use     | (a) prevent soil erosion                 |
| (ii) Humus       | (b) land suitable for agriculture        |
| (iii) Rock dams  | (c) productive use of land               |
| (iv) Arable land | (d) organic matter deposited on top soil |
|                  | (e) contour ploughing                    |

### 4. State whether the given statement is true or false. If true, write the reasons.

- (i) Ganga-Brahmaputra plain of India is an overpopulated region.
- (ii) Water availability per person in India is declining.
- (iii) Rows of trees planted in the coastal areas to check the wind movement is called intercropping.
- (iv) Human interference and changes of climate can maintain the ecosystem.

### 5. Activity

Discuss some more reasons which are responsible for changes of land use pattern. Has your place undergone any change in the land use pattern?

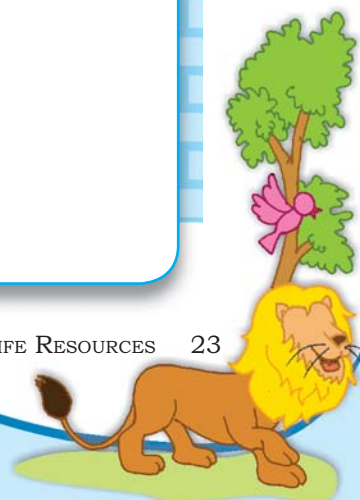




Find out from your parents and elderly people. You can conduct an interview by asking the following questions.

Place	When your grand parent's were in their 30's	When your parents were in their 30's	Why do you think this is happening?	Are common areas and open spaces disappearing?
<b>Rural</b>				
Number of cattle and poultry owned				
Number of trees and ponds in the village				
Main occupation of the head of the family				
<b>Urban</b>				
Number of cars owned				
Number of rooms in the house				
Number of metalled roads				
Number of flyovers in the city				
Number of parks and playgrounds				

Based on the table you have just completed, draw a picture of land use patterns that you foresee in your neighbourhood after 20 years. Why do you think that land use patterns change over the years?



## Mineral and Power Resources



**Fig. 3.1:** Uploading of a truck in a coal mine

Kiri is visiting Sukant in his native place near Dhanbad. Kiri is amazed to see that large areas were black. “Sukant, why is this place so black and dusty?” “This is because of the coal mines nearby. Do you see the trucks? They are carrying the mineral coal”.

“What are minerals?,” asks Kiri. Sukant says, “Have you ever seen a baker baking biscuits? The flour, milk, sugar and sometimes eggs are mixed together. While eating the baked biscuits can you

see these ingredients separately? Just as in the biscuits, there are a number of things that you cannot see, rocks on this earth have several materials called minerals mixed in them. These minerals are scattered throughout the earth’s rocky crust”.

A naturally occurring substance that has a definite chemical composition is a **mineral**. Minerals are not evenly distributed over space. They are concentrated in a particular area or rock formations. Some minerals are found in areas which are not easily accessible such as the Arctic ocean bed and Antarctica.

Minerals are formed in different types of geological environments, under varying conditions. They are created by natural processes without any human interference. They can be identified on the basis of their physical properties such as colour, density, hardness and chemical property such as solubility.

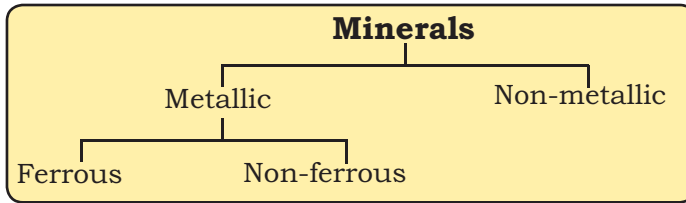
### Do you know?

The salt in your food and graphite in your pencil are also minerals.



## TYPES OF MINERALS

There are over three thousand different minerals. On the basis of composition, minerals are classified mainly as metallic and non-metallic minerals (Fig. 3.2).

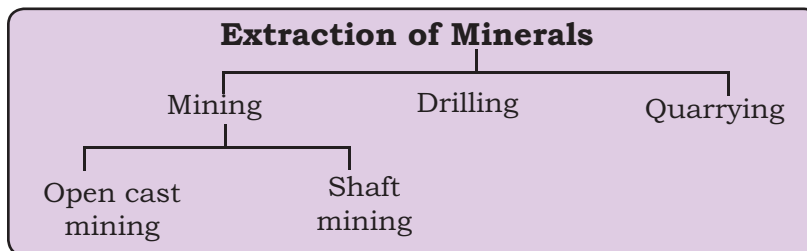


**Fig. 3.2:** Classification of Minerals

The **metallic** minerals contain metal in raw form. Metals are hard substances that conduct heat and electricity and have a characteristic lustre or shine. Iron ore, bauxite, manganese ore are some examples. Metallic minerals may be ferrous or non-ferrous. **Ferrous** minerals like iron ore, manganese and chromites contain iron. A **non-ferrous** mineral does not contain iron but may contain some other metal such as gold, silver, copper or lead.

The **non-metallic** minerals do not contain metals. Limestone, mica and gypsum are examples of such minerals. The mineral fuels like coal and petroleum are also non-metallic minerals.

Minerals can be extracted by mining, drilling or quarrying (Fig 3.3).



**Fig. 3.3:** Extraction of Minerals

The process of taking out minerals from rocks buried under the earth's surface is called **mining**. Minerals that lie at shallow depths are taken out by removing the surface layer; this is known as **open-cast mining**. Deep bores, called **shafts**, have to be made to reach mineral deposits that lie at great depths. This is called **shaft mining**. Petroleum and natural gas occur far below the earth's surface. Deep wells are bored to take them out, this is called **drilling** (Fig 3.4). Minerals that lie near the surface are simply dug out, by the process known as **quarrying**.

### Do you know?

A **rock** is an aggregate of one or more minerals but without definite composition of constituent of mineral. Rocks from which minerals are mined are known as **ores**. Although more than 2,800 types of minerals have been identified, only about 100 are considered **ore** minerals. Thus one can easily notice that all minerals are rocks but all rocks are not minerals.



**Fig. 3.4:** Off shore drilling of oil





### Do you know?

You can always tell if a rock contains copper because then the rock looks blue in colour.



## DISTRIBUTION OF MINERALS

Minerals occur in different types of rocks. Some are found in igneous rocks, some in metamorphic rocks while others occur in sedimentary rocks. Generally, metallic minerals are found in igneous and metamorphic rock formations that form large plateaus. Iron-ore in north Sweden, copper and nickel deposits in Ontario, Canada, iron, nickel, chromites and platinum in South Africa are examples of minerals found in igneous and metamorphic rocks. Sedimentary rock formations of plains and young fold mountains contain non-metallic minerals like limestone. Limestone deposits of Caucasus region of France, manganese deposits of Georgia and Ukraine and phosphate beds of Algeria are some examples. Mineral fuels such as coal and petroleum are also found in the sedimentary strata.

## ASIA

China and India have large iron ore deposits. The continent produces more than half of the world's tin.

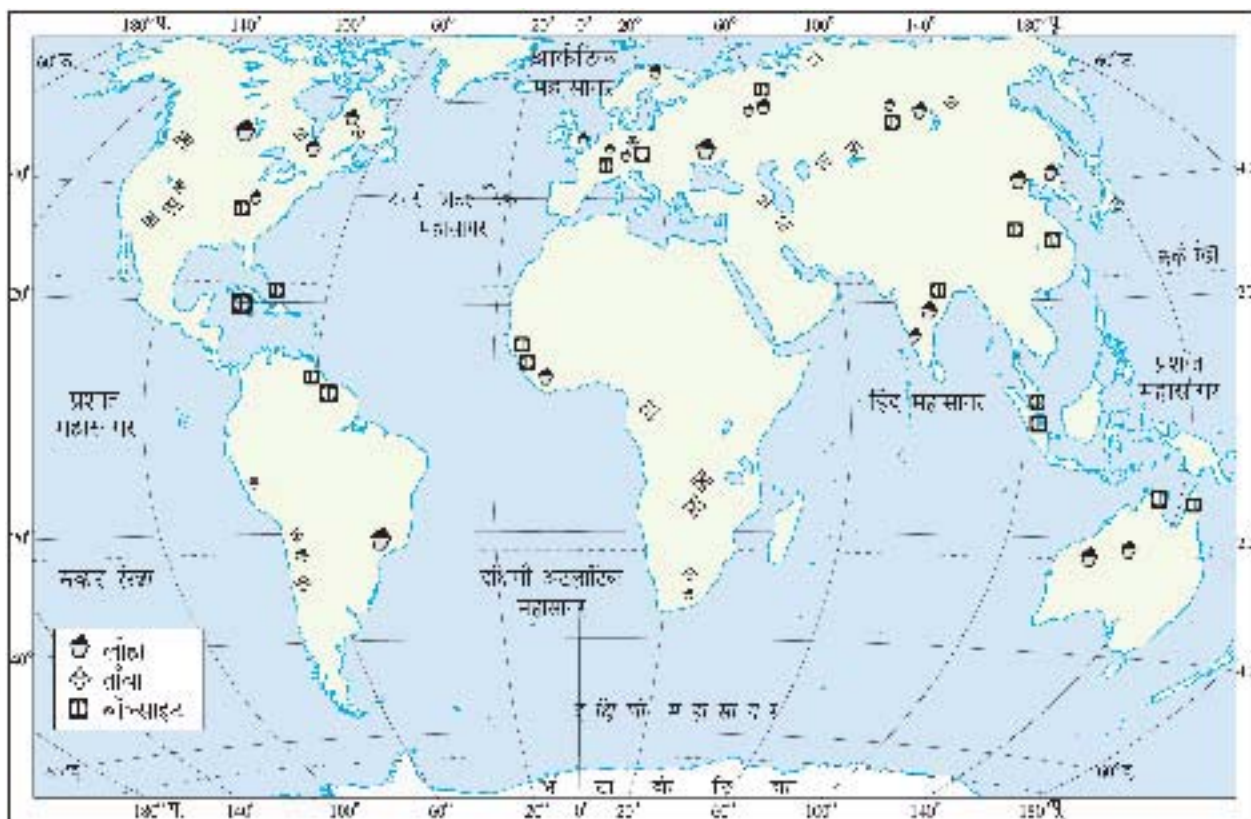
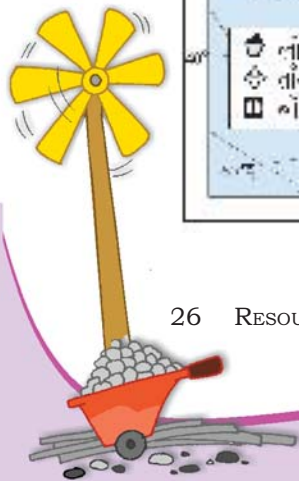


Fig. 3.5: World: Distribution of Iron, Copper and Bauxite



China, Malaysia and Indonesia are among the world's leading tin producers. China also leads in production of lead, antimony and tungsten. Asia also has deposits of manganese, bauxite, nickel, zinc and copper.

## EUROPE

Europe is the leading producer of iron-ore in the world. The countries with large deposits of iron ore are Russia, Ukraine, Sweden and France. Minerals deposits of copper, lead, zinc, manganese and nickel are found in eastern Europe and European Russia.

## NORTH AMERICA

The mineral deposits in North America are located in three zones: the Canadian region north of the Great Lakes, the Appalachian region and the mountain ranges of the west. Iron ore, nickel, gold, uranium and copper are mined in the Canadian Shield Region, coal in the Appalachians region. Western Cordilleras have vast deposits of copper, lead, zinc, gold and silver.

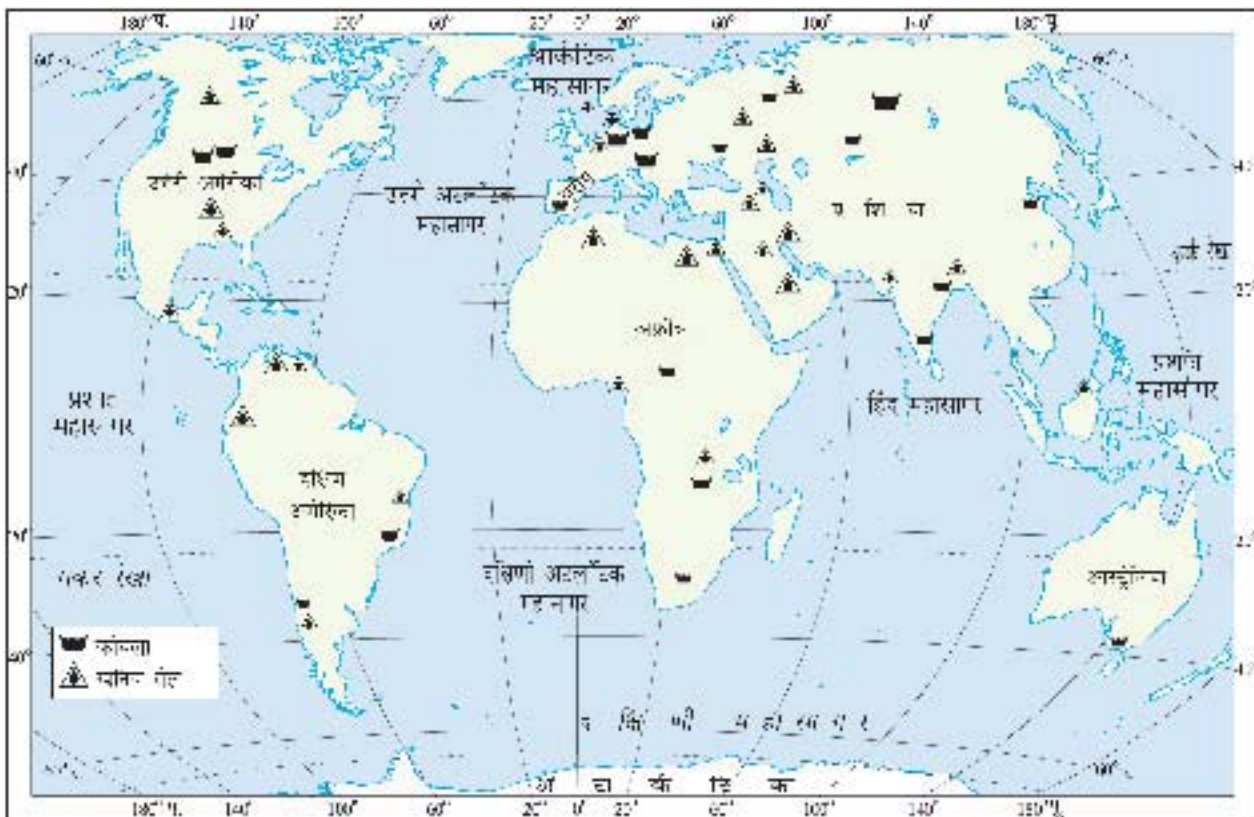
### Do you know?

Switzerland has no known mineral deposit in it.



### Let's do

Identify Canadian Shield, Appalachians, Western Cordilleras and Lake Superior with the help of an atlas.



**Fig 3.6:** World: Distribution of Mineral Oil and Coal



### Do you know?

- A green diamond is the rarest diamond.
- The oldest rocks in the world are in Western Australia. They date from 4,300 million years ago, only 300 million years after the earth was formed.



### Activity

On an outline map of India, mark the distribution of iron, bauxite, manganese and mica with the help of an atlas.



## SOUTH AMERICA

Brazil is the largest producer of high grade iron-ore in the world. Chile and Peru are leading producers of copper. Brazil and Bolivia are among the world's largest producers of tin. South America also has large deposits of gold, silver, zinc, chromium, manganese, bauxite, mica, platinum, asbestos and diamond. Mineral oil is found in Venezuela, Argentina, Chile, Peru and Columbia.

## AFRICA

Africa is rich in mineral resources. It is the world's largest producer of diamonds, gold and platinum. South Africa, Zimbabwe and Zaire produce a large portion of the world's gold. The other minerals found in Africa are copper, iron ore, chromium, uranium, cobalt and bauxite. Oil is found in Nigeria, Libya and Angola.

## AUSTRALIA

Australia is the largest producer of bauxite in the world. It is a leading producer of gold, diamond, iron ore, tin and nickel. It is also rich in copper, lead, zinc and manganese. Kalgoorlie and Coolgardie areas of western Australia have the largest deposits of gold.

## ANTARCTICA

The geology of Antarctica is sufficiently well known to predict the existence of a variety of mineral deposits, some probably large. Significant size of deposits of coal in the Transantarctic Mountains and iron near the Prince Charles Mountains of East Antarctica is forecasted. Iron ore, gold, silver and oil are also present in commercial quantities.

## DISTRIBUTION IN INDIA

**Iron:** India has deposits of high grade iron ore. The mineral is found mainly in Jharkhand, Orissa, Chhattisgarh, Madhya Pradesh, Goa, Maharashtra and Karnataka.

**Bauxite:** Major bauxite producing areas are Jharkhand, Orissa, Chhattisgarh, Madhya Pradesh, Gujarat, Maharashtra and Tamil Nadu.





**Mica:** Mica deposits mainly occur in Jharkhand, Bihar, Andhra Pradesh and Rajasthan. India is the largest producer and exporter of mica in the world.

**Copper:** It is mainly produced in Rajasthan, Madhya Pradesh, Jharkhand, Karnataka and Andhra Pradesh.

**Manganese:** India's manganese deposits lie in Maharashtra, Madhya Pradesh, Chhattisgarh, Orissa, Karnataka and Andhra Pradesh.

**Limestone:** Major limestone producing states in India are Bihar, Jharkhand, Orissa, Madhya Pradesh, Chhattisgarh, Rajasthan, Gujarat and Tamil Nadu.

**Gold:** Kolar in Karnataka has deposits of gold in India. These mines are among the deepest in the world which makes mining of this ore a very expensive process.

**Salt:** It is obtained from seas, lakes and rocks (Fig 3.8). India is one of the world's leading producers and exporters of salt.



