

CHAPTER-7: WEATHER, CLIMATE AND ADAPTATION OF ANIMALS TO THE CLIMATE

(MODULE-1)(WRITEUP)

WEATHER

- Weather is basically the way the atmosphere is behaving, mainly with respect to its effects upon life and human activities.
- Most people think of weather in terms of temperature, humidity, precipitation, cloudiness, brightness, visibility, wind, and atmospheric pressure, as in high and low pressure. Weather influences our lives in different ways.
- During summer, we switch on fans to keep ourselves cool, we use light coloured clothes in order to reflect the heat. During winter, we use dark colour clothes and wrap ourselves in warm clothes to protect us from cold environment. Similarly, during the rainy season, we use umbrella or raincoat as it may rain anytime. The weather of a place changes day after day and week after week. It is a complex phenomenon that may vary over very short periods of time (like hour to hour).
- Therefore, our daily activities are planned according to the weather predicted for a particular day. The daily report of weather is provided on television, radio and even in newspaper.
- The day -to- day condition of the atmosphere at a place with respect to the temperature, humidity, rainfall, wind speed, etc., is called the weather at that place.
- In most places, weather can change from minute-to-minute, hour-to-hour, day-to-day, and season-to-season. Climate, however, is the average of weather over time and space. An easy way to remember the difference is that climate is what you expect, like a very hot summer, and weather is what you get, like a hot day with pop-up thunderstorms. It can happen sometimes that it is sunny in the morning, but suddenly clouds appear from nowhere and it starts raining heavily. Or, a heavy rain may vanish in a matter of minutes and give way to bright sunshine.
- The weather reports are prepared by the Meteorological Department of the Government.

ELEMENTS OF WEATHER

- It includes temperature, air pressure, humidity, wind speed, wind direction, precipitation (rainfall), solar radiation.
- Weather also includes sunshine, rain, cloud cover, winds, hail, snow, sleet, freezing rain, flooding, blizzards, ice storms, thunderstorms, steady rains from a cold front or warm front, excessive heat, heat waves and more.

- **1. Temperature**

The weather is mainly affected by the sun that produces heat and raise the temperature of earth's surface, oceans and atmosphere.

- the sun's heat will change the atmosphere more frequently. The time of sunrise and sunset also changes throughout the year.

- **2. Rainfall**

The amount of water droplets that fall back on the earth after condensation of water vapours is called rainfall. When the temperature is too low, these droplets in the cloud get freeze into crystals of ice and come on the earth as snowfall. During winters, the temperature falls after sunset causing condensation of water vapours near the ground. These droplets hang in the air to form fog.

- **3. Humidity**

It is defined as 'the amount of water vapour in air which causes dampness of air'. Air has the ability to hold certain amount of water vapour. The capacity of air to hold water increases with rise in temperature and falls if heavy rainfall occurs.

- **4. Wind Speed**

It is caused due to the difference in air pressure. During summer, the wind blows from Indian ocean and Bay of Bengal and causes rain in India while during winter, it blows from the mountain of north India towards northern plain and causes cold weather (winter season).

How do we measure these elements of weather?

- We use maximum and minimum thermometers to measure and record the maximum and minimum temperatures every day.
- Look at the graph given below which shows the maximum temperature recorded during 03 August 2006 to 09 August 2006 at Shillong, Meghalaya (Fig. 7.2).

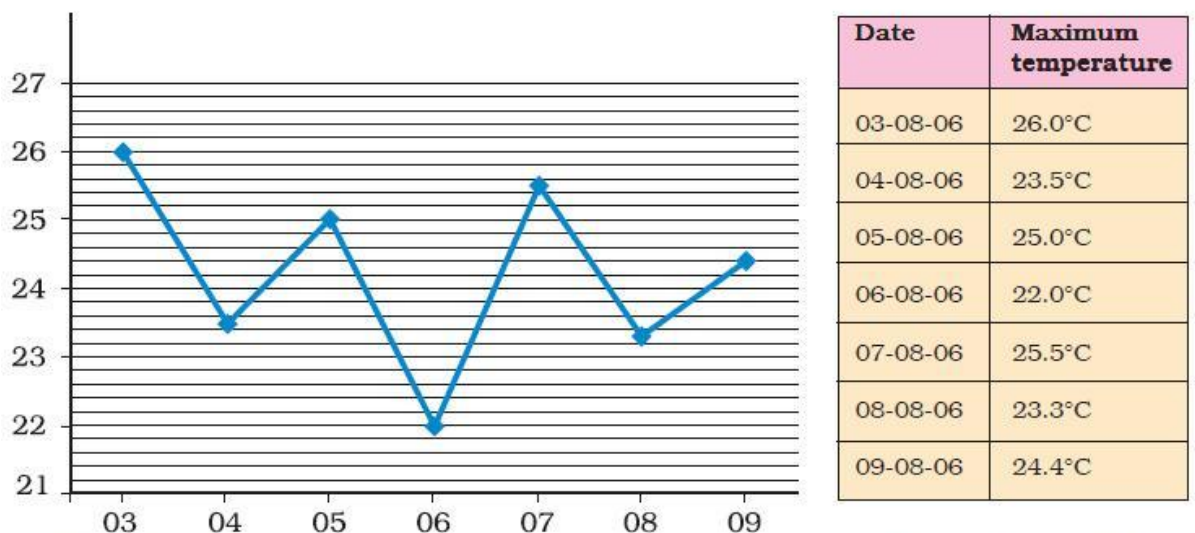


Fig. 7.2 Graph showing the variation of maximum temperature during 03 to 09 August 2006

