

15 Natural disasters



Pay your attention to the news paper head lines shown in Figure 15.1



Figure 15.1 ▲ News on floods and landslides

Head lines given above are about some natural disasters that affected Sri Lanka.

Natural disasters are naturally occurring destructive incidents, without the mediation of man, causing harm to human lives, property, environment and economy.

Some such incidents are shown in Figure 15.2





Cyclone



Volcano



Earthquake

Figure 15.2 ▲ Some natural disasters

Some examples for natural disaster are drought, landslide, flood, lightning, forest fire, cyclone, earthquake, tsunami, tornado and glacier erosion. The way that natural disasters occur and their influence differ from region to region, and from country to country.

Reasons for the occurrence of natural disasters are the weather and climatic changes, changes occurring at the interior of the earth and the changes occurring in the biosphere. Human activities affect to increase the intensity of natural disasters.



Activity 15.1

Make a collection of news paper head lines written on natural disasters.

With referring to the collection, prepare a list of natural disasters occurring all over the world.

Some of the natural disasters that affect Sri Lanka are mentioned below.

- Drought
- Landslide
- Flood
- Lightning and thundering

We will study about them in this lesson.

15.1 Drought

Long term decrease of rain fall, due to the change of the pattern of rain fall is known as drought. Way of definition and the nature of identification may change from country to country, region to region and from time to time.

Decrease of the amount of rain fall during a given time period, and as well as the change of the rain fall pattern cause droughts.

Thus, the reasons that affect the pattern of rain fall, affect the drought also.

Let us do Assignment 15.1 to study the change of pattern of rain fall.



Assignment 15.1

Find the data of rain fall in Sri Lanka for past few years. Comparing those values, study the rain fall pattern. Data can be collected from the meteorological department or from internet. Ask the assistance of your teacher for this.

Reasons for drought

Natural reasons as well as human activities may affect this.

Natural reasons cause to change rain fall pattern and the amount of rain fall.

Some natural reasons for drought are mentioned below.

- Lack of timely monsoon winds
- Dry air currents
- The phenomenon of EL-NINO

As Sri Lanka is an island, wind pattern basically affects the rain fall. Study the Table 15.1 given below.

Table 15.1 - Methods that bring rain fall to Sri Lanka

Method of rain fall	Time period	Region / Zone
South - West monsoon	May - September	Wet zone
North - East monsoon	November - February	Dry zone
Convectional / Intermonsoonal rain	March - April September - October	All regions

Dry air currents increase the rate of transpiration in plants. It increases the absorption of ground water by the roots of plants. Fountains dry up due to the reduction of ground water. This condition may cause a drought.

El-NINO is a phenomenon caused by the increase of temperature of the surface water in Pacific ocean. With the increase of the temperature of surface water in the ocean, normal circulation pattern of global air currents and oceanic water currents or the streams change.

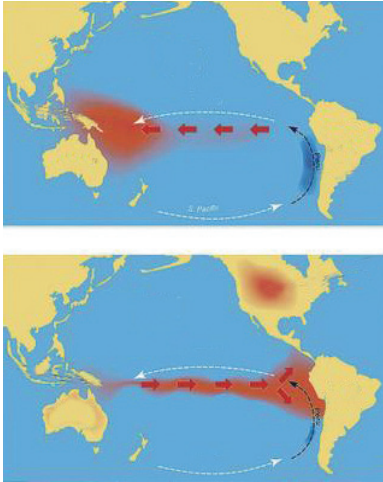


Figure 15.3 ▲ Wind pattern

Influence of the EL-NINO phenomenon may cause droughts as well as rain in Sri Lanka.

Drying up of water sources, decrease of water retention capacity in soil and global warming are the results of some human activities. These activities may cause the occurrence or further intensifying of droughts.

Some human activities that may cause drought are mentioned below.