**Fig. 3.7:** Quarrying of limestone



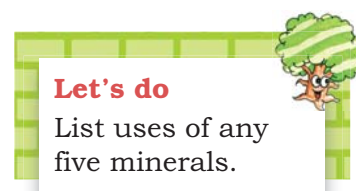
**Fig. 3.8:** Extraction of salt from Sambhar lake in Rajasthan

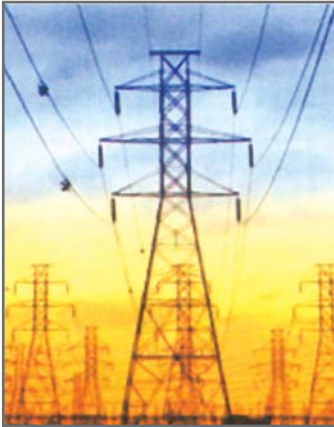
## USES OF MINERALS

Minerals are used in many industries. Minerals which are used for gems are usually hard. These are then set in various styles for jewellery. Copper is another metal used in everything from coins to pipes. Silicon, used in the computer industry is obtained from quartz. Aluminum obtained from its ore bauxite is used in automobiles and airplanes, bottling industry, buildings and even in kitchen cookware.

## CONSERVATION OF MINERALS

Minerals are a non-renewable resource. It takes thousands of years for the formation and concentration of minerals. The rate of formation is much smaller than the rate at which the humans consume these minerals. It is necessary to reduce wastage in the process of mining. Recycling of metals is another way in which the mineral resources can be conserved.





**Fig. 3.9:** National Power Grid to supply Electricity

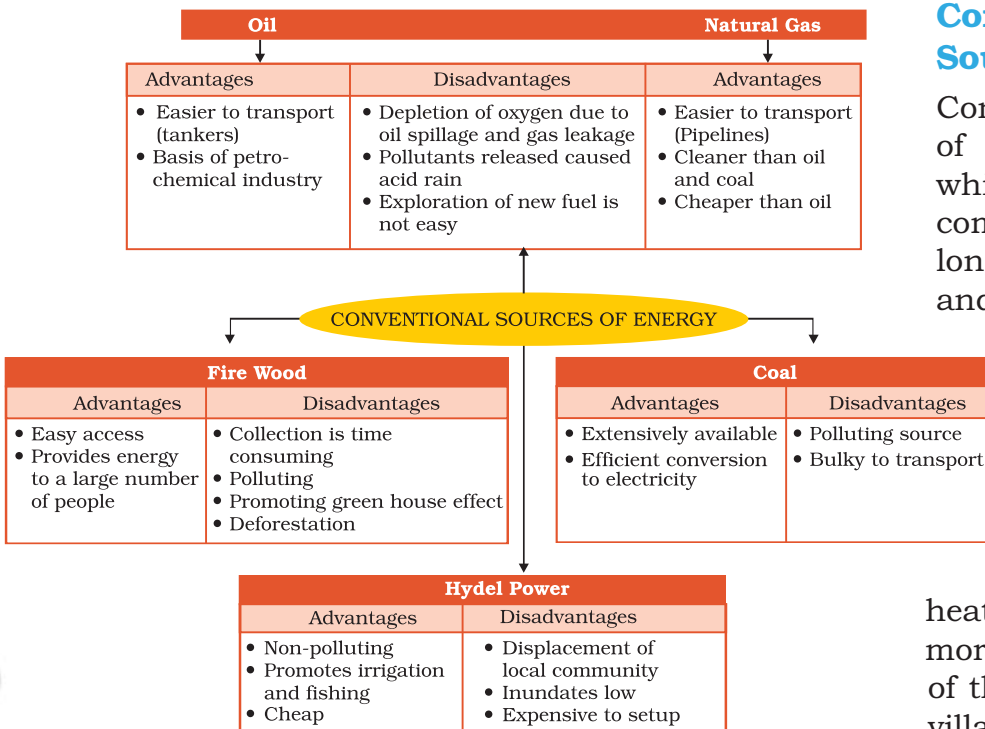
## POWER RESOURCES

Sunny's mother begins her day by switching on the geyser. She irons Sunny's school uniform before waking him up. She then rushes to the kitchen to prepare a glass of orange juice for him in the blender.

"Sunny, have you finished taking bath? Come and have your breakfast", calls out mother while preparing breakfast on the gas stove for Sunny.

While going to school Sunny forgets to switch off lights and fans. When mother switches them off she thinks that life in the cities may be more comfortable, but its dependency on more and more gadgets all of which consume energy has led to a wide gap between the demand and the supply. With the advent of science and technology the life styles are changing very fast.

Power or energy plays a vital role in our lives. We also need power for industry, agriculture, transport, communication and defense. Power resources may be broadly categorised as conventional and non-conventional resources.



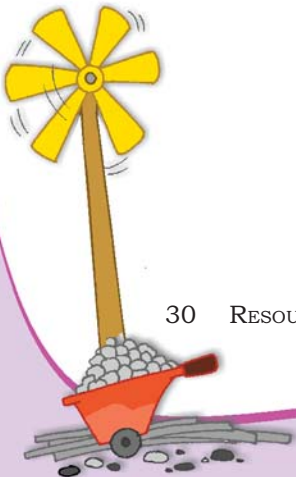
**Fig 3.10:** Conventional Sources of Energy

## Conventional Sources

Conventional sources of energy are those which have been in common use for a long time. Firewood and fossil fuels are the two main conventional energy sources.

### Firewood

It is widely used for cooking and heating. In our country more than fifty per cent of the energy used by villagers comes from fire wood.



Remains of plants and animals which were buried under the earth for millions of years got converted by the heat and pressure into fossil fuels. **Fossil fuel** such as coal, petroleum and natural gas are the main sources of conventional energy. The reserves of these minerals are limited. The rate at which the growing world population is consuming them is far greater than the rate of their formation. So, these are likely to be exhausted soon.

### Coal

This is the most abundantly found fossil fuel. It is used as a domestic fuel, in industries such as iron and steel, steam engines and to generate electricity. Electricity from coal is called **thermal power**. The coal which we are using today was formed millions of years ago when giant ferns and swamps got buried under the layers of earth. Coal is therefore referred to as **Buried Sunshine**.

The leading coal producers of the world are China, USA, Germany, Russia, South Africa and France. The coal producing areas of India are Raniganj, Jharia, Dhanbad and Bokaro in Jharkhand.

### Petroleum

The petrol that keeps your car running as well as the oil that keeps your cycle from squeaking, both began as a thick black liquid called Petroleum. It is found between the layers of rocks and is drilled from oil fields located in off-shore and coastal areas. This is then sent to refineries which process the crude oil and produce a variety of products like diesel, petrol, kerosene, wax, plastics and lubricants. Petroleum and its derivatives are called **Black Gold** as they are very valuable.



**Fig 3.13:** Crude Oil

The chief petroleum producing countries are Iran, Iraq, Saudi Arabia and Qatar. The other major producers are USA, Russia, Venezuela, and Algeria. The leading producers in India are Digboi in Assam, Bombay High in Mumbai and the deltas of Krishna and Godavari rivers.



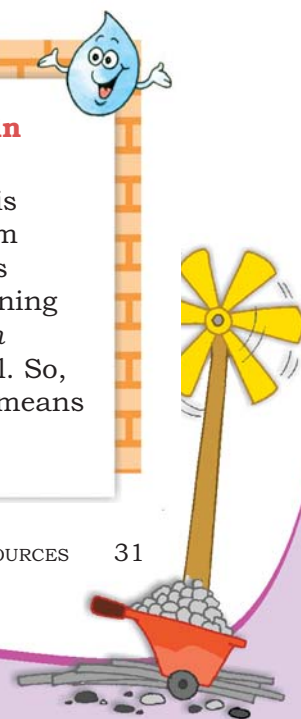
**Fig 3.11:** A woman carrying firewood in North East India



**Fig 3.12:** A view of a Thermal Power Station

#### Word Origin

The word petroleum is derived from Latin words –*Petra* meaning rock, *oleum* meaning oil. So, petroleum means rock oil.





### Do you know?

Compressed natural gas (CNG) is a popular eco-friendly automobile fuel as it causes less pollution than petroleum and diesel.



## Natural Gas

Natural gas is found with petroleum deposits and is released when crude oil is brought to the surface. It can be used as a domestic and industrial fuel. Russia, Norway, UK and the Netherlands are the major producers of natural gas.

In India Jaisalmer, Krishna Godavari delta, Tripura and some areas off shore in Mumbai have natural gas resources. Very few countries in the world have sufficient natural gas reserves of their own.

The sharp increase in our consumption of fossil fuels has led to their depletion at an alarming rate. The toxic pollutants released from burning these fuels are also a cause for concern. Unchecked burning of fossil fuel is like an unchecked dripping tap which will eventually run dry. This has led to the tapping of various non-conventional sources of energy that are cleaner alternatives to fossil fuels.

### Do you know?

Norway was the first country in the world to develop hydroelectricity.



## Hydel Power

Rain water or river water stored in dams is made to fall from heights. The falling water flows through pipes inside the dam over turbine blades placed at the bottom of the dam. The moving blades then turn the generator to produce electricity. This is called hydro electricity. The water discharged after the generation of electricity is used for irrigation. One fourth of the world's electricity is produced by hydel power. The leading producers of hydel power in the world are Paraguay, Norway, Brazil, and

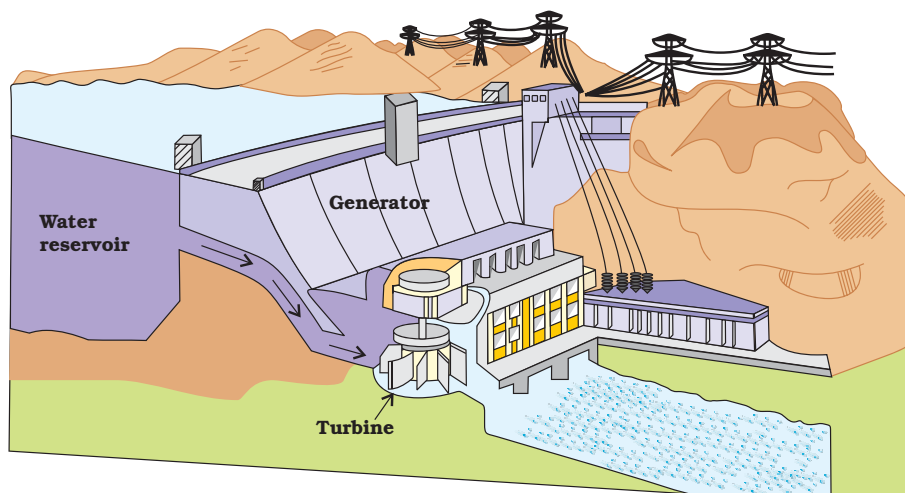


Fig. 3.14: Hydel Power



China. Some important hydel power stations in India are Bhakra Nangal, Gandhi Sagar, Nagarjunsagar and Damodar valley projects.

## NON-CONVENTIONAL SOURCES OF ENERGY

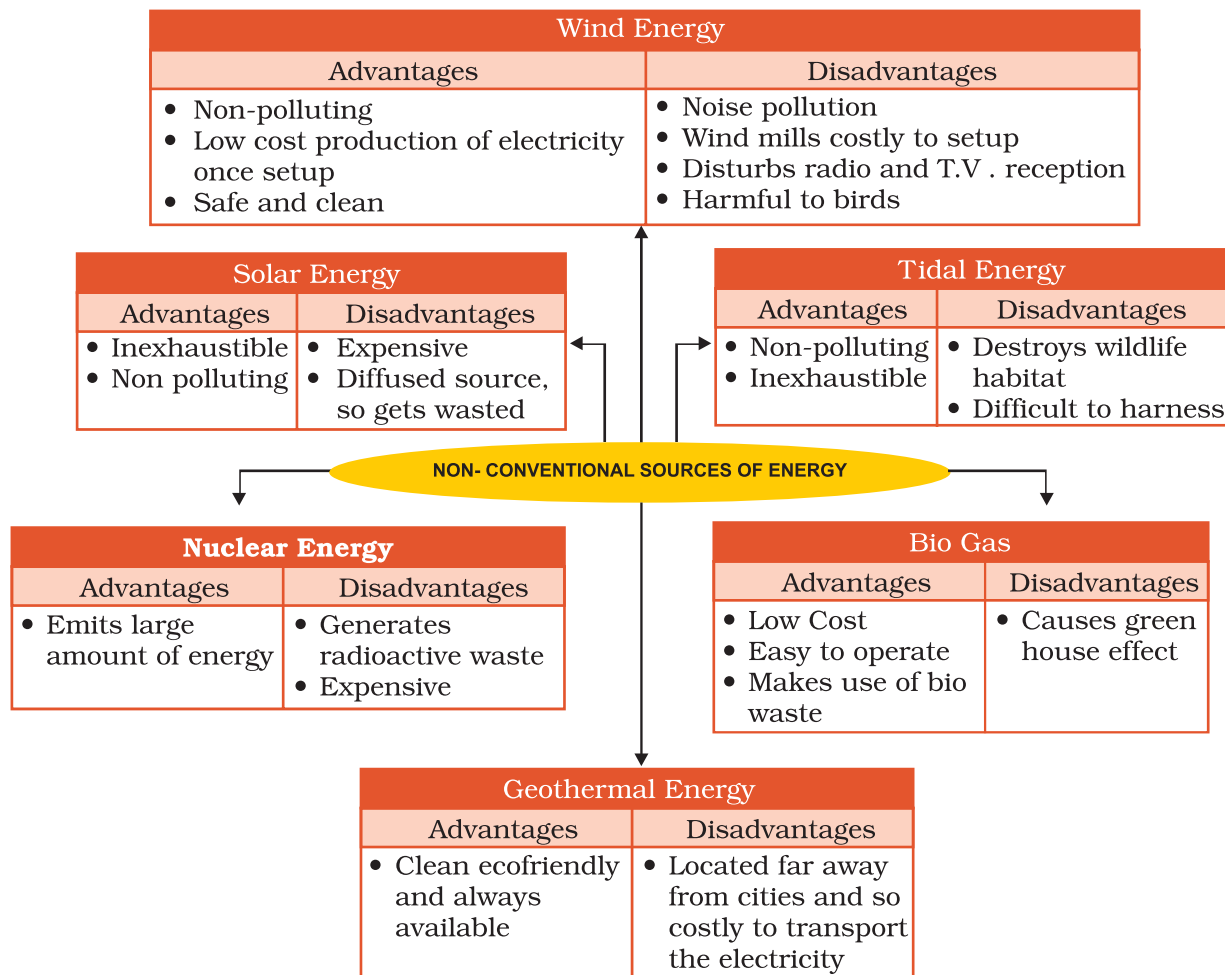
The increasing use of fossil fuels is leading to its shortage. It is estimated that if the present rate of consumption continues, the reserves of these fuel will get exhausted. Moreover, their use also causes environmental pollution. Therefore, there is need for using non-conventional sources such as solar energy, wind energy, tidal energy which are renewable.



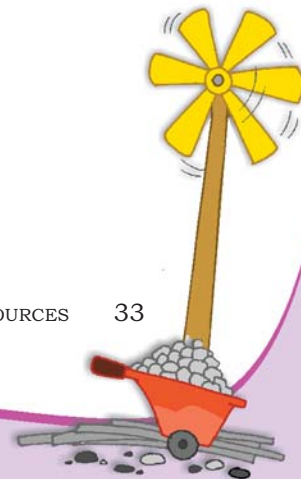
**Fig. 3.15:** Salal Hydroelectric Project Jammu and Kashmir

### Solar energy

Sun's heat and light energy can be felt by us every day. Solar energy trapped from the sun can be used



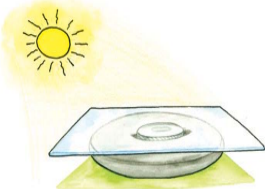
**Fig 3.16:** Non-conventional Sources of Energy



### Activity

#### Solar Worker

Take an old car tube. Inflate it and keep it on a wooden platform. Paint an aluminium vessel black from outside and add 1 cup rice with 2 cups of water to it. Close the vessel with a lid and place the vessel in the inner circle of the tube. Now place a glass frame over the tube and keep the set out in sun. After the glass frame is placed, air can neither come in or go out but the sun rays coming into the closed cavity enclosed by the tube, get trapped and cannot escape. The temperature increases slowly cooking the rice over few hours.



in solar cells to produce electricity. Many of these cells are joined into solar panels to generate power for heating and lighting purpose. The technology of utilising solar energy benefits a lot of tropical countries that are blessed with abundant sun shine. Solar energy is also used in solar heaters, solar cookers, solar dryers besides being used for community lighting and traffic signals.



**Fig 3.17:** Solar Panels to trap solar energy

### Wind Energy

Wind is an inexhaustible source of energy. Wind mills have been used for grinding grain and lifting water since times immemorial. In modern time wind mills, the high speed winds rotate the wind mill which is connected to a generator to produce electricity. Wind farms having clusters of such wind mills are located in coastal regions and in mountain passes where strong and steady winds blow. Windfarms are found in Netherlands, Germany, Denmark, UK, USA and Spain are noted for their wind energy production.

### Nuclear Power

Nuclear power is obtained from energy stored in the nuclei of atoms of naturally occurring radio active elements like uranium and thorium. These fuels undergo nuclear fission in nuclear reactors and emit power. The greatest producers of nuclear power are USA and Europe. In India Rajasthan and Jharkhand have large deposits of Uranium. Thorium is found in large quantities in the Monozite sands of Kerala. The nuclear power stations in India



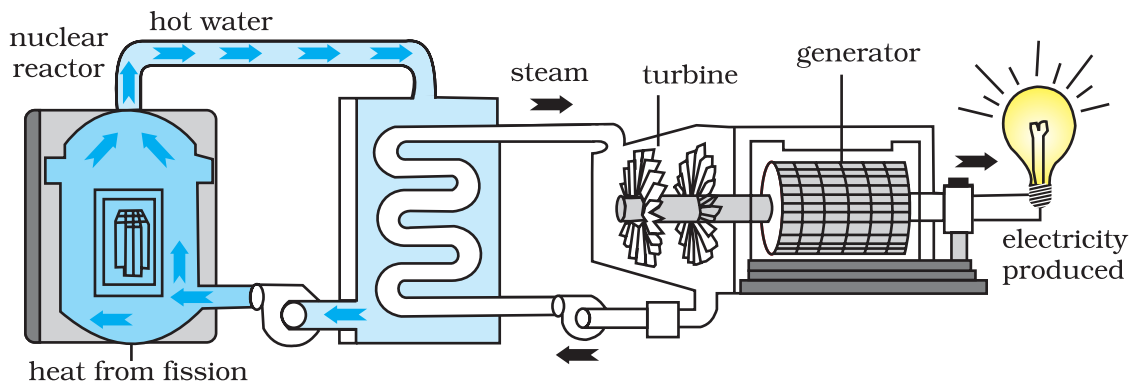
**Fig. 3.18 :** Nuclear power station , Kalpakkam

### Do you know?

The site of the world's first solar and wind powered bus shelter is in Scotland.



are located in Kalpakkam in Tamilnadu, Tarapur in Maharashtra, Ranapratap Sagar near Kota in Rajasthan, Narora in Uttar Pradesh and Kaiga in Karnataka.



