

11 Climatic Changes

11.1 Weather

The following is a weather forecast telecast on a particular day in November.

"Showers will occur in Western and Eastern provinces. Thunder showers will occur in Western, Southern and Sabaragamuwa provinces during the evening. There will be brief strong winds with thunder showers. The Meteorological Department requests the people to take necessary steps to prevent from damages caused by thunder."



Fig 11.1 ▲ Telecasting weather reports



Assignment 11.1

You may have heard weather reports as above, in different media. Listen to a weather forecast in a particular channel for a week and record the details.

You can also get information about the day's weather from the following web address of the Meteorological Department www.meteo.gov.lk

The following table shows some details of weather that a grade 6 student recorded.

Date	City	Rainfall mm	Average temperature °C	Humidity %
2013.09.17	Anuradhapura	1.8	27.8	80
	Badulla	0.0	30.1	50
	Batticaloa	0.0	32.4	85
	Colombo	0.9	28.0	80
	Galle	0.3	27.5	85
	Hambanthota	0.6	28.9	75
2013.09.18	Anuradhapura	0.0	26.4	85
	Badulla	0.0	21.0	90
	Batticaloa	0.0	26.6	85
	Colombo	8.4	25.2	90
	Galle	18.0	26.6	95
	Hambanthota	47.6	26.2	90

Table 11.1

(Humidity is a measure of the amount of water vapour in the environment)

Study the above table and answer the given questions.

1. What is the unit used to measure the rain fall?
2. What is the unit used to measure the temperature?
3. Which city recorded the highest rainfall on 17.09.2013?
4. Which city recorded the highest temperature on 17.09.2013?
5. Which city recorded the highest difference in the rainfall from 17.09.2013 to 18.09.2013 ?
6. Which city recorded the highest difference in temperature from 17.09.2013 to 18.09.2013 ?
7. Which city recorded the lowest humidity on 17.09.2013?
8. What was the humidity in that city on 18.09.2013?

The factors that determine the weather are:-

- Rainfall
- Temperature
- Humidity
- The speed and the direction of the wind

These factors change very often. So, the word **weather** can be defined as follows:-

Weather is an atmospheric conditions at a specified place during a short time period.

11.2 Climate

The Meteorological Department collects the daily weather reports of certain cities in Sri Lanka. The following table shows some data prepared using the weather reports for 30 years.

City	Average daily temperature $^{\circ}\text{C}$		Average annual rainfall mm
	Maximum	Minimum	
Colombo	30.6	24.1	2519.7
Nuwara-Eliya	20.2	11.6	1709.2
Hambanthota	30.0	24.0	1045.0

Table 11.2

Study the above table and answer the given questions.

1. Which city has the highest average temperature?
2. Which city has the lowest average temperature?
3. Which city has the highest rainfall?
4. Which city has the lowest rainfall?

After studying the weather conditions of a certain area for a long period of time (at least for 30 years) the climate of that area can be decided.

Climate is the prevailing weather condition in an area for a long time period.

11.3 Studying Data Related to Weather

The Meteorological Department keeps daily records about weather.

The following graph shows the rainfall in Colombo during the 12 months of a particular year.

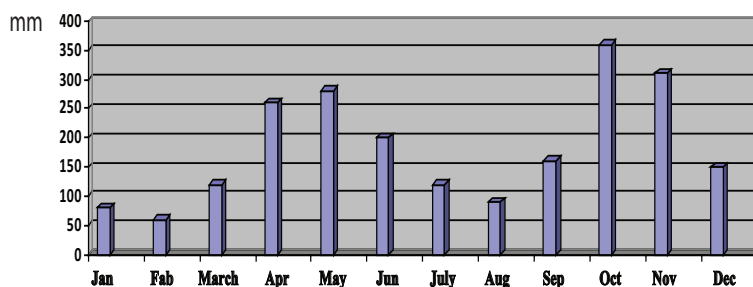


Fig 11.2

Study the graph and answer the following questions.

1. What is the month with the highest rainfall?
2. What was the rainfall?
3. What is the month with the lowest rainfall?

The following graph shows the average temperature in Colombo city during the 12 months of a particular year.