- Seepage of rain water into soil decreases due to various constructions. This decreases the water retention capacity in the soil. Water sources dry out because of deforestation for construction work.
- Wastage of water by irregular and over use is a reason for drought.
- Decrease of water retention capacity in soil and accelerated soil erosion are the results of irregular cultivation of crops. Thus, water capacity of reservoirs decrease, resulting spillage.
- Deforestation influences the water cycle directly or indirectly. Convective rains and rain fall are affected by this.
- Global warming also change the pattern of rain fall. Gases like carbon dioxide released into the atmosphere due to human activities, leads to global warming. Such gases are known as greenhouse gases.

How droughts occur due to human activities and natural causes can be simply shown by Figure 15.4.

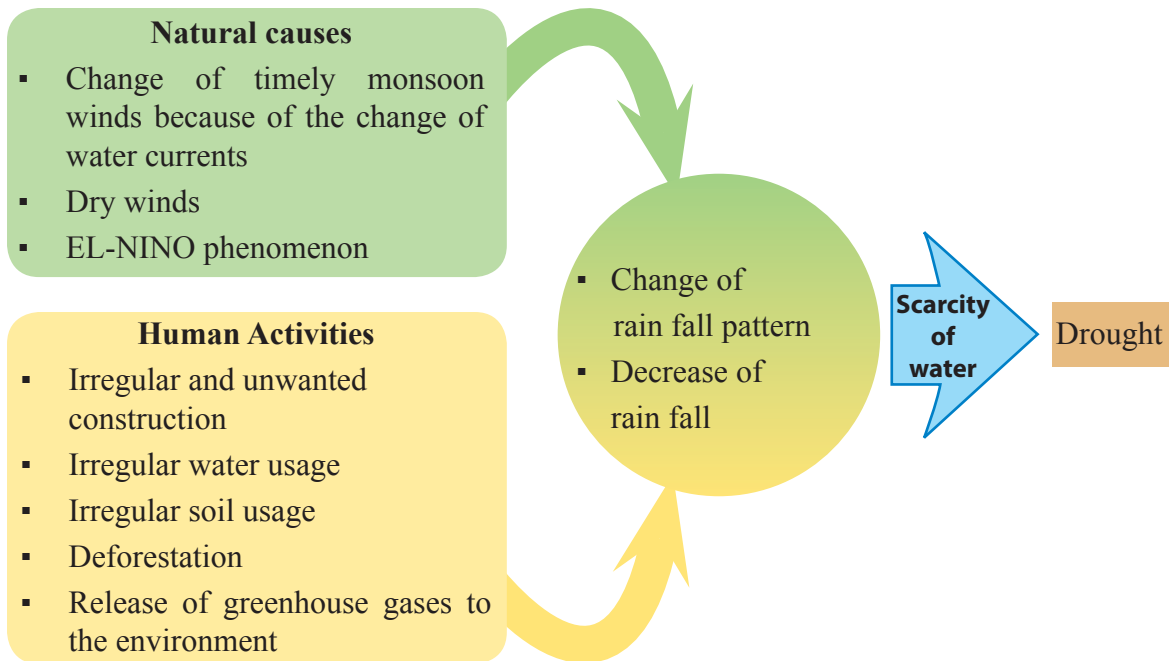


Figure 15.4 ▲

Drought basically affects the environment. Based on those environmental issues, various socio-economic issues also arise (Figure 15.5).