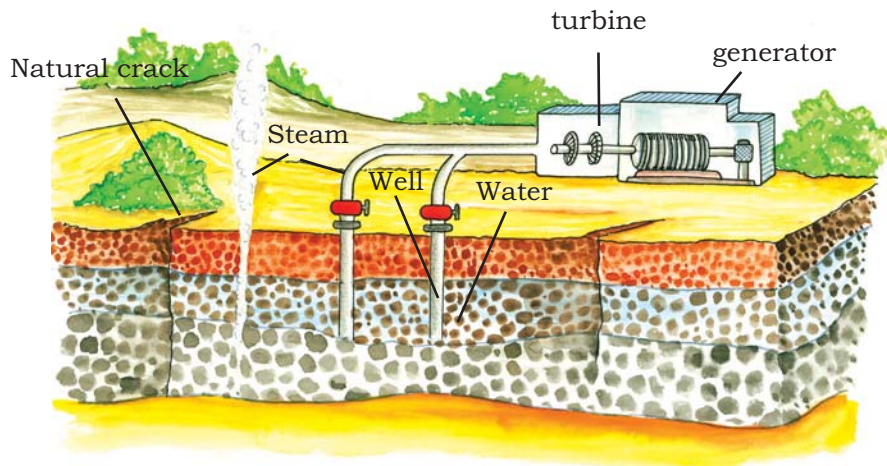
**Fig. 3.19 : Nuclear Energy**

### Geothermal Energy

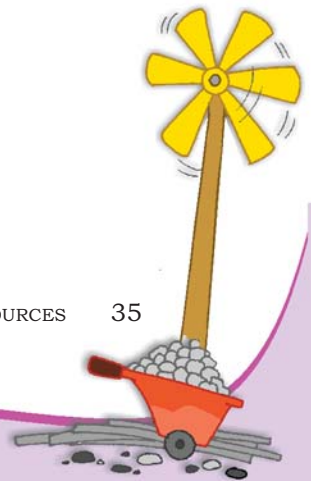
Heat energy obtained from the earth is called **geothermal energy**. The temperature in the interior of the earth rises steadily as we go deeper. Some times this heat energy may surface itself in the form of hot springs. This heat energy can be used to generate power. Geothermal energy in the form of hot springs has been used for cooking, heating and bathing for several



**Fig. 3.20 : (a) Geothermal Energy in Manikaran (b) Cooking food with the help of Geothermal Energy**



**Fig. 3.21 : Geothermal Energy**

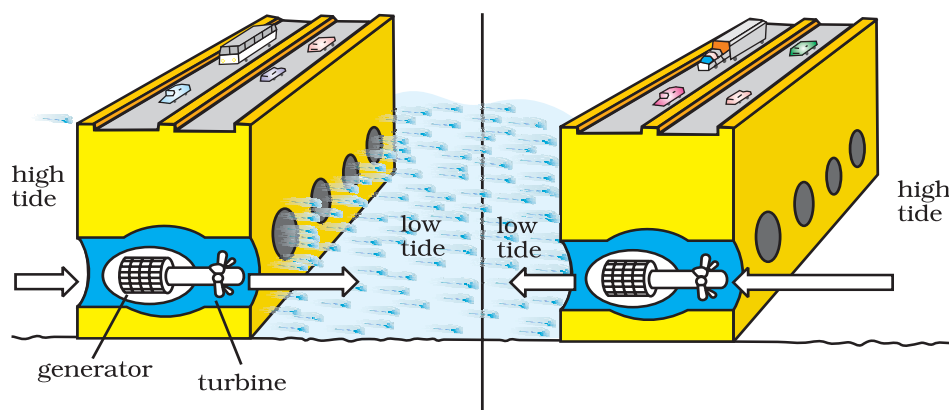


years. USA has the world's largest geothermal power plants followed by New Zealand, Iceland, Philippines and Central America. In India, geothermal plants are located in Manikaran in Himachal Pradesh and Puga Valley in Ladakh.

## TIDAL ENERGY

Energy generated from tides is called **tidal energy**. Tidal energy can be harnessed by building dams at narrow openings of the sea. During high tide the energy of the tides is used to turn the turbine installed in the dam to produce electricity. Russia, France and the Gulf of Kachchh in India have huge tidal mill farms.

**Low tidal energy is used to produce electricity**



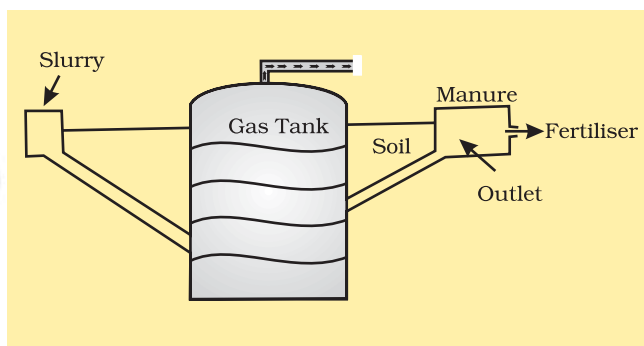
**Fig. 3.22: Tidal Energy**

## BIOGAS

Organic waste such as dead plant and animal material, animal dung and kitchen waste can be converted into a gaseous fuel called biogas. The organic waste is decomposed by bacteria in biogas digesters to emit biogas which is essentially a mixture of methane and carbon

dioxide. Biogas is an excellent fuel for cooking and lighting and produces huge amount of organic manure each year.

Energy is everywhere but we can see that harnessing this energy is both difficult as well as costly. Each one of us can make a difference by not wasting energy. Energy saved is energy generated. Act now and make brighter energy future.



**Fig. 3.23 : Biogas**



## Exercises

### 1. Answer the following questions.

- (i) Name any three common minerals used by you every day.
- (ii) What is an ore? Where are the ores of metallic minerals generally located?
- (iii) Name two regions rich in natural gas resources.
- (iv) Which sources of energy would you suggest for
  - (a) rural areas                      (b) coastal areas                      (c) Arid regions
- (v) Give five ways in which you can save energy at home.

### 2. Tick the correct answer.

- (i) Which one of the following is NOT a characteristic of minerals?
  - (a) They are created by natural processes.
  - (b) They have a definite chemical composition.
  - (c) They are inexhaustible.
  - (d) Their distribution is uneven.
- (ii) Which one of the following is NOT a producer of mica?
  - (a) Jharkhand                                      (c) Rajasthan
  - (b) Karnataka                                      (d) Andhra Pradesh
- (iii) Which one of the following is a leading producer of copper in the world?
  - (a) Bolivia    (c) Chile
  - (b) Ghana    (d) Zimbabwe
- (iv) Which one of the following practices will NOT conserve LPG in your kitchen.
  - (a) Soaking the dal for some time before cooking it.
  - (b) Cooking food in a pressure cooker.
  - (c) Keeping the vegetables chopped before lighting the gas for cooking.
  - (d) Cooking food in an open pan kept on low flame.

### 3. Give reasons.

- (i) Environmental aspects must be carefully looked into before building huge dams.
- (ii) Most industries are concentrated around coal mines.
- (iii) Petroleum is referred to as “black gold”.
- (iv) Quarrying can become a major environmental concern.

### 4. Distinguish between the followings.

- (i) Conventional and non conventional sources of energy
- (ii) Biogas and natural gas
- (iii) Ferrous and nonferrous minerals
- (iv) Metallic and nonmetallic minerals





### 5. Activity

- (i) Use pictures from old magazines to show different kinds of fuels used by us in our lives and display them on your bulletin board.
- (ii) Design a poster highlighting energy conservation tips you would take for your school.
- (iii) Salma's class took up an action campaign to do an energy audit of their school by surveying electricity consumption. They prepared survey sheets for the students of the school.

#### Electricity Audit

Sl. No.	Appliance	Quantity (No. being used)	Usage Time (Approx. No. of working hours)	Quantity (No. actual- ly needed)	Is it switched on even when not in use (Yes or No)
1.	Fluorescent Tube light 40 W				
2.	Incandescent Bulb 40 W / 60 W				
3.	Co-impact fluorescent lamps				
4.	Fans				
5.	Exhaust Fans				
6.	Electric Bell / Buzzer				
7.	TV				
8.	Computers				
9.	Air Conditioners				
10.	Refrigerators				
11.	Oven / Hot Case				
12.	Public Address System				
13.	Water Pump / Water Cooler				
14.	Overhead Projector				
15.	Photostat Machine				
16.	Any other				

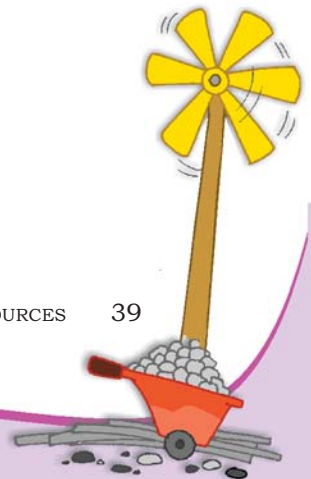


Using the data collected during the survey, students calculated the units consumed for one month and the approximate expenditure and compared it with the electricity bill of the previous month. They also calculated the approximate cost of electricity consumed by fans, lights and other appliances not switched off. Thus, they highlighted the amount that could be saved and suggested simple energy conservation habits like

- Switching off the appliances when not in use.
- Minimal usage as per requirement.
- Maximising the use of natural breeze and light by keeping the windows open.
- Keeping the lights dust free.
- The appropriate maintenance and usage of appliances as per the given instructions.

Can you add some more tips to this list?

You could conduct a similar survey at home and then extend it to your apartment and make your neighbours also energy wise.





*Gurpreet, Madho and Tina were walking through the village where they saw a farmer tilling land. The farmer told them that he was growing wheat and had just added manure to the soil to make it more fertile. He told the children that the wheat would fetch a good price in the mandi from where it would be taken to factories to make bread and biscuits from flour.*

This transformation from a plant to a finished product involves three types of economic activities. These are primary, secondary and tertiary activities.

Primary activities include all those connected with extraction and production of natural resources. Agriculture, fishing and gathering are good examples. Secondary activities are concerned with the processing of these resources. Manufacturing of steel, baking of bread and weaving of cloth are examples of this activity. Tertiary activities provide support to the primary and secondary sectors through services. Transport, trade, banking, insurance and advertising are examples of tertiary activities.

Agriculture is a primary activity. It includes growing crops, fruits, vegetables, flowers and rearing of livestock. In the world, 50 per cent of persons are engaged in agricultural activity. Two-thirds of India's population is still dependent on agriculture.

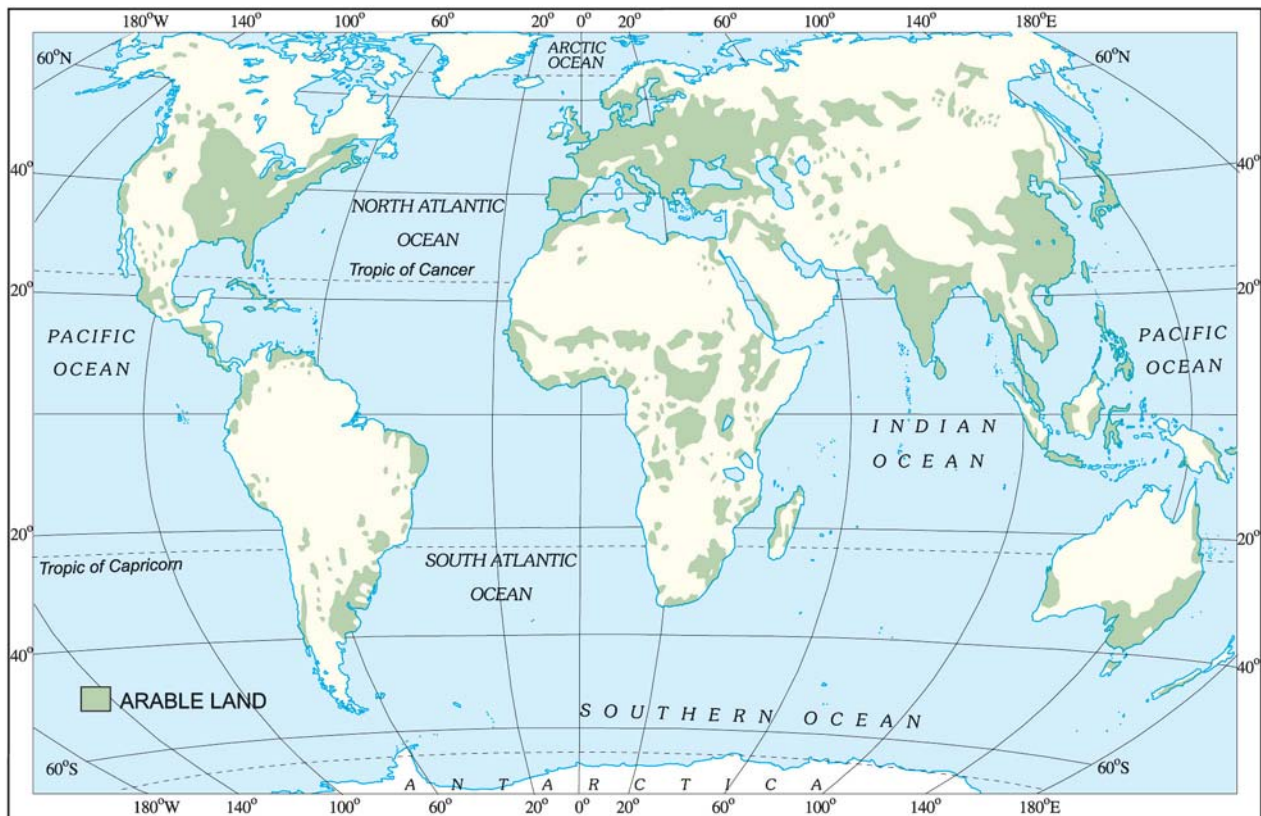
Favourable topography of soil and climate are vital for agricultural activity. The land on which the crops are grown is known as arable land (Fig. 4.1). In the map you can see that agricultural activity is concentrated in those regions of the world where suitable factors for the growing of crops exist.

#### Word Origin

The word agriculture is derived from Latin words *ager* or *agri* meaning soil and *culture* meaning, cultivation or tilling of soil.



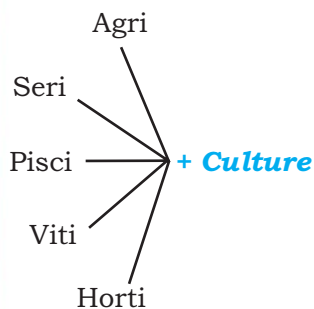




**Fig. 4.1:** World Distribution of Arable Land



### Do you know?



#### Agriculture

The science and art of cultivation on the soil, raising crops and rearing livestock. It is also called farming.

#### Sericulture

Commercial rearing of silk worms. It may supplement the income of the farmer.

#### Pisciculture

Breeding of fish in specially constructed tanks and ponds.

#### Viticulture

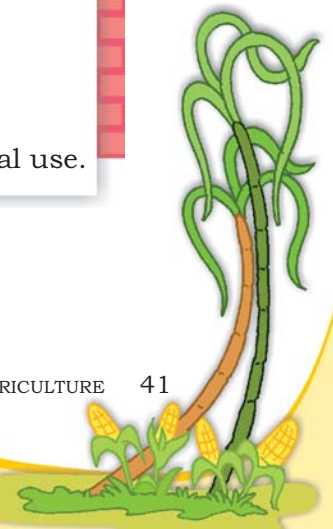
Cultivation of grapes.

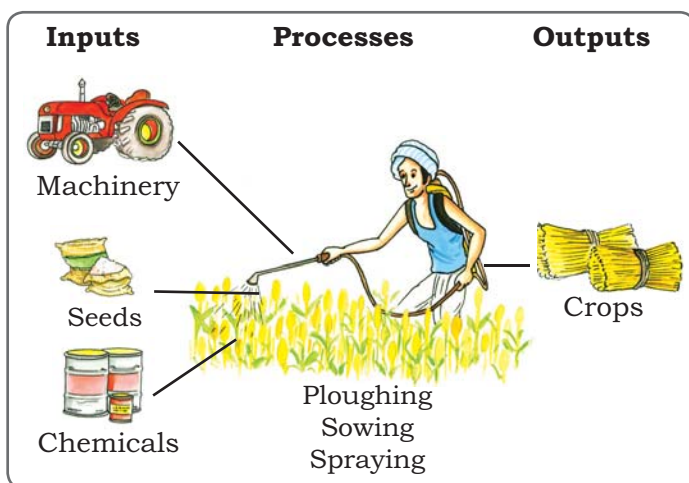
#### Horticulture

Growing vegetables, flowers and fruits for commercial use.

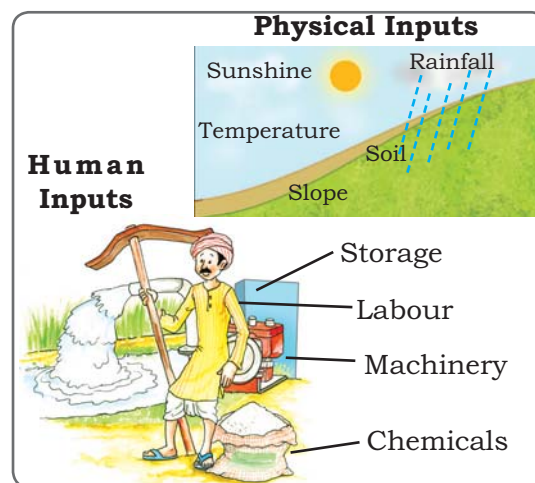
## FARM SYSTEM

Agriculture or farming can be looked at as a system. The important inputs are seeds, fertilisers, machinery and





**Fig 4.2:** The farm system of an arable farm



**Fig 4.3:** Physical and human farm inputs

labour. Some of the operations involved are ploughing, sowing, irrigation, weeding and harvesting. The outputs from the system include crops, wool, dairy and poultry products.