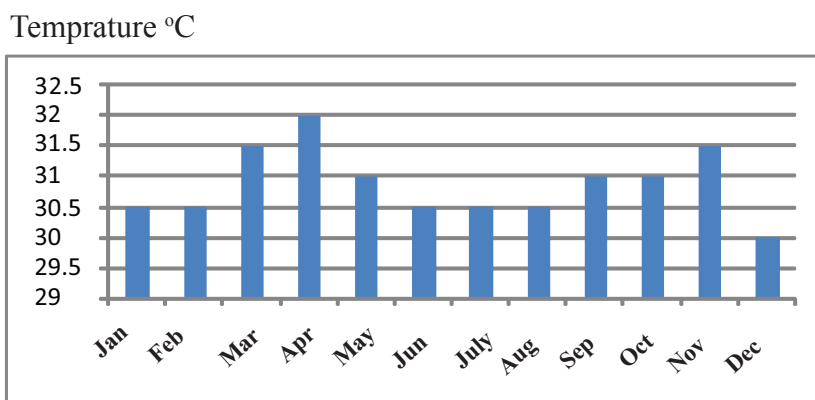


Fig 11.3

Study the graph and answer the following questions.

1. What is the month with the highest temperature?
2. What is the month with the lowest temperature?

11.4 Designing Apparatus to Measure Weather

▶▶ Measuring the temperature

The temperature of the atmosphere is a very important factor in determining the weather conditions. The figure 11.4 shows a thermometer used to measure the temperature in the atmosphere.



Fig.11.4 ▲ A thermometer

If data about the weather is recorded continuously, the validity becomes higher.



Assignment 11.2

Measure the temperature using a thermometer during different times of the day. Prepare a table as follows.

Date	Time	Temperature ($^{\circ}\text{C}$)
	7.30 a.m.	
	9.30 a.m.	
	11.30 a.m.	
	1.30 p.m.	

Table 11.3

The temperature changes from time to time during the day. The following table shows some recordings taken by a grade 6 student using this instrument from 7.30 a.m. to 1.30 p.m. on a particular day.

Date	Time	Temperature ($^{\circ}\text{C}$)
2014-03-15	7.30 a.m.	25
2014-03-15	9.30 a.m.	29
2014-03-15	11.30 a.m.	30
2014-03-15	1.30 p.m.	32

Table 11.4

These data can be shown in a graph.

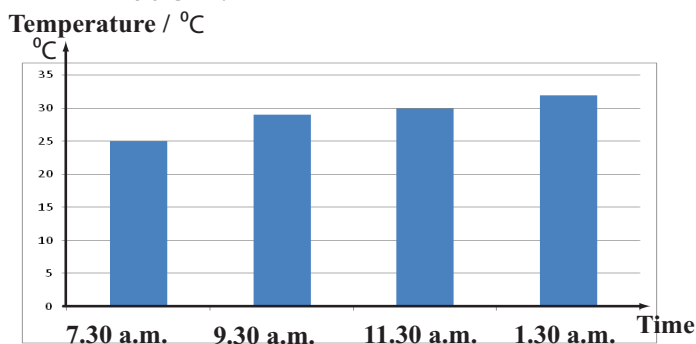


Fig.11.5 ▲

Through the above graph, we can understand that the temperature changes from time to time even at a same place.

▶▶ Measuring the rainfall

The rainfall is a very important factor in determining the weather.

So, the rainfall during 24 hours, is measured using a rain gauge. The data collecting centers use standard rain gauges to measure rainfall. You too can make a simple rain gauge and measure the rainfall.



Fig. 11.6 ▲ A rain gauge



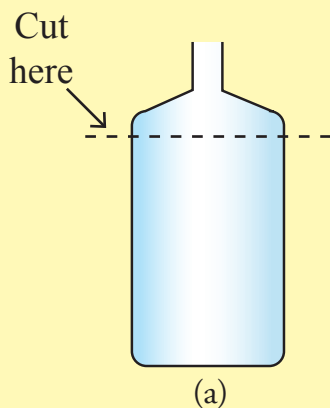
Activity 11.1

Let's make a simple rain gauge

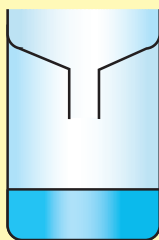
You will need :- A flat bottomed plastic bottle of one liter,
A tall glass with a $\frac{1}{4}$ of diameter of the bottle

Method :-

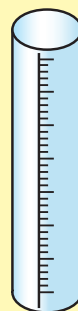
- Cut the plastic bottle as shown in figure (a).
- Place the removed upper part on the bottom part of the bottle as shown in figure (b).
- Pour water up to a height of 1cm of the bottle.