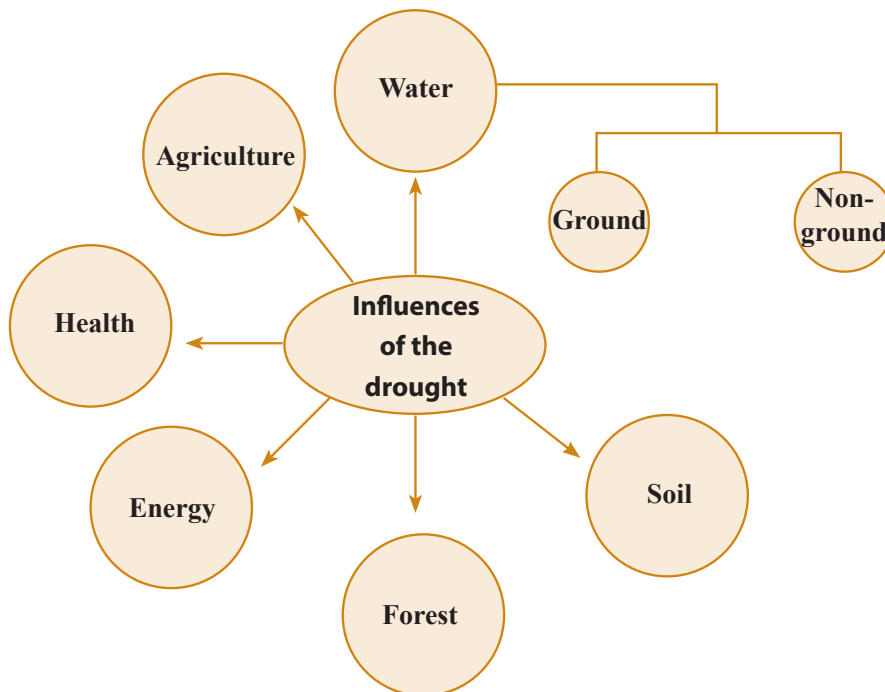


Figure 15.5 ▲ Fields, influences of the drought

Drought disaster management

There are three main steps that should be followed when managing any disaster.

- Readiness to face the disaster
- Mitigation of the damages caused by the disaster
- Adaptation to live with the disaster

Droughts are unavoidable. In the process of disaster management, readiness to face the disaster, mitigation and adaptation can be followed to minimize the damage caused by the disaster.

Some of the measures that can be taken in drought disaster management are given below.

- Avoiding the wastage and pollution of water - Rules and regulations should be introduced and people should be made aware of using water economically and without polluting.
- Planning agricultural activities with the view of conservation of water.
 - Practising economic water supply methods
 - Cultivating drought resistant crops
 - Mulching



Figure 15.6 ▲ Drought resistant corn plants

- Improving methods of collect rain water.
 - Increasing the capacity of reservoirs
 - Usage of methods to collect rain water domestically
- Reforestation - Growing forests in lieu of cleared forests
- Usage of alternatives to hydropower for the generation of power.

e.g.:- Wind power, solar power etc.



Figure 15.7 ▲ A method used to collect rain water domestically

15.2 Floods

Inundation of a usually uninundating area, due to heavy rain fall in a short period of time is known as a flood.

According to the way of occurrence, they can be categorised as below.

- **Floods due to over - flowing** - These floods occur due to the over flowing of rivers and other water ways.
- **Instantaneous floods** - This situation occurs due to the blockage of water drainage systems in urban areas

Reasons for floods

- High rain fall
- Removal of forest cover
- Reduction of the capacity of reservoirs
- Irregular construction work
- Blockage of water drainage systems
- Irregular land use
- Irregular land filling

Influences due to floods

- Loss of lives
- Failure of power supply, transportation and public services
- Damage to houses, property and roads
- Spread of communicable diseases after floods due to contamination of water sources

Management of flood disaster

- Refraining from putting up houses in flood areas. If it is necessary to put up a house in such a place, it is advisable to build it on pillars.
- Leaving partially inundated houses as it is dangerous to stay in them.
- Disconnecting the electricity supply of the houses and refraining from touching electrical items while being in water.
- Having identified a place and a method to keep goods securely during a flood.
- Having identified an elevated place to reach for security.
- Having prepared a disaster kit, contains drinking water, dry food stuffs and other essential items to take in the case of leaving home.
- Having prepared with a battery-powered radio.

- Refraining from walking through fast-flowing water. One can be pushed down by running water of the depth of six inches (15 cm).
- Refraining from driving motor vehicles across flooded area. Leaving the vehicle and reach a higher land, if the vehicle is drowned.

15.3 Landslide / Earth slip

Slipping down of soil layers in slopy regions in highlands can be considered as a landslide.

Landslides are a common disaster in central hills of Sri Lanka. Places of landslide danger are identified in some other districts, also. Those areas are in Badulla, Nuwara Eliya, Mathale, Kandy, Kegalle, Monaragala, Kurunegala, Rathnapura, Kaluthara, Galle, Mathara and Hambanthota districts. Such areas are shown in Figure 15.9.