## TYPES OF FARMING

Farming is practised in various ways across the world. Depending upon the geographical conditions, demand of produce, labour and level of technology, farming can be classified into two main types. These are **subsistence farming** and **commercial farming**.

### Subsistence Farming

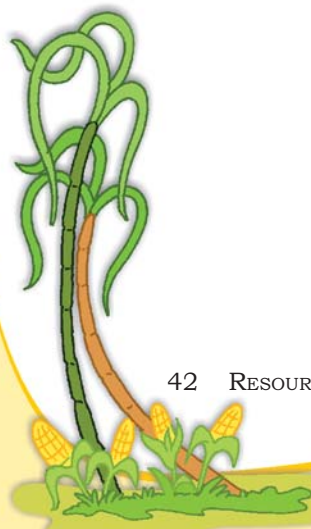
This type of farming is practised to meet the needs of the farmer's family. Traditionally, low levels of technology and household labour are used to produce on small output. Subsistence farming can be further classified as intensive subsistence and primitive subsistence farming.

In **intensive subsistence agriculture** the farmer cultivates a small plot of land using simple tools and more labour. Climate with large number of days with sunshine and fertile soils permit growing of more than one crop annually on the same plot. Rice is the main crop. Other crops include wheat, maize, pulses and oilseeds. Intensive subsistence agriculture is prevalent in the thickly populated areas of the monsoon regions of south, southeast and east Asia.

### Interesting Fact

#### Organic Farming

In this type of farming, organic manure and natural pesticides are used instead of chemicals. No genetic modification is done to increase the yield of the crop.





**Primitive subsistence agriculture** includes shifting cultivation and nomadic herding.

**Shifting cultivation** is practised in the thickly forested areas of Amazon basin, tropical Africa, parts of southeast Asia and Northeast India. These are the areas of heavy rainfall and quick regeneration of vegetation. A plot of land is cleared by felling the trees and burning them. The ashes are then mixed with the soil and crops like maize, yam, potatoes and cassava are grown. After the soil loses its fertility, the land is abandoned and the cultivator moves to a new plot. Shifting cultivation is also known as 'slash and burn' agriculture.

**Nomadic herding** is practised in the semi-arid and arid regions of Sahara, Central Asia and some parts of India, like Rajasthan and Jammu and Kashmir. In this type of farming, herdsmen move from place to place with their animals for fodder and water, along defined routes. This type of movement arises in response to climatic constraints and terrain. Sheep, camel, yak and goats are most commonly reared. They provide milk, meat, wool, hides and other products to the herders and their families.

### Commercial Farming

In commercial farming crops are grown and animals are reared for sale in market. The area cultivated and the amount of capital used is large. Most of the work is done by machines. Commercial farming includes commercial grain farming, mixed farming and plantation agriculture (Fig 4.5).

In *commercial grain farming* crops are grown for commercial purpose. Wheat and maize are common commercially grown grains. Major areas where commercial grain farming is practised are temperate grasslands of North America, Europe and Asia. These areas are sparsely populated with large farms spreading over hundreds of hectares. Severe winters restrict the growing season and only a single crop can be grown.

In **mixed farming** the land is used for growing food and fodder crops and rearing livestock.

#### Do you know?

Shifting cultivation is known by different names in different parts of the world

**Jhumming** -

North-East India

**Milpa** - Mexico

**Roca** - Brazil.

**Ladang** - Malaysia



**Fig 4.4:** Nomadic Herders with their camels



**Fig 4.5:** Sugarcane plantation



It is practised in Europe, eastern USA, Argentina, southeast Australia, New Zealand and South Africa.



**Fig 4.6 :** *Banana Plantation*

**Plantations** are a type of commercial farming where single crop of tea, coffee, sugarcane, cashew, rubber, banana or cotton are grown. Large amount of labour and capital are required. The produce may be processed on the farm itself or in nearby factories. The development of a transport network is thus essential for such farming.

Major plantations are found in the tropical regions of the world. Rubber in Malaysia, coffee in Brazil, tea in India and Sri Lanka are some examples.

### Major Crops

A large variety of crops are grown to meet the requirement of the growing population. Crops also supply raw materials for agro based industries. Major food crops are wheat, rice, maize and millets. Jute and cotton are fibre crops. Important beverage crops are tea and coffee.



**Fig 4.7:** *Rice Cultivation*



**Fig 4.8:** *Wheat Harvesting*

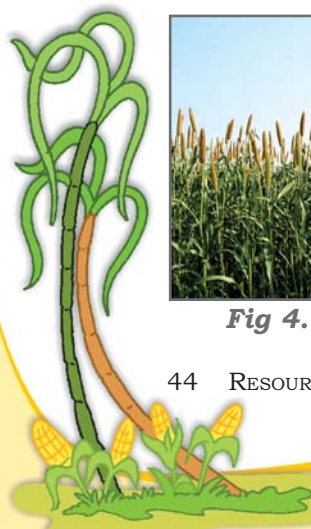
**Rice:** Rice is the major food crop of the world. It is the staple diet of the tropical and sub-tropical regions. Rice needs high temperature, high humidity and rainfall. It grows best in alluvial clayey soil, which can retain water. China leads in the production of rice followed by India, Japan, Sri Lanka and Egypt. In favourable climatic conditions as in West Bengal and Bangladesh two to three crops a year are grown.

**Wheat:** Wheat requires moderate temperature and rainfall during growing season and bright sunshine at the time of harvest. It thrives best in well drained loamy soil. Wheat is grown extensively in USA, Canada, Argentina, Russia, Ukraine, Australia and India. In India it is grown in winter.



**Fig 4.9:** *Bajra Cultivation*

**Millets:** They are also known as coarse grains and can be grown on less fertile and sandy soils. It is a hardy crop that needs low rainfall and high to



moderate temperature and adequate rainfall. Jowar, bajra and ragi are grown in India. Other countries are Nigeria, China and Niger.



**Fig 4.10:** Maize Cultivation

**Maize:** Maize requires moderate temperature, rainfall and lots of sunshine. It needs well-drained fertile soils. Maize is grown in North America, Brazil, China, Russia, Canada, India, and Mexico.



**Fig 4.11:** Cotton Cultivation

**Cotton:** Cotton requires high temperature, light rainfall, two hundred and ten frost-free days and bright sunshine for its growth. It grows best on black and alluvial soils. China, USA, India,

Pakistan, Brazil and Egypt are the leading producers of cotton. It is one of the main raw materials for the cotton textile industry.

**Jute:** Jute was also known as the 'Golden Fibre'. It grows well on alluvial soil and requires high temperature, heavy rainfall and humid climate. This crop is grown in the tropical areas. India and Bangladesh are the leading producers of jute.



**Fig 4.12:** Coffee Plantation

**Coffee:** Coffee requires warm and wet climate and well-drained loamy soil. Hill slopes are more suitable for growth of this crop. Brazil is the leading producer followed by Columbia and India.

**Tea:** Tea is a beverage crop grown on plantations. This requires cool climate and well distributed high rainfall throughout the year for the growth of its tender leaves.

### Do you know?

Maize is also known as corn. Various colourful varieties of maize are found across the world.



### Interesting Fact

#### Who discovered the Coffee Plant?

There are different versions about the discovery of coffee. In about AD 850, Kaldi, an Arab goat-herder, who was puzzled by the queer antics of his flock, tasted the berries of the evergreen bush on which the goats were feeding. On experiencing a sense of exhilaration, he proclaimed his discovery to the world.





**Fig 4.13:** Tea Plantation

It needs well-drained loamy soils and gentle slopes. Labour in large number is required to pick the leaves. Kenya, India, China, Sri Lanka produce the best quality tea in the world.

## AGRICULTURAL DEVELOPMENT

Agricultural Development refers to efforts made to increase farm production in order to meet the growing demand of increasing population. This can be achieved in many ways such as increasing the cropped area, the number of crops grown, improving irrigation facilities, use of fertilisers and high yielding variety of seeds. Mechanisation of agriculture is also another aspect of agricultural development. The ultimate aim of agricultural development is to increase food security.

### Do you know?

Food security exists when all people, at all times, have access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life.



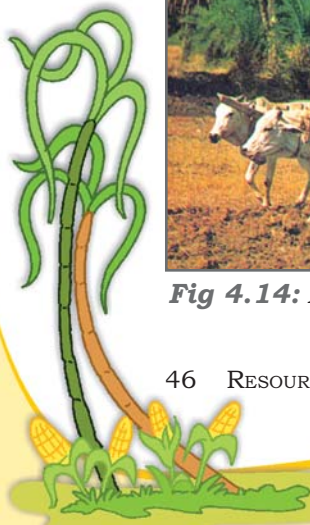
Agriculture has developed at different places in different parts of the world. Developing countries with large populations usually practise intensive agriculture where crops are grown on small holdings mostly for subsistence. Larger holdings are more suitable for commercial agriculture as in USA, Canada and Australia. With the help of two case studies of farms — one from India and the other from the USA, let us understand about agriculture in the developing and a developed country.

## A Farm in India

There is a small village Adilabad in Ghazipur district of Uttar Pradesh. Munna Lal is a small farmer in this village who has farmland of about 1.5 hectares. His house is in the main village. He purchases high yielding varieties of seeds from the market every alternate year. The land is fertile and he grows at least two crops in a year which are normally wheat or rice and pulses. The farmer takes advice of his friends and elders as well as government agricultural officers regarding farming practices. He takes a tractor on rent for ploughing his field, though some of his friends still use traditional method of using bullocks for ploughing. There is a tubewell in the nearby field which he takes on rent to irrigate his field.



**Fig 4.14:** A farmer ploughing a field





Munna Lal also has two buffaloes and few hens. He sells milk in the cooperative store located in the nearby town. He is a member of the co-operative society which also advises him on the type of fodder for his animals, safety measures to protect the health of the livestock and artificial insemination.

All the members of the family help him in various farm activities. Sometimes, he takes credit from a bank or the agricultural co-operative society to buy HYV seeds and implements.

He sells his produce in the *mandi* located in the nearby town. Since majority of the farmers do not have lack storage facilities, they are forced to sell the produce even when the market is not favourable to them. In recent years, the government has taken some steps to develop storage facilities.



**Fig 4.15:** Agricultural Field in India

### A Farm in the USA

The average size of a farm in the USA is much larger than that of an Indian farm. A typical farm size in the USA is about 250 hectares. The farmer generally resides in the farm. Some of the major crops grown are corn, soyabean, wheat, cotton and sugarbeet. Joe Horan, a farmer in the Midwest USA, in Iowa State owns about 300 hectares of land. He grows corn on his field after making sure that soil and water resources meet the needs



**Fig 4.16:** A Farm in the USA



**Fig 4.17:** Spray of Pesticides

of this crop. Adequate measures are taken to control pests that can damage the crop. From time to time he sends the soil samples to a soil testing laboratory to check whether the nutrients are sufficient or not. The results help Joe Horan to plan a scientific fertiliser programme. His computer is linked to the satellite which gives him a precise picture of his field. This helps him to use chemical fertilisers





**Fig 4.18:** Mechanised Harvesting in the USA

and pesticides wherever they are required. He uses tractors, seed drills, leveller, combined harvester and thresher to perform various agricultural operations. A grains are stored in the automated grain storage or despatched to market agencies. The farmer in USA works like a businessman and not like a peasant farmer.



## Exercises

### 1. Answer the following questions.

- (i) What is agriculture?
- (ii) Name the factors influencing agriculture?
- (iii) What is shifting cultivation? What are its disadvantages?
- (iv) What is plantation agriculture?
- (v) Name the fibre crops and name the climatic conditions required for their growth.

### 2. Tick the correct answer.

- (i) Horticulture means
 

(a) growing of fruits and vegetables	(b) primitive farming
(c) growing of wheat	
- (ii) Golden fibre refers to
 

(a) tea	(b) cotton	(c) jute
---------	------------	----------
- (iii) Leading producers of coffee
 

(a) Brazil	(b) India	(c) Russia
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### 3. Give reasons.

- (i) In India agriculture is a primary activity.
- (ii) Different crops are grown in different regions.

### 4. Distinguish between the followings.

- (i) Primary activities and tertiary activities
- (ii) Subsistence farming and intensive farming.

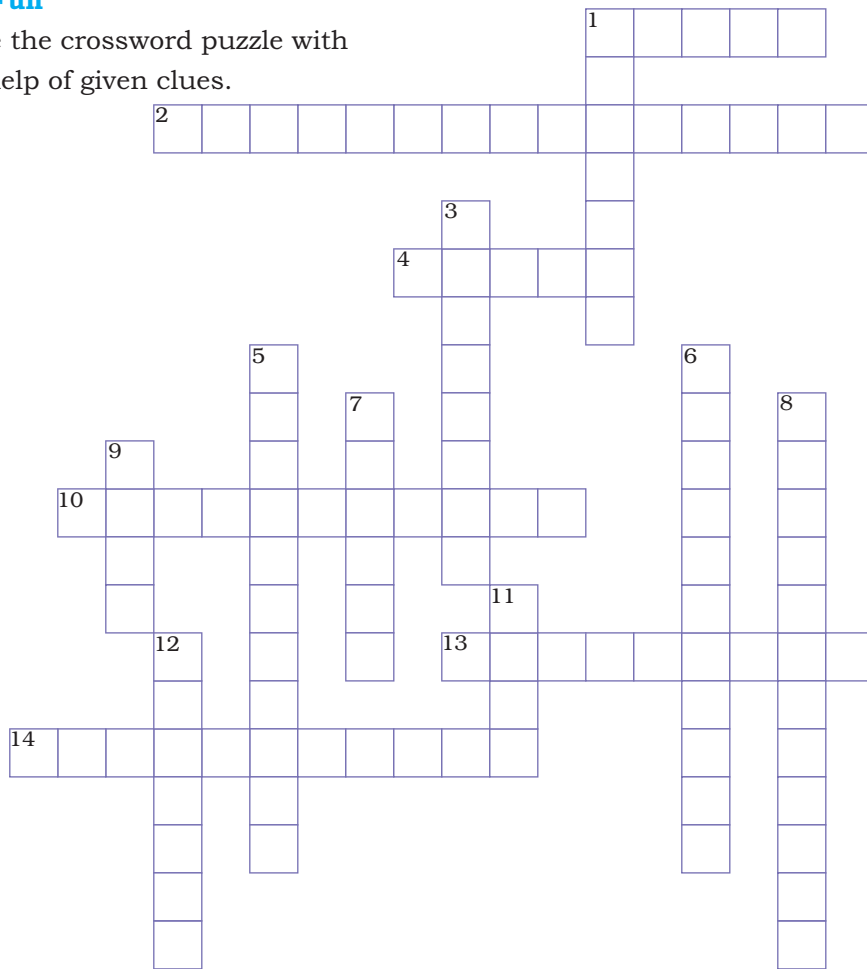
### 5. Activity

- (i) Collect seeds of wheat, rice, jowar, bajra, ragi, maize, oilseeds and pulses available in the market. Bring them to the class and find out in which type of soil they grow.
- (ii) Find out the difference between the life style of farmers in the USA and India on the basis of pictures collected from magazines, books, newspapers and the internet.



## 6. For Fun

Solve the crossword puzzle with the help of given clues.

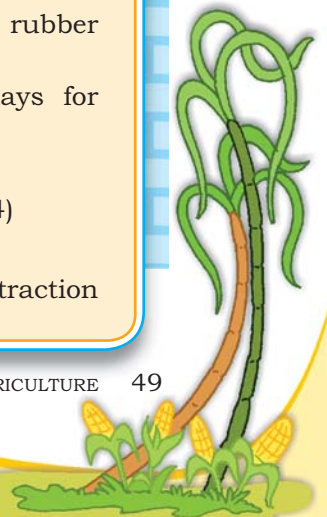


### Across

1. Crop that needs well drained fertile soils, moderate temperatures and lots of sunshine (5)
2. Increasing production through use of HYV seeds, chemical fertilisers and pesticides (5,10)
4. USA, Canada, Russia, Australia are major producers of this crop (5)
10. Type of farming to meet family needs (11)
13. Rearing of animals for sale (9)
14. Growing grapes for wines (11)

### Down

1. Coarse grains are also called (7)
3. Cultivation involving slash and burn (8)
5. Growing of crops, fruits and vegetables (11)
6. Tea, coffee, sugarcane and rubber are grown in (11)
7. Requires 210 frost-free days for growth (6)
8. Growing of flowers (12)
9. Also called 'Golden Fibre' (4)
11. Also known as paddy (4)
12. Activity concerned with extraction of natural resources (7)







*Journey begins...*



*...paper made...  
...recycle...*

*Have you ever given a thought to the fact that the note book you use for writing has come to you after a long process of manufacturing. It started its life as part of a tree. It was cut down and transported to the pulp mill. There the wood of the tree was processed and converted into wood pulp. The wood pulp was mixed with chemicals and finally changed into paper by machines. This paper found its way to the press where ink made from chemicals was used to print the lines on the pages. The pages were then bound in the form of a note book, packed and sent to the market for sale. Finally, it reached your hands.*

**Secondary activities** or **manufacturing** change raw materials into products of more value to people. As you have seen pulp was changed into paper and paper into a note book. These represent the two stages of the manufacturing process.

The paper made from pulp and cloth made from cotton have had value added to them at each stage of the manufacturing process. In this way the finished product has more value and utility than the raw material that it is made from.

**Industry** refers to an economic activity that is concerned with production of goods, extraction of minerals or the provision of services. Thus we have iron and steel industry (production of goods), coal mining industry (extraction of coal) and tourism industry (service provider).

### Activity

Trace the journey of your shirt from a cotton field to your wardrobe.



## CLASSIFICATION OF INDUSTRIES

Industries can be classified on the basis of raw materials, size and ownership.