(a)



(b)



(c)

Fig.11.6

- Pour the water in the bottle to the glass.
- Paste a strip of paper on the glass.
- Mark the level of water on the paper strip.
- Divide the height into 10 similar parts from the bottom of the glass to the mark.
- One part denotes 1mm of rainfall.
- Keep the bottle with the funnel in an open area.
- Measure the amount of water collected in the bottle daily at 7.00 a.m. Use the glass to measure the amount of water. Record your findings in a similar table given below.
- By pasting a numbered strip on the bottle in fig.(b), the rainfall can be measured by the reading on it.
- If there is little rainfall, it can be measured by putting it to the bottle in fig.(b) with the numbered strip.

Date	Rainfall (mm)

The Meteorological Department forecasts daily weather. This weather report includes the places of minimum and maximum temperature and the places of maximum rainfall during the last 24 hours. The following table shows some such records collected during several days.

Date	Maximum temperature and the city	Minimum temperature and the city	Maximum rainfall and the city
2013.08.21	36.1 °C Polonnaruwa	12.8 °C Nuwara Eliya	4.6 mm Neboda
2013.08.22	36.0 °C Polonnaruwa	13.8 °C Nuwara Eliya	9.2 mm Kalutara
2013.08.23	36.4 °C Polonnaruwa	13.5 °C Nuwara Eliya	27.4 mm Guruluwana
2013.08.24	36.8 °C Polonnaruwa	13.1 °C Nuwara Eliya	7.5 mm Hiniduma
2013.08.25	37.1 °C Polonnaruwa	12.3 °C Nuwara Eliya	3.8 mm Baddegama

Table 11.5



Assignment 11.3

- Prepare a weather report using media reports on weather and show it to your teacher.
- Sometimes there may be a place in your area that measures the rainfall. Pay a visit to that place with your teacher and get an idea of how rainfall is measured.

▶▶ Measuring the speed and direction of wind

The speed and the direction of wind are very important factors in determining the weather. An anemometer is used to measure the speed of wind and a wind vane is used to find out the direction of the wind.

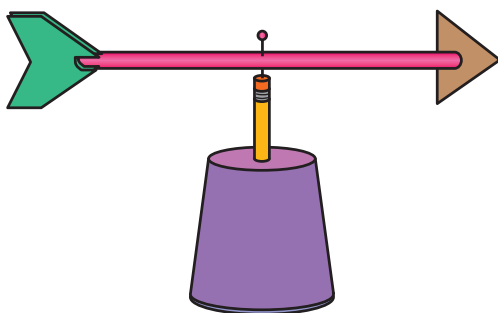


Fig. 11.8 ▲ A wind vane

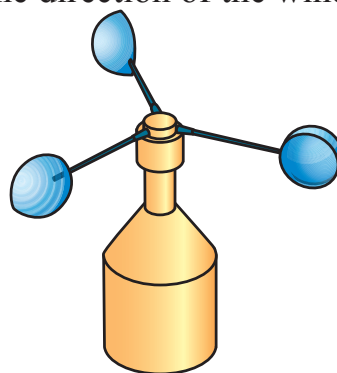


Fig.11.9 ▲ An anemometer



Activity 11.2

Let's make a wind vane

You will need :- a piece of card board or a file cover, A long pin, A pencil with an eraser, A plastic straw, Clay

Method :-

- Cut an arrow head of 5 cm and the back of arrow of 7 cm.
- Have a cut of 1cm on either side of the plastic straw.
- Insert the arrow head and the back of arrow into the cuts at the two sides of the straw.
- Find the balance point of the straw and fix it to the eraser of the pencil using the long pin.

- Cut a circle with the card board and mark the four directions
- Keep the clay ball in the middle of the card board circle and fix the pencil on it.
- Use the instrument to find the direction of the wind.
- The arrow head is pointed to the direction of the wind.