Figure 15.8 ▲ A location of landslide

What is happening during a landslide is the slipping down of a lump of soil or a layer of soil upon another layer under gravity.

Continuous heavy rain causes landslides in risky regions. Soil, soaked in rain water becomes heavy. The bond between soil particles and the bed rock getting weak at the same time. Due to the weakened bond, there is a point that the bed rock can not hold the upper soil layer further. At that moment soil particles start to flow down suddenly and soil particles near by the activity region join with the flow.

Gravitational potential energy of the lumps of soil increases because of being in a higher elevation and absorption of water. This high potential energy is converted to kinetic energy while the layers of soil are slipping down. Because of this kinetic energy, lumps of soil and rocks collect everything in the route while flowing down. Sometimes the route of a landslide may be as long as 1 km.

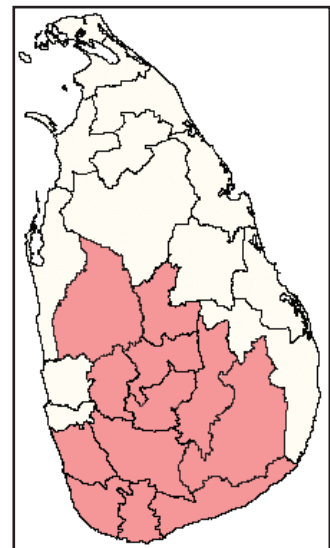


Figure 15.9 ▲ Regions which are subjected to the danger of landslides in Sri Lanka

Pre-signs of a landslide

If the following incidents are occurring with continuous heavy rainfall, it indicates a close-by landslide.

- Receiving more than 100 mm of rainfall within 24 hours
- Appearing new cracks on the surface of the slope
- Appearing cracks on buildings
- Depressions on earth
- Dying or slanting of trees on slopes
- Sudden leaking of muddy water on slopes
- Sudden surface run-off of water or disappearing of springs
- Animals showing abnormal behaviours
- Appearing new water springs
- Entering water into cracks of the earth and oozing out from some other places with mud

Management of landslides

- Removing the slide initiation area (slide initiation has a large rock or a thick layer of soil, under which there is an area of water or mud. That is the first place to collapse with a heavy noise during a landslide). Removing of slide initiation area is very difficult as it is not easy to reach the place. To avoid the destruction caused by landslide, the slide should be removed using cranes. This should be done by the relevant authorities.
- There are three main risk areas in a landslide namely initiation area, flow path and depositional area. Relevant authorities must be assigned power to take necessary measures to prevent landslides.
- Evacuating people from the areas subjected to landslides earlier and let the areas be stabilized.
- Bringing down water using pipe lines when it is collected in higher levels of a hill.
- Digging contour ditches to drain rain water down the slope without letting it soak into soil.
- If a slope of a hill is necessary to cut, it should be cut in cascade manner. Water drainage systems should be prepared. Cover crops should be grown. e.g.:- Lavender

- Stability of the land should be considered, when selecting a land to build a house. It is not suitable to build houses in slopy areas by cutting the slope. A place of prior landslide is also not suitable for putting up houses.

If a construction is to be done in a district of landslide threats, consulting National Building Research Organisation (NBRO) is necessary. People can get necessary directions from the regional offices of the soil organisation. The web address is www.nbro.gov.lk.

15.4 Lightning and thundering

There are tiny water droplets and ice crystals in cumulonimbus clouds. Because of air currents, those water droplets and ice crystals are rubbed each other. Thus, they become **charged**.



Figure 15.10 ▲ A cumulonimbus cloud and a lightning

Positive charges collect in the top layers of the cloud and negative charges collect in the bottom layer of the cloud. Positive charges are generated on the earth, right below the cloud. When the amount of charges reach a certain level, an electrical discharge occurs. It is known as lightning and thundering.

According to the way of electrical discharge, there are three types of lightning (Figure 15.11).