**Raw Materials:** Industries may be agro based, mineral based, marine based and forest based depending on the type of raw materials they use. **Agro based industries** use plant and animal based products as their raw materials. Food processing, vegetable oil, cotton textile, dairy products and leather industries are examples of agro-based industries. **Mineral based industries** are primary industries that use mineral ores as their raw materials. The products of these industries feed other industries. Iron made from iron ore is the product of mineral based industry. This is used as raw material for the manufacture of a number of other products, such as heavy machinery, building materials and railway coaches. **Marine based industries** use products from the sea and oceans as raw materials. Industries processing sea food or manufacturing fish oil are some examples. **Forest based industries** utilise forest produce as raw materials. The industries associated with forests are pulp and paper, pharmaceuticals, furniture and buildings.

**Size:** It refers to the amount of capital invested, number of people employed and the volume of production. Based on size, industries can be classified into **small scale** and **large scale industries**. Cottage or household industries are a type of small scale industry where the products are manufactured by hand, by the artisans. Basket weaving, pottery and other handicrafts are examples of cottage industry. Small scale industries use lesser amount of capital and technology as compared to large scale industries that produce large volumes of products. Investment of capital is higher and the technology used is superior in large scale industries. Silk weaving and food processing industries are small scale industries (Fig 5.1). Production of automobiles and heavy machinery are large scale industries.

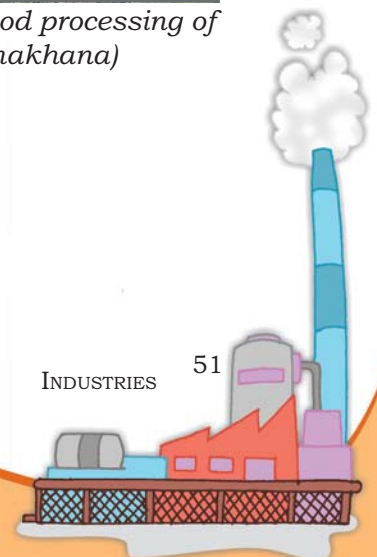
**Ownership:** Industries can be classified into private sector, state owned or public sector, joint sector and cooperative sector. **Private sector industries** are owned and operated by individuals or a group of individuals. The public sector industries are owned and operated by the government, such as Hindustan Aeronautics Limited

### Activity

Give some examples of agro based industries.



**Fig 5.1:** Stages in food processing of Gorgon nut (makhana)

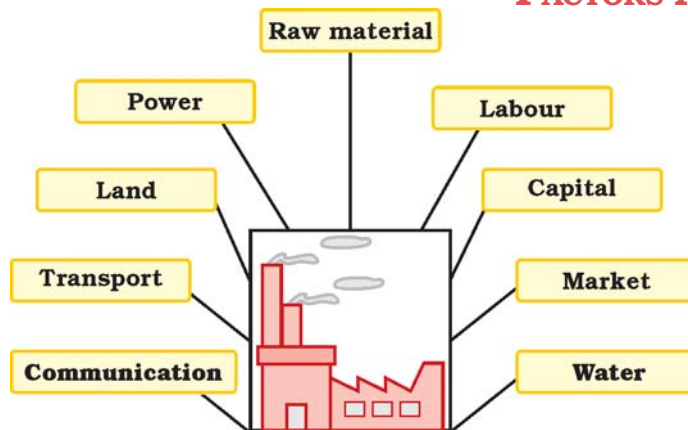




**Fig 5.2:** Sudha dairy in Co-operative sector

and Steel Authority of India Limited. **Joint sector industries** are owned and operated by the state and individuals or a group of individuals. Maruti Udyog Limited is an example of joint sector industry. **Co-operative sector** industries are owned and operated by the producers or suppliers of raw materials, workers or both. Anand Milk Union Limited and Sudha Dairy are a success stories of a co-operative venture.

## FACTORS AFFECTING LOCATION OF INDUSTRIES



**Fig 5.3:** Locational factors of industries

The factors affecting the location of industries are the availability of raw material, land, water, labour, power, capital, transport and market. Industries are situated where some or all of these factors are easily available. Sometimes, the government provides incentives like subsidised power, lower transport cost and other infrastructure so that industries may be located in backward areas. Industrialisation often leads to development and growth of towns and cities.

## INDUSTRIAL SYSTEM

An industrial system consists of inputs, processes and outputs. The inputs are the raw materials, labour and costs of land, transport, power and other infrastructure. The processes include a wide range of activities that convert the raw material into finished products. The outputs are the end product and the income earned from it. In case of the textile industry the inputs may be cotton, human labour, factory and transport cost. The processes include ginning, spinning, weaving, dyeing and printing. The output is the shirt you wear.

### Activity

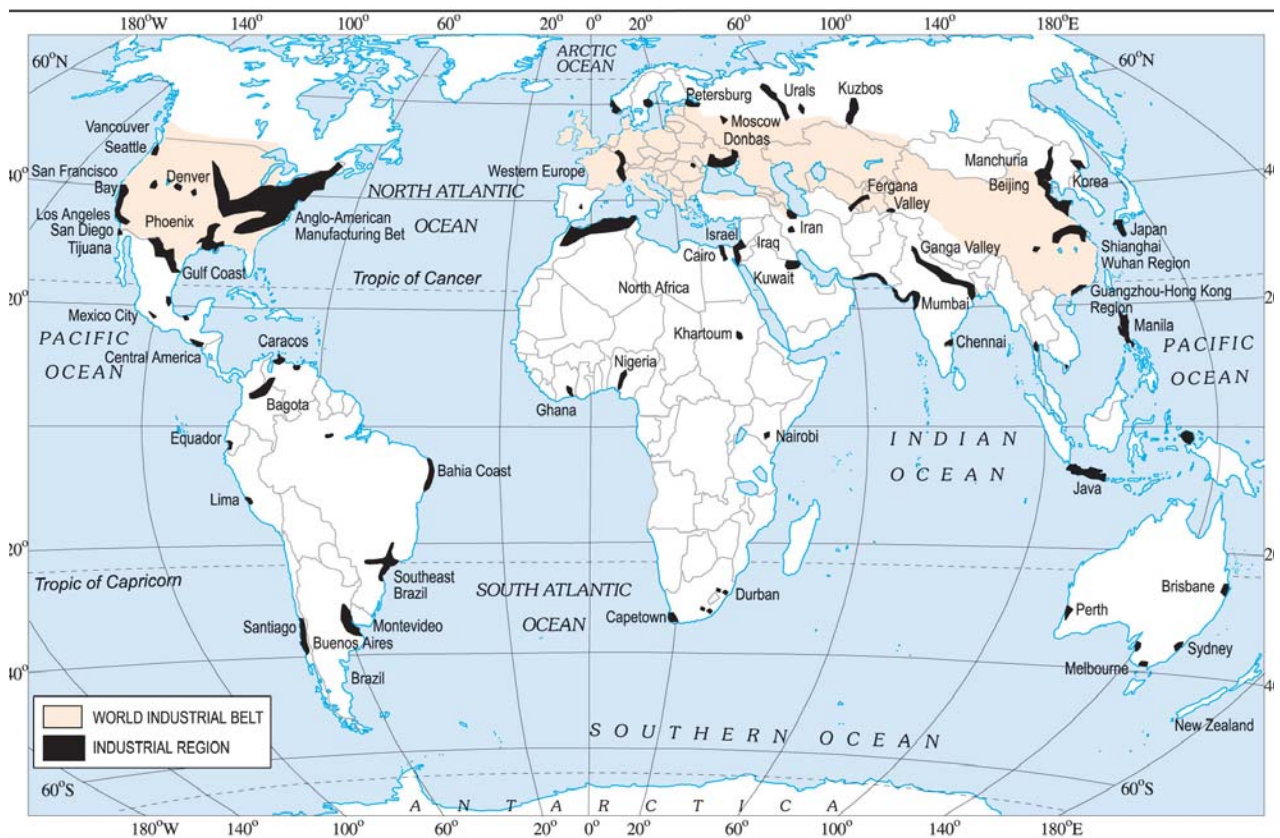
Find out the inputs, outputs and processes involved in the manufacture of a leather shoe.

## INDUSTRIAL REGIONS

Industrial regions emerge when a number of industries locate close to each other and share the benefits of their closeness. Major industrial regions of the world are eastern North America, western and central Europe, eastern Europe and eastern Asia (Fig 5.4). Major







**Fig 5.4:** World's Industrial Regions

industrial regions tend to be located in the temperate areas, near sea ports and especially near coal fields.

India has several industrial regions like Mumbai-Pune cluster, Bangalore-Tamil Nadu region, Hugli region, Ahmedabad-Baroda region, Chottanagpur industrial belt, Vishakhapatnam-Guntur belt, Gurgaon-Delhi-Meerut region and the Kollam-Thiruvananthapuram industrial cluster.

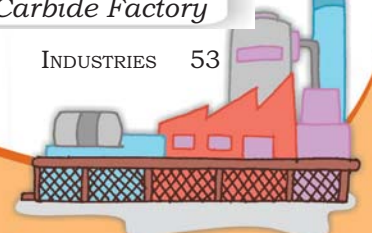
### Industrial Disaster

In industries, accidents/disaster mainly occur due to technical failure or irresponsible handling of hazardous material.

One of the worst industrial disasters of all time occurred in Bhopal on 3 December 1984 around 00:30 a.m. It was a technological accident in which highly poisonous Methyl Isocyanate (MIC) gas along with Hydrogen Cyanide and other reaction products leaked out of the pesticide factory of Union Carbide. The official death toll was 3,598 in 1989. Thousands, who survived still suffer from one or many ailments like blindness, impaired immune system, gastrointestinal disorders etc.



*Union Carbide Factory*



In another incident, on 23 December 2005, due to gas well blowout in Gao Qiao, Chongqing, China, 243 people died, 9,000 were injured and 64,000 were evacuated. Many people died because they were unable to run after the explosion. Those who could not escape in time suffered burns to their eyes, skin and lungs from the gas.



*Rescue operation  
in Gao Qiao*

### Risk Reduction Measures

1. Densely populated residential areas should be separated far away from the industrial areas.
2. People staying in the vicinity of industries should be aware of the storage of toxins or hazardous substances and their possible effects in case if an accident occurs.
3. Fire warning and fighting system should be improved.
4. Storage capacity of toxic substances should be limited.
5. Pollution dispersion qualities in the industries should be improved.

#### Do you know?

Emerging industries are also known as 'Sunrise Industries'. These include Information technology, Wellness, Hospitality and Knowledge.



### DISTRIBUTION OF MAJOR INDUSTRIES

The world's major industries are the iron and steel industry, the textile industry and the information technology industry. The iron and steel and textile industry are the older industries while information technology is an emerging industry.

The countries in which iron and steel industry is located are Germany, USA, China, Japan and Russia. Textile industry is concentrated in India, Hong Kong, South Korea, Japan and Taiwan. The major hubs of Information technology industry are the Silicon valley of Central California and the Bangalore region of India.

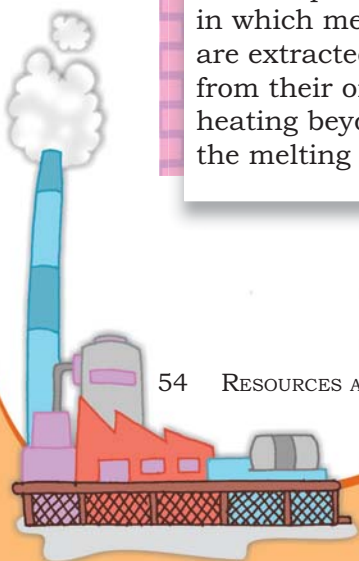
### Iron and Steel Industry

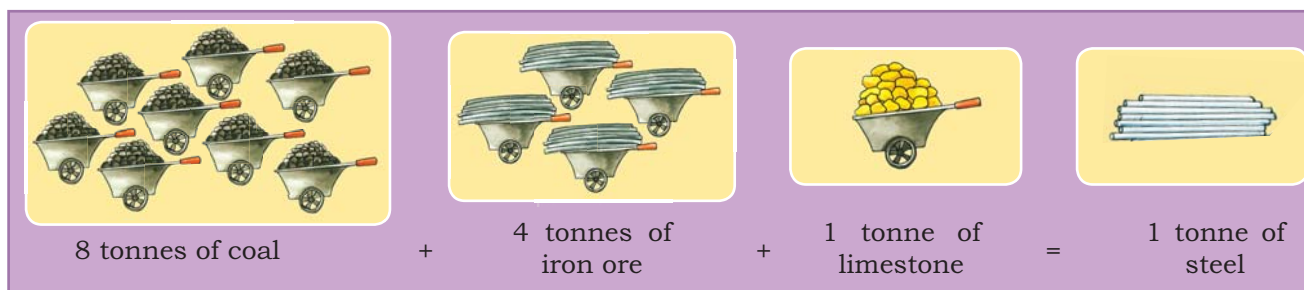
Like other industries iron and steel industry too comprises various inputs, processes and outputs. This is a feeder industry whose products are used as raw material for other industries.

The inputs for the industry include raw materials such as iron ore, coal and limestone, along with labour, capital, site and other infrastructure. The process of converting iron ore into steel involves many stages. The raw material is put in the blast furnace where it undergoes smelting (Fig 5.6). It is then refined. The output obtained is steel which may be used by other industries as raw material.

#### Glossary Smelting

It is the process in which metals are extracted from their ores by heating beyond the melting point





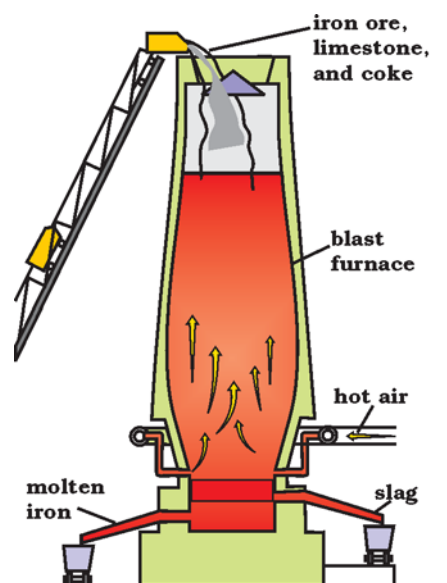
**Fig 5.5:** Manufacturing of steel

Steel is tough and it can easily be shaped, cut, or made into wire. Special alloys of steel can be made by adding small amounts of other metals such as aluminium, nickel, and copper. Alloys give steel unusual hardness, toughness, or ability to resist rust.

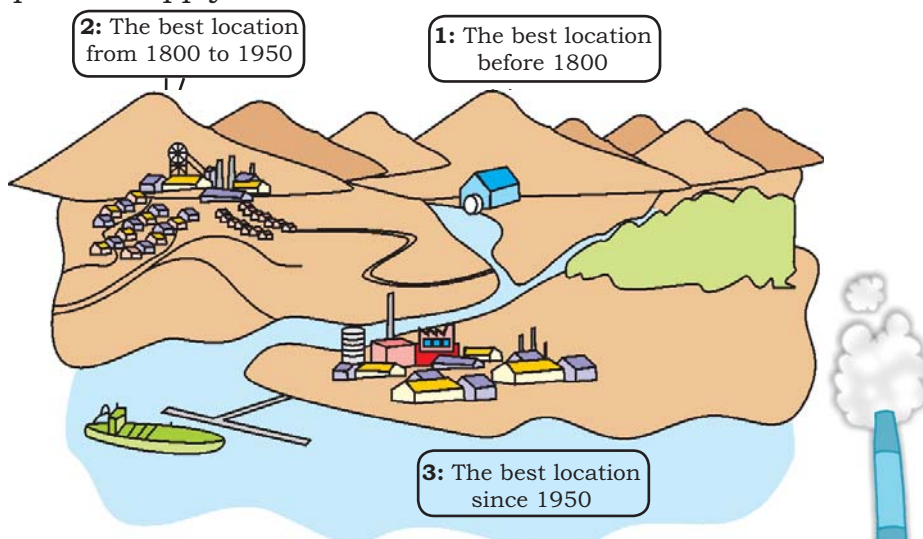
Steel is often called the backbone of modern industry. Almost everything we use is either made of iron or steel or has been made with tools and machinery of these metals. Ships, trains, trucks, and autos are made largely of steel. Even the safety pins and the needles you use are made from steel. Oil wells are drilled with steel machinery. Steel pipelines transport oil. Minerals are mined with steel equipment. Farm machines are mostly steel. Large buildings have steel framework.

Before 1800 A.D. iron and steel industry was located where raw materials, power supply and running water were easily available. Later the ideal location for the industry was near coal fields and close to canals and railways. After 1950, iron and steel industry began to be located on large areas of flat land near sea ports. This is because by this time steel works had become very large and iron ore had to be imported from overseas (Fig 5.7).