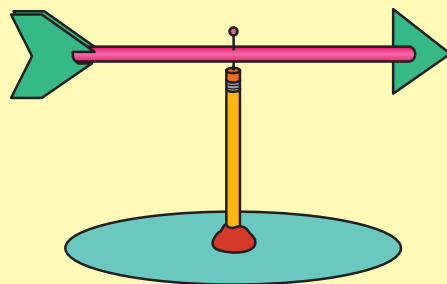


Fig 11.10

Eg: If the arrow head is pointed to East, the direction of the wind is from East to west.



Activity 11.3

Let's make an anemometer

You will need :- four spoke wires of a bicycle, two balls with a diameter of 6 cm (in 2 colours), a rubber cork, ignition tube

Method :-

- Make a hole in the middle of the rubber cork.
- Insert the ignition tube into it.
- Cut each of the 3 spoke wires to a length of 20 cm. (They should be with parts that are fixed to the rim.) Point the ends without screws.
- Cut the plastic balls into two halves each. Two halves of same colour and one half of a different colour are needed.
- Make a hole in each half of the balls to insert the spoke wires. (See figure 11.9)
- Use the screws of the spoke wires and fix them into the halves of the balls.

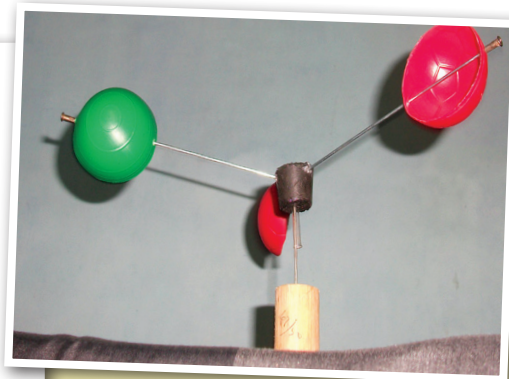
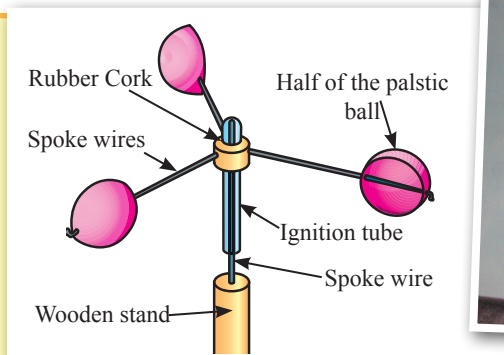


Fig 11.11

- Fix the pointed end of the spoke to the cork with an angle of 120° (See figure 11.11)
- Insert the other spoke wire to the ignition tube and with the help of it fix the anemometer to a pole.
- Observe the anemometer well when it rotates to the wind.

Count the number of times that the different coloured half of the ball passes a certain point. Measure the time taken for ten turns in minutes. You can calculate the speed of wind using it.

Eg:- If it takes 2 minutes for ten turns, what is the speed of the anemometer?

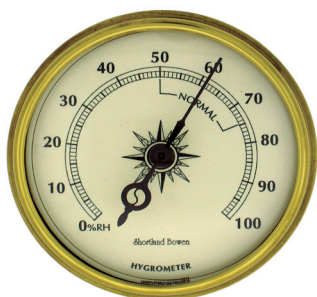
$$\text{Speed of the wind} = \frac{\text{number of turns}}{\text{Time taken}}$$

$$= \frac{10}{2}$$

$$= 5 \text{ turns per minute}$$

►► Measuring the humidity of atmosphere

The amount of water vapour in the atmosphere is known as humidity. This differs daily from time to time. The hygrometer is used to measure the humidity. At weather centers standard hygrometers are used.



You too can design a simple hygrometer to measure the humidity in atmosphere.

Fig. 11.12 ▲ A hygrometer



Activity 11.5

Let's design a simple hygrometer

You will need : A long strand of hair (about 50 cm length), a wooden plank, a long ekel, a pin, a nail (1 inch long), Thin wooden strip (60 cm length)

Method :-

- Fix the wooden strip on the wooden plank as shown in the figure.
- Fix the nail at the upper end of the thin wooden strip.
- Fix the ekel to the thin wooden strip with the help of the pin as shown in the figure.