- Earth-lightning is an electrical discharge that transfer from a cloud to the earth.
- Cloud-lightning is an electrical discharge that transfer through the cloud or between two clouds.
- Air-lightning is an electrical discharge that transfer from a cloud into the air.

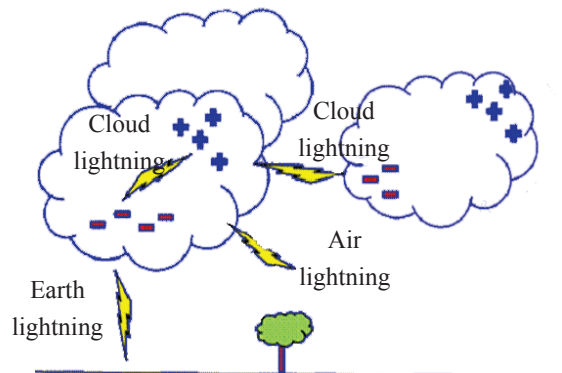


Figure 15.11 ▲ Types of lightning

Let us do Activity 15.2 to study about the discharging of electrical charges.



Activity 15.2

You will need :- Two thin dry plastic strips

Method:-

- Keep two plastic strips, one over the other. Hold them from one end to hang down.
- Rub the two strips down firmly using your thumb and another finger.
- Observe what happens.
- Try this activity using strips of transparent sheets.

You can observe that the plastic strips shift apart at the lower ends. That is because the strips are electrically charged.

If you drag apart the strips, you can observe a sound.



For extra knowledge

Voltage of a lightning stroke is about 100 million Volts. Electrical energy generated in lightning is very high. Electrical current of a lightning is about 25, 000 amperes.

Current flowing through a bulb of 25 W is about 0.1 A and Voltage of house hold electrical supply is 230 V.

Lightning danger is common during the inter-monsoons in Sri Lanka. Maximum number of accidents due to lightning were reported during the month of April. Each year, more than 50 deaths are reported due to lightning.

(from science data)

Tall buildings and trees are easily subjected to the hazard of lightning. The reason for this is that tall places provide the shortest path for the discharge of lightning from the clouds.

Management of Lightning hazards

Destruction of buildings by lightning can be avoided by fitting lightning conductors.

Lightning conductors should be fitted to the required standards. Some other protective measures from lightning are listed below.

- Avoid keeping the house connected to close-by trees with metallic wires. Metallic cloth lines and wires used to the trees that are slanted to the houses are some examples for this.
- Conducting wires in the environment (electricity supply wires, television antenna wires, protective wires, wire fences) help to conduct electric current of a lightning from place to place. Therefore, protective measures should be taken, when fixing them.

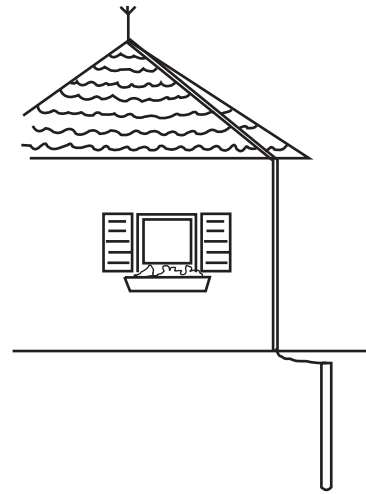


Figure 15.12 ▲ A building fitted with a lightning conductor

It is appropriate to follow the measures indicated below, when a lightning weather condition is forecast.

- Keeping the electrical appliances disconnected from the circuits.
- Keeping the disconnected plug of television antenna out of the house, near the ground.
- Refraining from using and touching metal equipments.
- Refraining from using telephones.

The things that should be done before a lightning weather condition are mentioned below.

- Going into a building or into a vehicle to minimize exposure to the environment.
- Going to a place of security, if the time interval between sight and the sound of the lightning thunder is less than 15 seconds.

Things to avoid during a lightning weather condition

- Avoid being in open places. If there is no time to go to a place of security, keep your legs close to each other and crouch to the ground.
- Refraining of being near tall trees and elevated places.
- Refraining from riding or driving open vehicles like cycles and tractors.
- Refraining from swimming, canoeing and walking on wet places.