In India, iron and steel industry has developed taking

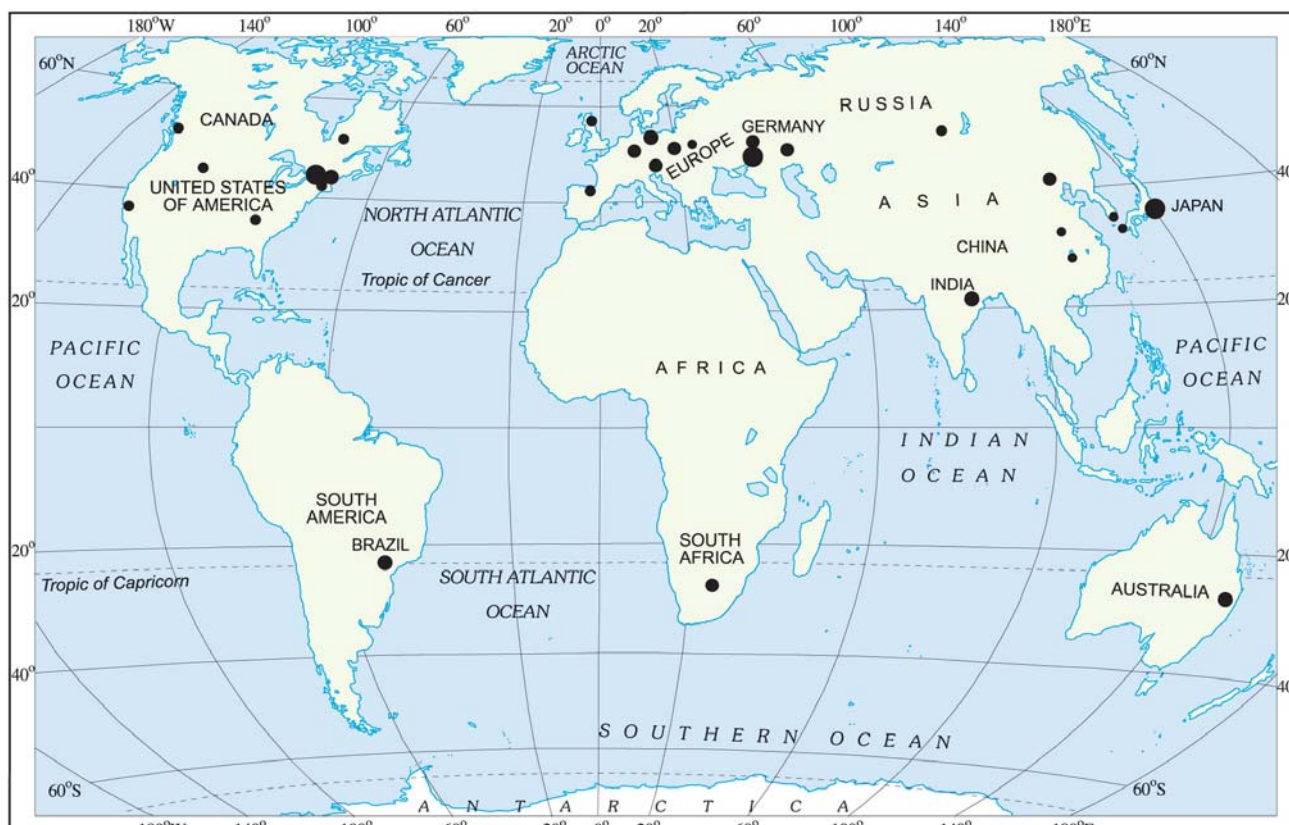


**Fig. 5.6:** From iron ore to steel in a blast furnace



**Fig 5.7:** The changing location of the iron and steel industry



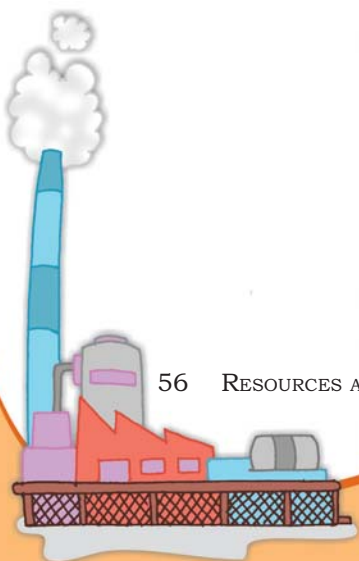


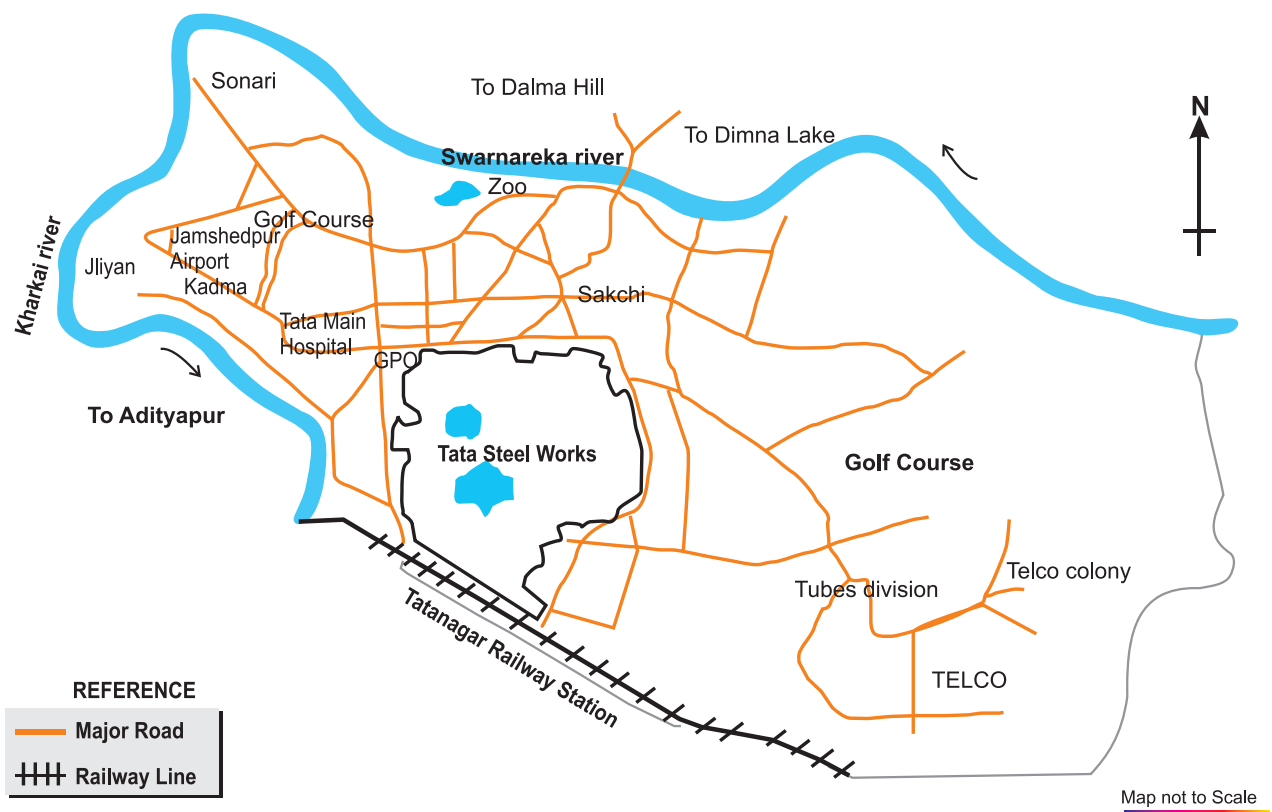
**Fig 5.8:** World: Major Iron Ore Producing Areas

advantage of raw materials, cheap labour, transport and market. All the important steel producing centres such as Bhilai, Durgapur, Burnpur, Jamshedpur, Rourkela, Bokaro are situated in a region that spreads over four states — West Bengal, Jharkhand, Orissa and Chhattisgarh. Bhadravati and Vijay Nagar in Karnataka, Vishakhapatnam in Andhra Pradesh, Salem in Tamil Nadu are other important steel centres utilising local resources. India's steel production increased from one million tonne in 1947 to 30 million tonnes in 2002.

### **TATA IRON AND STEEL COMPANY, JAMSHEDPUR**

Before 1947, there was only one iron and steel plant in the country – Tata Iron and Steel Company Limited (TISCO). It was privately owned. After Independence, the government took the initiative and set up several iron and steel plants. TISCO was started in 1907 at Sakchi, near the confluence of the rivers Subarnarekha and Kharkai in Jharkhand. Geographically, Jamshedpur is the most conveniently situated iron and steel centre in the country.



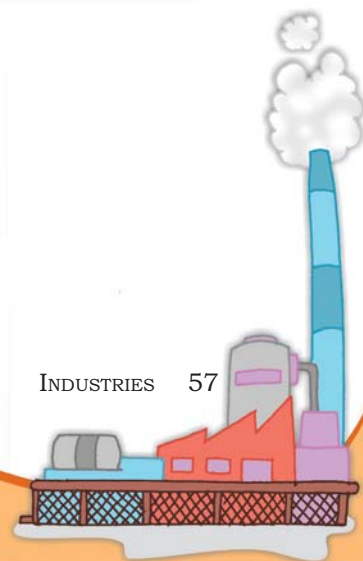
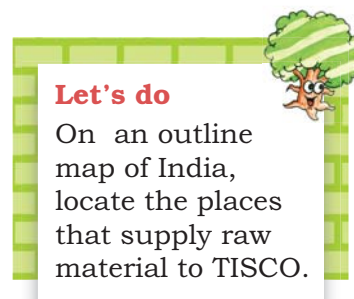


**Fig 5.9:** Location of iron and steel industry in Jamshedpur

Sakchi was chosen to set up the steel plant for several reasons. This place was only 32 km away from Kalimati station on the Bengal-Nagpur railway line. It was close to the iron ore, coal and manganese deposits as well as to Kolkata, which provided a large market. TISCO, gets coal from Jharia coalfields, and iron ore, limestone, dolomite and manganese from Orissa and Chhattisgarh. The Kharkai and Subarnarekha rivers ensured sufficient water supply. Government initiatives provided adequate capital for its later development.

In Jamshedpur, several other industrial plants were set up after TISCO. They produce chemicals, locomotive parts, agricultural equipment, machinery, tinplate, cable and wire.

The development of the iron and steel industry opened the doors to rapid industrial development in India. Almost all sectors of the Indian industry depend heavily on the iron and steel industry for their basic infrastructure. The Indian iron and steel industry consists of large integrated steel plants as well as mini



steel mills. It also includes secondary producers, rolling mills and ancillary industries.

**Pittsburgh** : It is an important steel city of the United States of America. The steel industry at Pittsburgh enjoys locational advantages. Some of the raw material such as coal is available locally, while the iron ore comes from the iron mines at Minnesota, about 1500 km from Pittsburgh. Between these mines and Pittsburgh is one of the world's best routes for shipping ore cheaply – the famous Great Lakes waterway. Trains carry the ore from the Great Lakes to the Pittsburgh area. The Ohio, the Monogahela and Allegheny rivers provide adequate water supply.

Today, very few of the large steel mills are in Pittsburgh itself. They are located in the valleys of the Monogahela and Allegheny rivers above Pittsburgh and along the Ohio River below it. Finished steel is transported to the market by both land and water routes.

The Pittsburgh area has many factories other than steel mills. These use steel as their raw material to make many different products such as railroad equipment, heavy machinery and rails.

### Do you know?

The name of great lakes are Superior, Huron, Ontario, Michigan and Erie. Lake Superior is the largest of these five lakes. It lies higher upstream than others.



### Word Origin

The term 'textile' is derived from Latin word *texere* which means to weave.

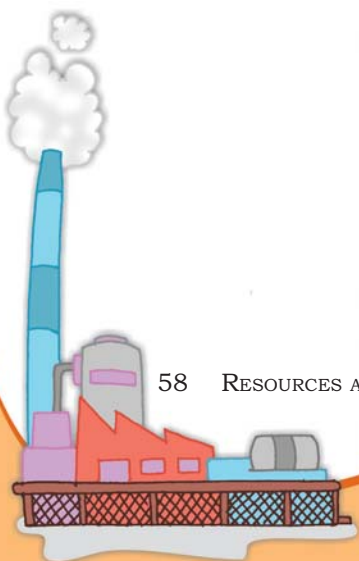


## COTTON TEXTILE INDUSTRY

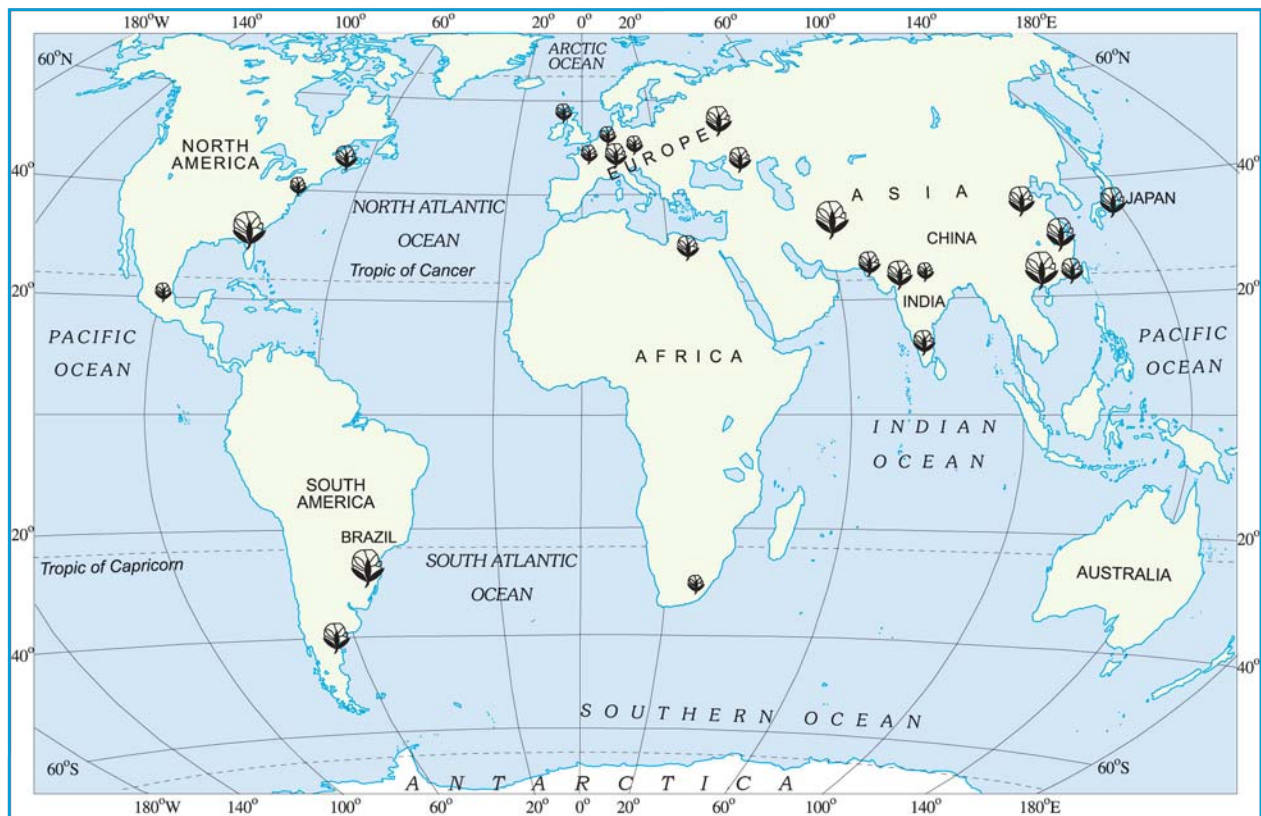
Weaving cloth from yarn is an ancient art. Cotton, wool, silk, jute, flax have been used for making cloth. The textile industry can be divided on the basis of raw materials used in them. Fibres are the raw material of textile industry. Fibres can be natural or man-made. Natural fibres are obtained from wool, silk, cotton, linen and jute. Man made fibres include nylon, polyester, acrylic and rayon.

The cotton textile industry is one of the oldest industries in the world. Till the industrial revolution in the 18th century, cotton cloth was made using hand spinning techniques (wheels) and looms. In 18th century power looms facilitated the development of cotton textile industry, first in the Great Britain and later in other parts of the world. Today India, China, Japan and USA are the important producers of cotton textiles.

India has a glorious tradition of producing good quality cotton textiles. Before the British rule, Indian hand spun







**Fig 5.10:** World : Major cotton textile manufacturing regions

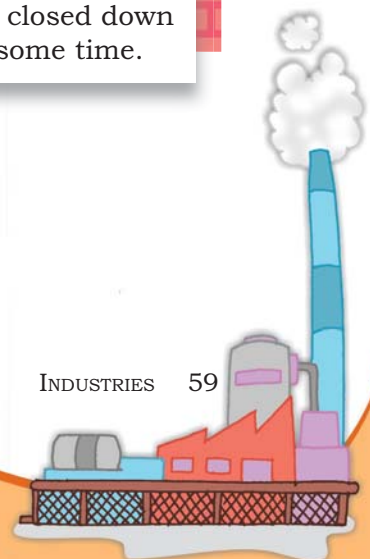
and hand woven cloth already had a wide market. The *Muslins* of Dhaka, *Chintzes* of Masulipatnam, *Calicos* of Calicut and Gold-wrought cotton pieces of Burhanpur, Surat and Vadodara were known worldwide for their quality and design. But the production of hand woven cotton textile was expensive and time consuming. Hence, traditional cotton textile industry could not face the competition from the new textile mills of the West, which produced cheap and good quality fabrics.

The first successful modern textile mill was established in Mumbai in 1854. The warm, moist climate, port for importing machinery, availability of raw material and skilled labour resulted in rapid expansion of the industry in the region.

Initially this industry flourished in the states of Maharashtra and Gujarat because of favourable humid climate. But today, humidity can be created artificially, and raw cotton is a pure and not weight losing raw material, so this industry has spread to other parts

#### Do you know?

The first textile mill in the country was established at Fort Gloster near Kolkata in 1818 but it closed down after some time.





### Do you know?

About one-third of the Indian textiles industry's total production is exported.



### Activity

Collect different types of cloth pieces from the tailor's shop and classify them under cotton, silk, synthetic and woollen. Find out the raw materials used in their manufacturing.



### Let's do

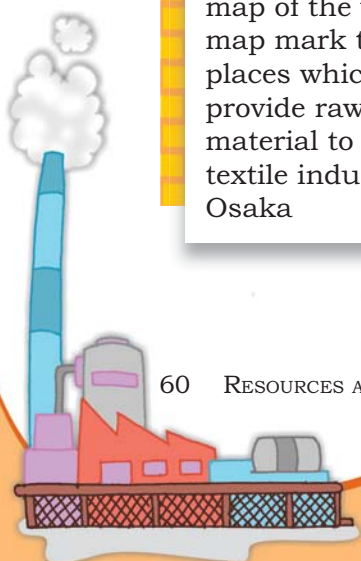
On an outline map of the world map mark the places which provide raw material to cotton textile industry of Osaka

of India. Coimbatore, Kanpur, Chennai, Ahmedabad, Mumbai, Kolkata, Ludhiana, Pondicherry and Panipat are some of the other important centres.

**Ahmedabad :** It is located in Gujarat on the banks of the Sabarmati river. The first mill was established in 1859. It soon became the second largest textile city of India, after Mumbai. Ahmedabad is often referred to as the 'Manchester of India'. Favourable locational factors were responsible for the development of the textile industry in Ahmedabad. Ahmedabad is situated in the heart of a cotton growing area. This ensures easy availability of raw material. The humid climate is ideal for spinning and weaving. The flat terrain and easy availability of land is suitable for the establishment of the mills. The densely populated states of Gujarat and Maharashtra provide both skilled and semi-skilled labour. Well developed road and railway network permits easy transportation of textiles to different parts of the country, thus providing easy access to the market. Mumbai port nearby facilitates import of machinery and export of cotton textiles.