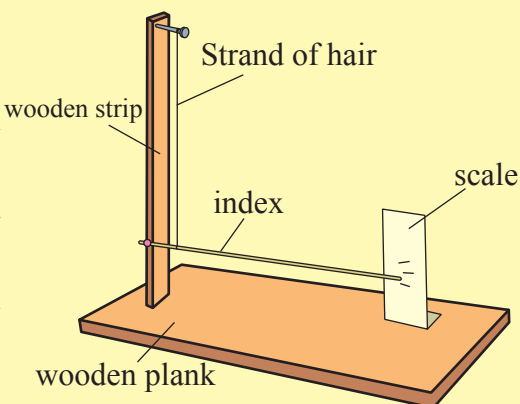


Fig. 11.13 ▲ A hygrometer

- Wash the strand of hair with shampoo and dry it. Tie the strand of hair to the nail and the ekel as shown in the figure. Fix a scale to the free end of the ekel as shown in the figure.
- Mark the end of the ekel on the scale at a time when there is less humidity in the atmosphere. Mark as "less" at that point. When the humidity is increased (when it is going to rain), mark the end of the ekel on the scale. Mark as "more" at that point.
- When the water vapour in the atmosphere is increased or decreased, the length of the hair is increased or decreased. We

can measure the humidity with the scale.

11.5 Natural Disasters Occured Due to Climatic Changes

►► Cyclones

Wind is a very important factor in determining the weather. Although wind is very important to us, sometimes it causes disasters. Cyclone is one such disaster.

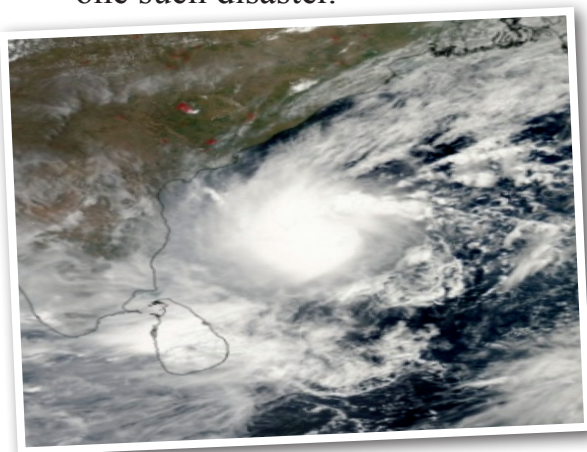


Fig.11.14 ▲ A satellite picture of a cyclone

A cyclone occurs when the pressure in some area decreases compared to other areas of the atmosphere. A pressure depression is created in a place with a low pressure. Then the air around that place is blown at a very high speed towards the pressure depression. This causes a cyclone.

Most of the cyclones that affect our country originate in the Bay of Bengal. Rain with storms, huge sea waves, thunderbolts occur due to cyclones. The destruction of lives and property caused by cyclones is very high.

The Meteorological Department is alert about cyclones during 24 hours of the day. As it is equipped with high technological instruments, it has the ability to warn about a cyclone before 48 hours. You can get details about cyclones on 0112686686 or from their web site.

►► Flood

Rain is a major factor that determines the weather. As Sri Lanka is an agricultural country, rain is very important for us. But heavy rains may cause disasters. Due to heavy rains, streams, rivers, reservoirs etc. are filled with a huge amount of water in a very short time period and they overflow. As a result of this overflow a large area of land is temporarily covered with water. This is known as flood. Although flood is a natural disaster, it can cause greater damage. Flood can occur due to human activities such as reclamation of lands, improper construction activities and sand mining.



Fig. 11.13 ▲ Flood

►► Drought

Certain area gets less than 75% of expected rainfall at a certain time period a dry weather condition may occur in that area. The dry period that occurs due to lack of rain can be simply called as drought.



For Your Extra Knowledge

Considering the annual rainfall, Sri Lanka has been divided into four zones.

- Wet zone
- Intermediate zone
- Dry zone
- Arid zone

There is an expected amount of rainfall and a pattern of rainfall for all these zones.

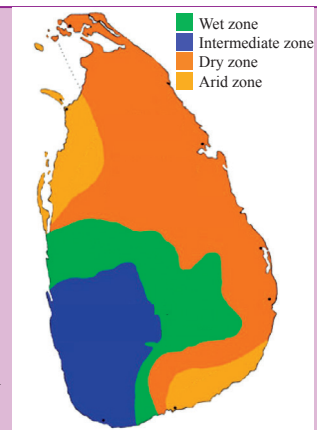


Fig. 11.16

Collecting water during the rainy season is an action that can be taken to minimize the effect of a drought. Ancient kings built tanks for this purpose. Today many people make water collecting tanks to collect water during rainy seasons.