Measures to be taken in connection with a person subjected to lightning hazard

All lightning hazards are not fatal. First aids should be given to a person subjected to such a threat.

If the limbs of the victim are numbed or stiffed, massaging can be done to recover.

If breathing is stopped, artificial breathing should be given. Both massaging and artificial breathing have to be given according to the nature of harm. Giving first aids should be continued till breathing starts.

It is not dangerous to touch a person subjected to a lightning hazard.



Activity 15.3

Construct a wall paper containing information on natural disasters that affect Sri Lanka. Pay your attention to the following points.

- Causes for the natural disasters
- Harms caused by disasters
- Measures that you can take to minimize the harms

Disasters and the reasons for their occurrence discussed in this chapter can be summarized as below (Table 15.2).

Table 15.2 - Disasters and the reasons for their occurrence

Disaster	Reasons for the occurrence of disaster
Drought	Accelerated evaporation and transpiration, deforestation and burning of forests, human activities like are pollution, global warming due to climatic changes
Landslides	Heavy rain, nature of rocks that the mountains are made of, irregular human activities
Floods	Heavy rain, influence of tides and stormy waves, irregular human activities
Lightning and thundering	Shifting / discharging of electrical charges to the earth from the clouds.

Damages caused by natural disasters can be minimized by acting in accordance with the instructions published over the media by relevant authorities.



Summary

- Droughts, floods, landslides and lightning hazards are some of the natural disasters that Sri Lanka faces.
- Natural reasons as well as human activities influence the occurrence of droughts, floods and landslides.
- Though the natural disasters are unavoidable, the harm caused by them can be minimized by taking necessary measures for readiness, mitigation and adaptation.
- Adaptations make people to live with some disasters for a long period of time.

Exercise

Select the correct answer.

1. Which of the following is **not** a human activity that affects the change of rain fall pattern ?
 1. Destruction of forests
 2. Reduction of forest cover
 3. Irregular soil management
 4. EL-NINO phenomenon
2. When is / are the cause of health problems that arise due to drought ?
 1. Scarcity of water
 2. Reduction of food supply
 3. Pollution of water sources
 4. All above

Answer following questions briefly.

1. Drought is one of the natural disasters that affects Sri Lanka.
 1. Mention three factors that contribute directly for drought.
 2. " Drought affects adversely for the generation of energy in Sri Lanka" Do you agree with the above idea? Describe reasons for your answer.
 3. Suggest three measures to be taken now to face the drought conditions that may occur in future.
2. From time to time, people of many countries have to face natural disasters like floods and landslides. One aspect of disaster management is to minimize the damages caused by such disasters.
 1. State two natural disasters that affect Sri Lanka other than those mentioned above.

2. What is the main reason for occurring floods?
 3. State two reasons for the occurrence of floods other than the one you mentioned above.
 4. Write four essential items that should be included in a disaster kit prepared to face floods.
 5. Name two communicable diseases that can spread after floods.
 6. What is landslide ?
 7. Write two human activities that affect landslides.
 8. Mention three pre-signs / foreruns seen in the associated environment before a landslide.
- 3.
1. What is known as a lightning ?
 2. How are the clouds charged to occur a lightning ?
 3. What are the three types of discharging that happen in the charged clouds ?
 4. What type of lightning, you mentioned above, is harmful to lives and property ?
 5. In which month, that the lightning hazards are maximum in Sri Lanka ?
 6. Mention three things that should not be done during lightning.
 7. State three protective measures that should be followed during a lightning weather condition.

Technical Terms

Droughts	- නියත	- வறட்சி
Floods	- மூலகூர்	- வெள்ளம்
Landslides	- நாயகூரீ	- மண்சரிவு
Lightning and thundering	- அகூகூ	- மின்னலும் இடியும்
Mitigation	- அலம கிரீம	- இழிவளவாக்கல்
Readiness	- கூடானம	- தயார் நிலை
Adaptation	- அகூகூரூரீ	- இசைவாக்கம்