But in the recent years, Ahmedabad textile mills have been having some problems. Several textile mills have closed down. This is primarily due to emergence of new textile centres in the country as well as non-upgradation of machines and technology in the mills of Ahmedabad.

**Osaka :** It is an important textile centre of Japan, also known as the 'Manchester of Japan'. The textile industry developed in Osaka due to several geographical factors. The extensive plain around Osaka ensured that land was easily available for the growth of cotton mills. Warm humid climate is well suited to spinning and weaving. The river Yodo provides sufficient water for the mills. Labour is easily available. Location of port facilitates import of raw cotton and for exporting textiles. The textile industry at Osaka depends completely upon imported raw materials. Cotton is imported from Egypt, India, China and USA. The finished product is mostly exported and has a good market due to good quality and low price. Though it is one of the important textile cities in the country, of late, the cotton textile industry of Osaka has been replaced by other industries, such as



iron and steel, machinery, shipbuilding, automobiles, electrical equipment and cement.

## INFORMATION TECHNOLOGY (IT)

*Imagine how much could be accomplished if companies could operate on a twenty-four hour workday. Some software companies in the United States of America and in Bangalore, India have joined hands to achieve this. There are many ways in which this form of shift work across oceans. For example, two software professionals, Danny in Silicon Valley, California and Smitha in Bangalore are working on a joint project. While Smitha in Bangalore sleeps, Danny in California is working. At the end of his workday, he sends a message to Smitha, updating his progress. When she arrives at work in Bangalore, a couple of hours later, she notices that a message awaits her. She gets to work on the project straight away. By the end of her workday she relays the results of her efforts back to California. By the way they communicate and work together, it is as if they were sitting in adjoining offices.*

The **information technology** industry deals in the storage, processing and distribution of information. Today, this industry has become global. This is due to a series of technological, political, and socio-economic events. The main factors guiding the location of these industries are resource availability, cost and infrastructure. The major hubs of the IT industry are the Silicon Valley, California and Bangalore, India.

Bangalore is located on the Deccan Plateau from where it gets the name 'Silicon Plateau'. The city is known for its mild climate throughout the year. Silicon Valley, is a part of Santa Clara Valley, located next to the Rocky Mountains of North America. The area has temperate climate with the temperatures rarely dropping below 0 degrees centigrade. The locational advantages of the Silicon plateau, Bangalore and Silicon Valley, California are discussed on the next page. You may notice the similarities between the two cities.

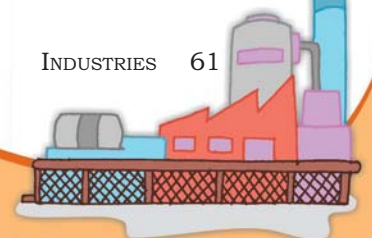
There are other emerging information technology hubs in metropolitan centres of India such as Mumbai,



**Fig 5.11:** A View of an IT industry

### Activity

Bangalore has some important public sectors and research institutions. Find out the full forms of the organisations listed below.  
BEL, BHEL, HAL,  
NAL, DRDO, ISRO,  
ITI, IISc, NCBS  
and UAS





### Do you know?

Why do high technology industries group together?

- They can be located near main road/highways for an easy access.
- Firms can benefit from exchange of knowledge.
- Services and facilities such as roads, car parks and waste disposal can be organised efficiently.



Bangalore has the largest number of educational institutions and IT colleges in India.

The city was considered dust free with low rents and cost of living.



The state government of Karnataka was the first to announce an IT Policy in 1992.



The city has the largest and widest availability of skilled managers with work experience.



**Fig 5.12:** Locational advantages  
Silicon plateau - Bangalore



Close to some of the most advanced scientific and technological centres in the world

Pleasant climate with an attractive and a clean environment. Plenty of space for development and future expansion.



Located close to major roads and airports

Good access to markets and skilled work force



**Fig. 5.13:** Locational advantages of  
Silicon valley - California

### Interesting Fact

**Being Bangalored...** means to lose one's job to someone in the city of Bangalore. Few years ago many IT jobs in the USA were outsourced to countries like India where equally skilled labour was available at lower salaries.

New Delhi, Hyderabad and Chennai. Other cities such as Gurgaon, Pune, Thiruvanthapuram, Kochi and Chandigarh are also important centres of the IT industry. However, Bangalore has always had a unique advantage, as a city with highest availability of middle and top management talent.





## Exercises

### 1. Answer the following questions.

- (i) What is meant by the term 'industry'?
- (ii) Which are the main factors which influence the location of an industry?
- (iii) Which industry is often referred to as the backbone of modern industry and why?
- (iv) Why cotton textile industry rapidly expanded in Mumbai?
- (v) What are the similarities between information technology industry in Bangalore and California?

### 2. Tick the correct answer.

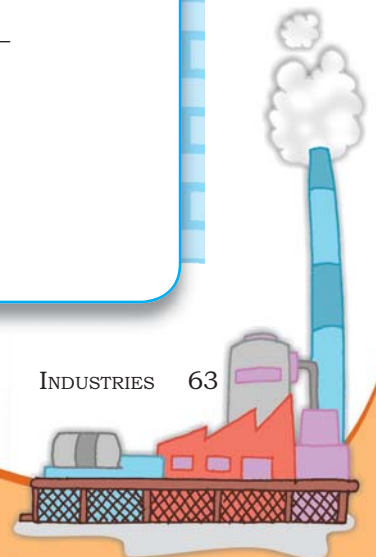
- (i) Silicon Valley is located in
  - (a) Bangalore
  - (b) California
  - (c) Ahmedabad
- (ii) Which one of the following industries is known as sunrise industry?
  - (a) Iron and steel industry
  - (b) Cotton textile
  - (c) Information technology
- (iii) Which one of the following is a natural fibre?
  - (a) nylon
  - (b) jute
  - (c) acrylic

### 3. Distinguish between the followings.

- (i) Agro-based and mineral based industry
- (ii) Public sector and joint sector industry

### 4. Give two examples of the following in the space provided.

- (i) Raw Materials: \_\_\_\_\_ and \_\_\_\_\_
- (ii) End product: \_\_\_\_\_ and \_\_\_\_\_
- (iii) Tertiary Activities: \_\_\_\_\_ and \_\_\_\_\_
- (iv) Agro-based Industries: \_\_\_\_\_ and \_\_\_\_\_
- (v) Cottage Industries: \_\_\_\_\_ and \_\_\_\_\_
- (vi) Co-operatives: \_\_\_\_\_ and \_\_\_\_\_

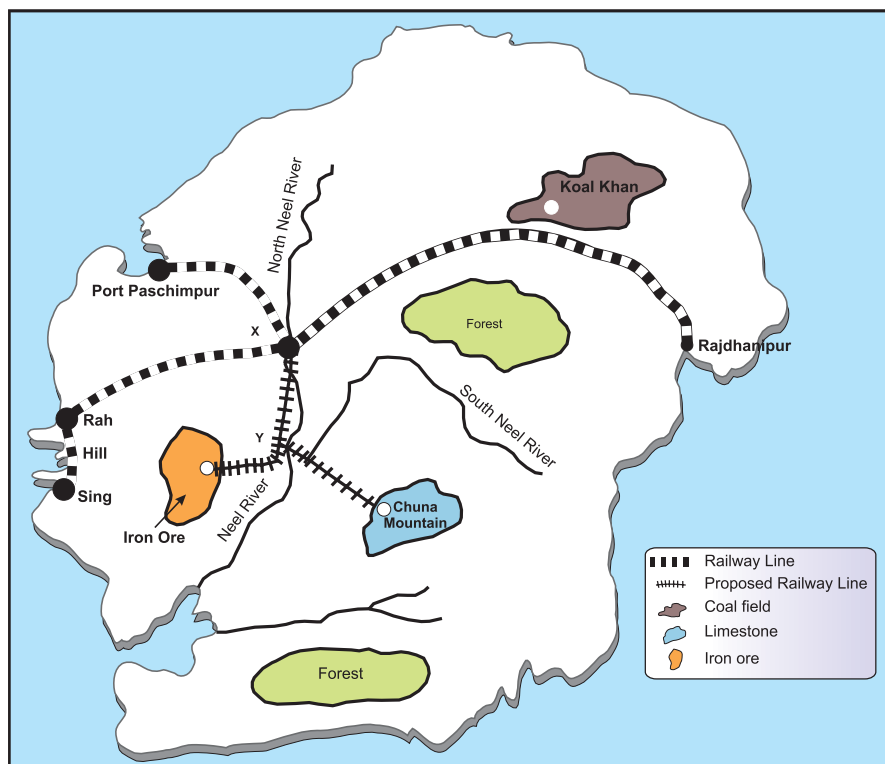


### 5. Activity

How to identify a location for establishing an industry —

Divide your class into groups. Each group is a Board of Directors faced with the problem of choosing a suitable site for an iron and steel plant of Developen Dweep. A team of technical experts have submitted a report with notes and a map. The team considered access to iron ore, coal, water and limestone, as well as the main market, sources of labour and port facilities. The team has suggested two sites, X and Y. The Board of Directors have to take the final decision of where to locate the steel plant.

- Read the report submitted by the team.
- Study the map to find out the distances of the resources from each site.
- Give each resource a 'weight' from 1 to 10, according to its importance. The greater the 'pull' of the factor on the industry the higher the weight from 1 to 10.
- Complete the table below.
- The site with the lowest total should be the most satisfactory site.
- Remember each group of directors can decide differently.





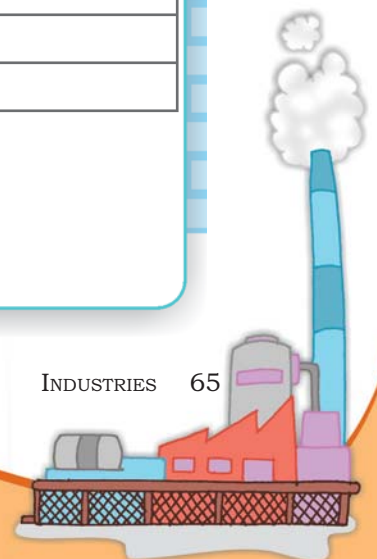
## Report

### Factors/Resources affecting the location of a proposed Iron and Steel Plant on Developon Dweep.

- **Iron ore:** This is a very large deposit of low grade iron ore. Long distance transportation of the ore would be uneconomic.
- **Coal:** The only coalfield contains rich deposits of high grade coal. Transportation of the coal is by railway, which is relatively cheap.
- **Limestone:** This is widely available over the island, but the purest deposits are in the Chuna Mountains.
- **Water:** Both the tributaries of River Neel carry sufficient water to supply a large iron and steel plant in all seasons. The sea water because of its high salt content is unsuitable.
- **Market:** It is expected that the chief market for the Plant's products will be the engineering works of Rajdhanipur. Transport costs for the products- mainly small steel bars and light steel plates would be relatively low.
- **Labour supply:** This will have to be recruited mainly from the unskilled workers in the 3 fishing villages of Hil, Rah and Sing. It is expected that most workers will commute daily from their present homes.
- **Port facilities:** These are at present minimal. There is a good, deep natural harbour at port Paschimpur developed to import metal alloys.

Resource	Distance from X	Distance from Y	Weighting* 1-10	Distance X weight for site X	Distance X weight for site Y
Iron ore					
Coal					
Limestone					
Water					
Chief market					
Labour supply					
			Total =		

\* the larger the pull, the higher the weighting



## Human Resources

### Do you know?

The Government of India has a Ministry of Human Resource Development. The Ministry was created in 1985 with an aim to improve people's skills. This just shows how important people are as a resource for the country.

People are a nation's greatest resource. Nature's bounty becomes significant only when people find it useful. It is people with their demands and abilities that turn them into 'resources'. Hence, **human resource** is the ultimate resource. Healthy, educated and motivated people develop resources as per their requirements.

Human resources like other resources are not equally distributed over the world. They differ in their educational levels, age and sex. Their numbers and characteristics also keep changing.



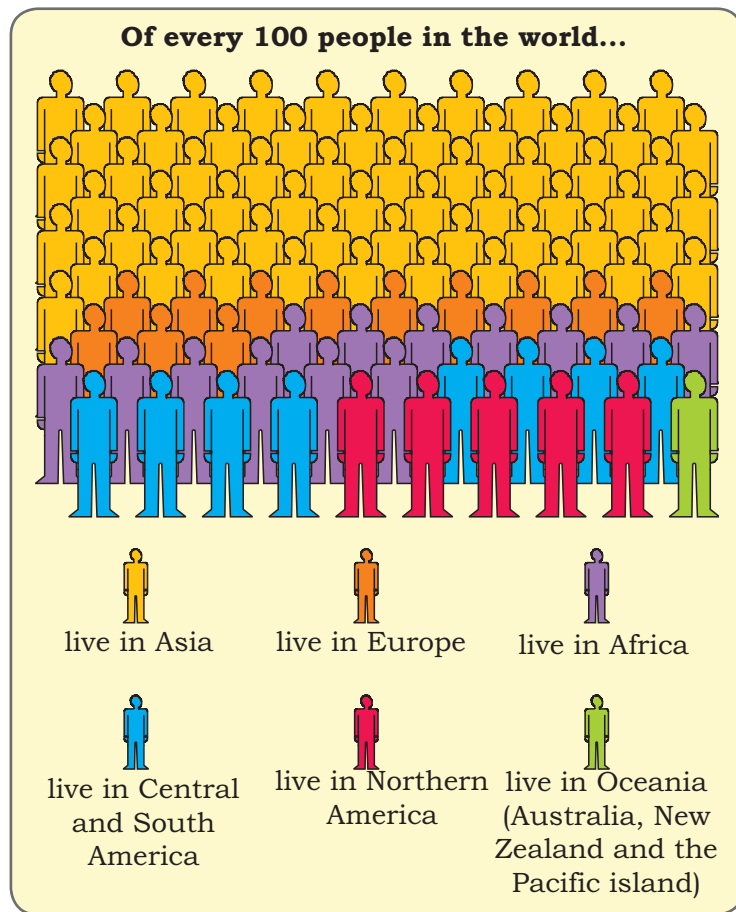
## DISTRIBUTION OF POPULATION

The way in which people are spread across the earth surface is known as **the pattern of population distribution**. More than 90 per cent of the world's population lives in about 10 per cent of the land surface. The distribution of population in the world is extremely uneven.

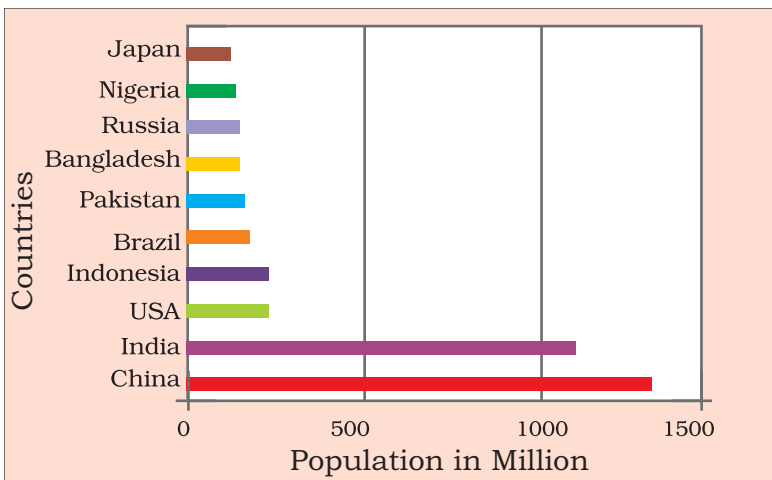
Some areas are very crowded and some are sparsely populated. The crowded areas are south and southeast Asia, Europe and north eastern North America. Very few people live in high latitude areas, tropical deserts, high mountains and areas of equatorial forests.

Many more people live north of the Equator than south of the Equator. Almost three-quarters of the world's people live in two continents Asia and Africa.

Sixty per cent of the world's people stay in just 10 countries. All of them have more than a 100 million people.



**Fig. 6.1:** World population by continents



**Fig. 6.2:** World's most populous countries

### Activity

Study Fig. 6.1 and find out :  
of the world's total population which continent has —  
(a) only 5 per cent  
(b) only 13 per cent  
(c) only 1 per cent  
(d) only 12 per cent

Population in Million





### Do you know?

Average density of population in India is 324 persons per square km.

## DENSITY OF POPULATION

Population density is the number of people living in a unit area of the earth's surface. It is normally expressed as per square km. The average density of population in the whole world is 45 persons per square km. South Central Asia has the highest density of population followed by East and South East Asia

When all the 30 students are present, our classroom seems very crowded. But when the same class is seated in the school assembly hall, it seems so open and empty. Why?



Because the size or area of the hall is much larger than that of the classroom. However, when all the students of the school come into the hall, the hall too starts looking crowded.

## FACTORS AFFECTING DISTRIBUTION OF POPULATION

### Geographical Factors

**Topography:** People always prefer to live on plains rather than mountains and plateaus because these areas are suitable for farming, manufacturing and service activities. The Ganga plains are the most densely populated areas of the world while mountains like Andes, Alps and Himalayas are sparsely populated.

**Climate:** People usually avoid extreme climates that are very hot or very cold like Sahara desert, polar regions of Russia, Canada and Antarctica.

**Soil:** Fertile soils provide suitable land for agriculture. Fertile plains such as Ganga and Brahmaputra in India, Hwang-He, Chang Jiang in China and the Nile in Egypt are densely populated.

**Water:** People prefer to live in the areas where fresh water is easily available. The river valleys of the world are densely populated while deserts have sparse population.

**Minerals:** Areas with mineral deposits are more populated. Diamond mines of South Africa and discovery of oil in the Middle east lead to settling of people in these areas.

### Social, Cultural and Economic Factors

**Social:** Areas of better housing, education and health facilities are more densely populated e.g., Pune.



### Activity

Look at Fig 6.2 and find out: of these countries how many are in Asia? Colour them on a world map.



**Cultural:** Places with religion or cultural significance attract people. Varanasi, Jerusalem and Vatican city are some examples.

**Economic:** Industrial areas provide employment opportunities. Large number of people are attracted to these areas. Osaka in Japan and Mumbai in India are two densely populated areas.