Fig. 11.17 ▲ An occasion of a drought

▶▶ Landslides

Landslide is a natural disaster related with rain.

Having a continuous rain for three days or over 200 mm of rainfall, may cause landslides. Sliding down a large amount of soil and stones in a higher area (with trees, creepers and everything on it) to a lower area is known as a landslide. The gravity of the earth affects landslides. Landslides mostly occur in hilly areas, especially lands used by man.

Landslides are a natural process. But due to some human activities, landslides can occur.

Eg: cultivation on slope areas, cutting trees, clearing forests

A landslide becomes a disaster when it occurs in a populated area destroying lives and property.



Fig. 11.18 ▲ An occasion of a landslide



Fig. 11.19 ▲ An occasion of a landslide

Badulla, Nuwara ELLiya, Kegalle and Rathnapura are the districts that record more about land slides. National Building Research Organization collects data about areas where landslides occur. It also gives instructions to prevent landslides and re-constructs lands that have already faced landslides. Their web address is www.nbro.gov.lk

We can't stop natural disasters such as cyclones, flood droughts etc. What we should do is be alert about these disasters. It is our responsibility to listen to the announcements and instructions given by media and minimize the effects of these disasters.



Summary

- Atmospheric condition at a specified place during a short time period is known as weather.
- Climate is the prevailing weather condition in an area for a long time period.
- The Meteorological Department records weather conditions and also forecasts weather.
- Temperature, rainfall, speed of wind and humidity are some factors that determine the weather.
- Many standard instruments are used to get information about weather. You too can make some simple instruments to measure the factors that affect weather.
- Natural disasters such as cyclones, flood, droughts, landslides occur due to changes of weather conditions.
- We can minimize the effects of these natural disasters by being alert about the changes in weather.

Exercises

1. Fill in the blanks.
 - I. The unit used to measure the temperature is
 - II. Wind blown horizontally at a very high speed is known as
 - III. If the arrow head of the wind vane is pointed to North, wind blows from to.....
 - IV. The unit used to measure the rainfall is
2. What do you mean by “ weather” ?
3. What is the difference between weather and climate?

4. Study the table and answer the given questions.

Month : June 2012

Colombo

Date	Maximum Temperature °C	Minimum Temperature °C	Rainfall (mm)	Humidity %
1	31.3	27.9	0	80
2	31.6	28.1	0	81
3	31.3	28.2	0	81
4	30.9	26.8	2.29	82
5	31.3	26.4	0.25	77
6	30.7	25.2	1.29	89
7	30.5	25.0	22.35	83
8	31.3	26.9	0.25	80
9	31.3	28.1	0	82
10	31.1	28.0	0	80

Answer the following questions using the information about the above 10 days.

- I. What are the days with the same maximum temperature ?
- II. What are the days with the same minimum temperature ?
- III. What is the day with the least maximum temperature ?
- IV. What is the day with the least minimum temperature ?
- V. What is the day with the maximum rainfall ?

Project

- Have a visit to the Meteorological Department in Baudhaloka Mawatha, Colombo or meteorological Department in your area and observe the process of collecting data.
- Find the methods of collecting data on weather. Collect information and prepare a report.
- Prepare a booklet about the methods used by our ancestors to forecast weather.

Glossary

Weather	- காடுகுளம்	- வானிலை
Climate	- டீடுகுளம்	- காலநிலை
Rainfall	- வர்ஜாபதம்	- மழைவீழ்ச்சி
Temperature	- டீஷன்வம்	- வெப்பநிலை
Humidity	- டார்ஜகாவ	- ஈரப்பதன்
Rain Gauge	- வர்ஜாமாதம்	- மழைமானி
Thermometer	- டீஷன்வமாதம்	- வெப்பமானி
Hygrometer	- டார்ஜகாமாதம்	- ஈரமானி
Anemometer	- டிநிலமாதம்	- காற்றுவேகமானி
Wind vane	- டுலம் டீலா டீர்லகம்	- காற்றுத்திசைகாட்டி
Cyclone	- டுலி டுலம்	- சூறாவளி
Flood	- டம்வதர்	- வெள்ளம்
Drought	- திசுடம்	- வரட்சி
Landslide	- தாட யாம	- மண்ணரிப்பு