## Glossary

### Life expectancy

It is the number of years that an average person can expect to live.

## POPULATION CHANGE

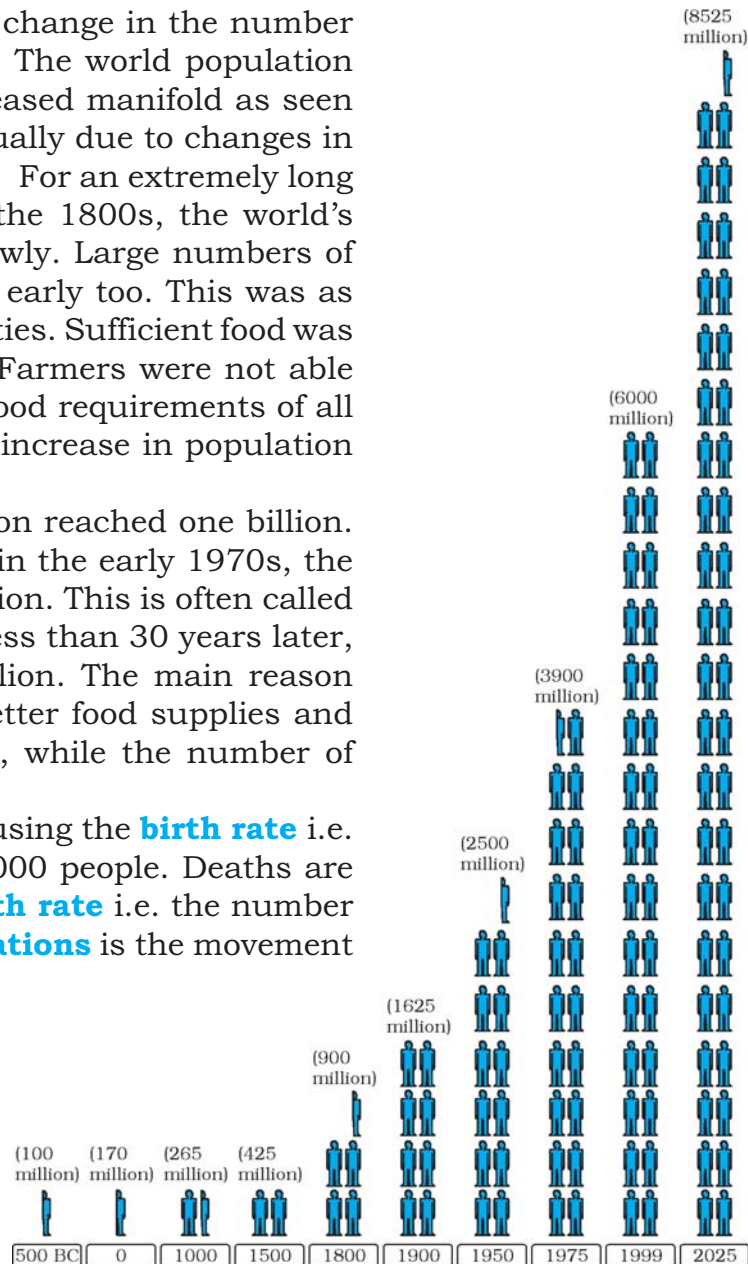
The population change refers to change in the number of people during a specific time. The world population has not been stable. It has increased manifold as seen in the Fig 6.3. Why? This is actually due to changes in the number of births and deaths. For an extremely long period of human history, until the 1800s, the world's population grew steadily but slowly. Large numbers of babies were born, but they died early too. This was as there were no proper health facilities. Sufficient food was not available for all the people. Farmers were not able to produce enough to meet the food requirements of all the people. As a result the total increase in population was very low.

In 1820, the world's population reached one billion. A hundred and fifty years later, in the early 1970s, the world's population reached 3 billion. This is often called population explosion. In 1999, less than 30 years later, the population doubled to 6 billion. The main reason for this growth was that with better food supplies and medicine, deaths were reducing, while the number of births still remained fairly high.

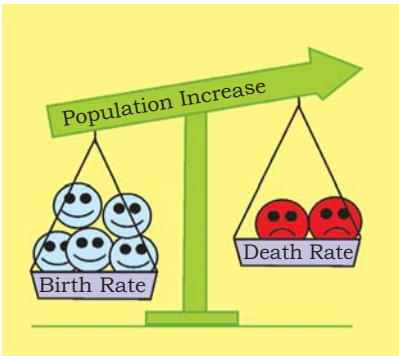
Births are usually measured using the **birth rate** i.e. the number of live births per 1,000 people. Deaths are usually measured using the **death rate** i.e. the number of deaths per 1,000 people. **Migrations** is the movement of people in and out of an area.

Births and deaths are the natural causes of population change. The difference between the birth rate and the death rate of a country is called the **natural growth rate**.

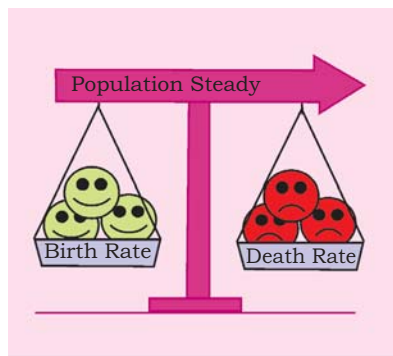
The population increase in the world is mainly due to rapid increase in natural growth rate.



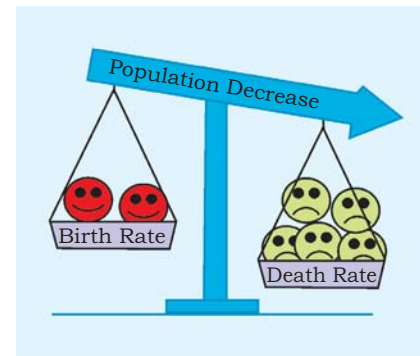
**Fig 6.3:** World Population Growth



Birth rate more than death rate: population increase



Birth rate and death rate: same population stays the same



Death rate more than birth rate: population decreases

**Fig 6.4:** Balance of Population

Migration is another way by which population size changes. People may move within a country or between countries. **Emigrants** are people who leave a country; **Immigrants** are those who arrive in a country.

Countries like the United States of America and Australia have gained in-numbers by **in-migration** or **immigration**. Sudan is an example of a country that has experienced a loss in population numbers due to **out-migration** or **emigration**.

The general trend of international migrations is from the less developed nations to the more developed nations in search of better employment opportunities. Within countries large number of people may move from the rural to urban areas in search of employment, education and health facilities.

## PATTERNS OF POPULATION CHANGE

Rates of population growth vary across the world (Fig 6.5). Although, the world's total population is rising rapidly, not all countries are experiencing this growth. Some countries like Kenya have high population growth rates. They had both high birth rates and death rates. Now, with improving health care, death rates have fallen, but birth rates still remain high leading to high growth rates.

In other countries like United Kingdom, population growth is slowing because of both low death and low birth rates.

### Glossary

#### Immigration

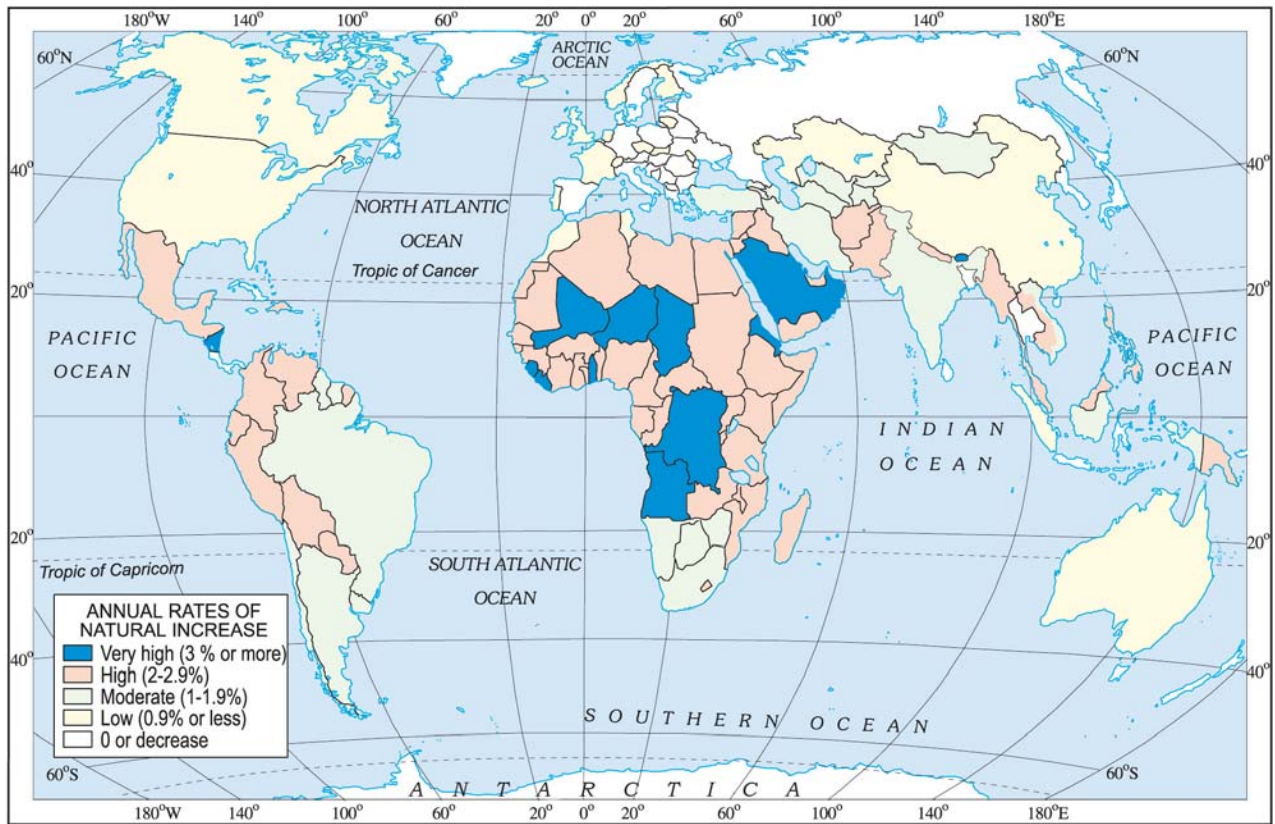
When a person enters a new country.

#### Emigration

When a person leaves a country.







**Fig. 6.5:** World: Differing rates of population growth

## POPULATION COMPOSITION

How crowded a country is, has little to do with its level of economic development. For example, both Bangladesh and Japan are very densely populated but Japan is far more economically developed than Bangladesh.

To understand the role of people as a resource, we need to know more about their qualities. People vary greatly in their age, sex, literacy level, health condition, occupation and income level. It is essential to understand these characteristics of the people. Population composition refers to the structure of the population.

The composition of population helps us to know

I tell stories to my grandchildren.

I build bridges.

I sing at weddings.

I take care of my home.

I am researching for medicines to cure cancer.

I am a farmer.

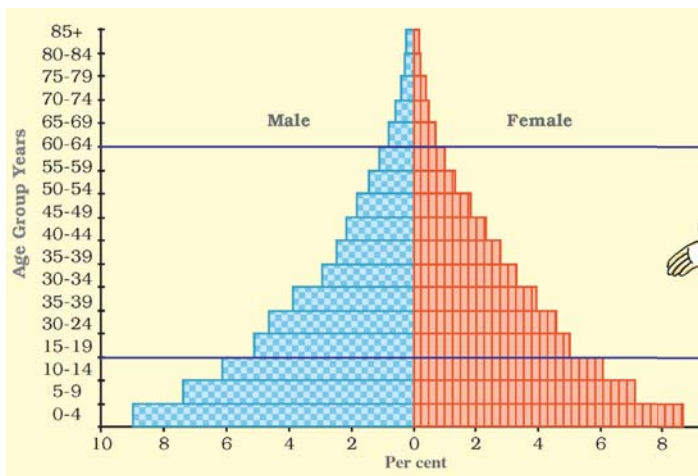
**Think:** Every human being is potential resource for the society. What will be your contribution as a human resource?

how many are males or females, which age group they belong to, how educated they are and what type of occupations they are employed in, what their income levels and health conditions are.

An interesting way of studying the population composition of a country is by looking at the population pyramid, also called an age-sex pyramid.

A population pyramid shows

- The total population divided into various age groups, e.g., 5 to 9 years, 10 to 14 years.
- The percentage of the total population, subdivided into males and females, in each of those groups.



What is this triangular looking diagram?

This is a population pyramid.

Fig. 6.6: Population Pyramid

What's that?

It shows the pre-sent number of males and females in a country along with their age groups.

Can I play detective and investigate the population of a country.

Sure, let's study three countries.



The shape of the population pyramid tells the story of the people living in that particular country. The numbers of children (below 15 years) are shown at the bottom and reflect the level of births. The size of the top shows the numbers of aged people (above 65 years) and reflects the number of deaths.

The population pyramid also tells us how many dependents there are in a country. There are two groups of dependents — young dependents (aged below 15 years) and elderly dependents (aged over 65 years). Those of the working age are the economically active.

The population pyramid of a country in which birth and death rates both are high is broad at the base and rapidly narrows towards the top. This is because although,

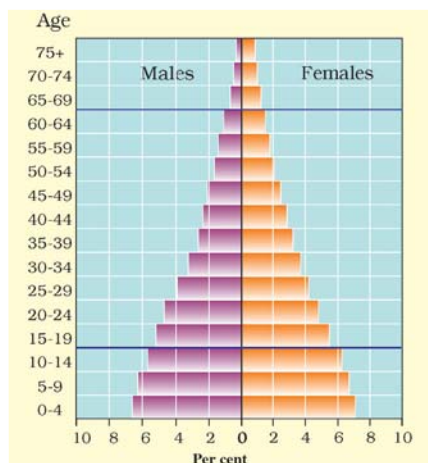


Fig. 6.8: Population Pyramid of India

many children are born, a large percentage of them die in their infancy, relatively few become adults and there are very few old people. This situation is typified by the pyramid shown for Kenya (Fig 6.7).

In countries where death rates (especially amongst the very young) are decreasing, the pyramid is broad in the younger age groups, because more infants survive to adulthood. This can be seen in the pyramid for India (Fig 6.8). Such populations contain a relatively large number of young people and which means a strong and expanding labour force.

In countries like Japan, low birth rates make the pyramid narrow at the base (Fig 6.9). Decreased death rates allow numbers of people to reach old age.

Skilled, spirited and hopeful young people endowed with a positive outlook are the future of any nation. We in India are fortunate to have such a resource. They must be educated and provided skills and opportunities to become able and productive.

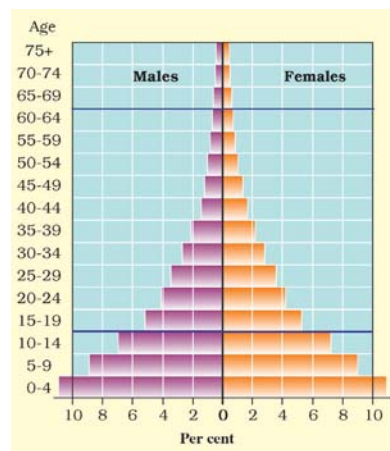


Fig. 6.7: Population Pyramid of Kenya

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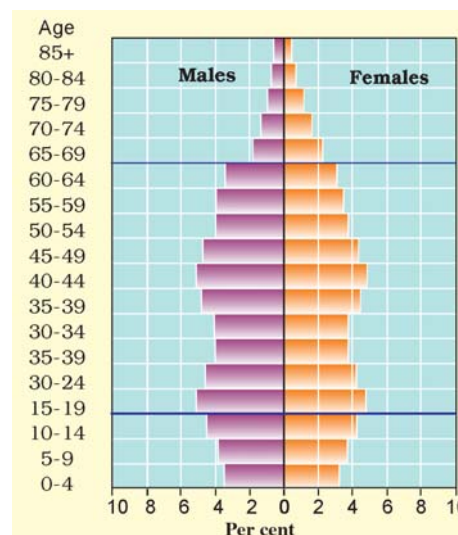


Fig. 6.9: Population Pyramid of Japan







## Exercise

### 1. Answer the following questions.

- (i) Why are people considered a resource?
- (ii) What are the causes for the uneven distribution of population in the world?
- (iii) The world population has grown very rapidly. Why?
- (iv) Discuss the role of any two factors influencing population change.
- (v) What is meant by population composition?
- (vi) What are population pyramids? How do they help in understanding about the population of a country?

### 2. Tick the correct answer.

- (i) Which does the term population distribution refer to?
  - (a) How population in a specified area changes over time.
  - (b) The number of people who die in relation to the number of people born in a specified area.
  - (c) The way in which people are spread across a given area.
- (ii) Which are three main factors that cause population change?
  - (a) Births, deaths and marriage
  - (b) Births, deaths and migration
  - (c) Births, deaths and life expectancy
- (iii) In 1999, the world population reached
  - (a) 1 billion      (b) 3 billion      (c) 6 billion
- (iv) What is a population pyramid?
  - (a) A graphical presentation of the age, sex composition of a population.
  - (b) When the population density of an area is so high that people live in tall buildings.
  - (c) Pattern of population distribution in large urban areas.

### 3. Complete the sentences below using some of the following words.

sparingly, favourable, fallow, artificial, fertile, natural, extreme, densely

When people are attracted to an area it becomes .....  
populated

Factors that influence this include ..... climate; good  
supplies of ..... resources and ..... land.



#### 4. Activity

Discuss the characteristics of a society with 'too many under 15s' and one with 'too few under 15s'.

*Hint : need for schools; pension schemes, teachers, toys, wheel chairs, labour supply, hospitals.*

#### ***Some Internet Sources for More Information***

[www.ndmindia.nic.in](http://www.ndmindia.nic.in)  
[www.environmentdefense.org](http://www.environmentdefense.org)  
[www.freefoto.com](http://www.freefoto.com)  
[www.worldgame.org/worldmeters](http://www.worldgame.org/worldmeters)  
[www.cseindia.org](http://www.cseindia.org)  
[www.mnes.nic.in](http://www.mnes.nic.in)  
[www.undp.org/popin](http://www.undp.org/popin)



## **Notes**