- Rainfall(precipitation) is measured by an instrument called the rain gauge. It is basically a measuring cylinder with a funnel on top to collect rainwater.
- Air pressure is measured by barometer,
- Humidity- hygrometer
- Wind speed- anemometer
- Wind dirrection- wind sock

- Solar radiation- pyranometer

Weather Prediction

- The prediction of weather is done by scientists, called meteorologist, who study the changes in the weather.
- The weather is predicted by studying the patterns of weather and factors affecting them.
- The science which deals with the study of weather is called meteorology.
- In India, the weather reports are prepared by the Meteorological Department of Government. This department collects the data of temperature, wind, etc., and predicts whether on television or radio or newspaper.
- The weather report is recorded everyday in the form of graph and published in a table form showing readings of different elements of weather.

Difference in Time of Sunrise and Sunset

- There is the difference in the time of sunrise during summer and winter.
- In summer the sun rises earlier in the morning and the sun sets late in the evening during the month of June, while sun rises late and sets early in the month of December.
- Therefore, days are longer and night shorter in summers while day is shorter and night is longer during winter.

Why should we Study about Climate?

- The reason studying climate and a changing climate is important, is that will affect people around the world.
- Rising global temperatures are expected to raise sea levels, and change precipitation and other local climate conditions.
- Changing regional climate could alter forests, crop yields, and water supplies.
- It could also affect human health, animals, and many types of ecosystems.
- Deserts may expand into existing rangelands, and features of some of our National Parks and National Forests may be permanently altered.
- In order to help people to be prepared to face all of these, the National Oceanic and Atmospheric Administration's (NOAA) National Weather Service (NWS), the lead forecasting outlet for the nation's weather, has over 25 different types of warnings, statements or watches that they issue.
- Some of the reports NWS issues are: Flash Flood Watches and Warnings, Severe Thunderstorm Watches and Warnings, Blizzard Warnings, Snow Advisories, Winter Storm Watches and Warnings, Dense Fog Advisory, Fire Weather Watch, Tornado Watches and Warnings, Hurricane Watches and Warnings. They also provide Special Weather Statements and Short and Long Term Forecasts.
- NWS also issues a lot of notices concerning marine weather for boaters and others who dwell or are staying near shorelines

What is Climate?

- In short, climate is the description of the long-term pattern of weather in a particular area.
- The average weather pattern taken over a long time, say 25 years, is called the climate of the place
- Some scientists define climate as the average weather for a particular region and time period, usually taken over 30-years. It's really an average pattern of weather for a

particular region.

When scientists talk about climate, they're looking at averages of precipitation, temperature, humidity, sunshine, wind velocity, phenomena such as fog, frost, and hail storms, and other measures of the weather that occur over a long period in a particular place.

For example, after looking at rain gauge data, lake and reservoir levels, and satellite data, scientists can tell if during a summer, an area was drier than average. If it continues to be drier than normal over the course of many summers, then it would likely indicate a change in the climate.

Table 7.2 Srinagar (Jammu & Kashmir)

Information about climate

Month	Mean temperature °C		Mean total rainfall (mm)
	Daily minimum	Daily maximum	
Jan	-2.3	4.7	57
Feb	-0.6	7.8	65
Mar	3.8	13.6	99
Apr	7.7	19.4	88
May	10.7	23.8	72
Jun	14.7	29.2	37
July	8.2	30.0	49
Aug	17.5	29.7	70
Sep	12.9	27.8	33
Oct	6.1	21.9	36
Nov	0.9	14.7	27
Dec	-1.6	8.2	43

Table 7.3 Thiruvananthapuram (Kerala)

Information about climate

Month	Mean temperature °C		Mean total rainfall (mm)
	Daily minimum	Daily maximum	
Jan	22.2	31.5	23
Feb	22.8	31.9	24
Mar	24.1	32.6	40
Apr	24.9	32.6	117
May	24.7	31.6	230
Jun	23.5	29.7	321
July	23.1	29.2	227
Aug	23.2	29.4	138
Sep	23.3	30.0	175
Oct	23.3	29.9	282
Nov	23.1	30.3	185
Dec	22.6	31.0	66

(Note: The numbers for the mean total rainfall have been rounded off)

- **Climates in India**

The climate of India varies in different regions. These can be described as below:

- The northern region of Himalayas has cold and moderately wet climate (e.g. Kashmir).
- Plains has a moderately hot and wet climate (e.g. Uttar Pradesh).
- South has very hot and wet climate .
- The western region has hot and dry climate (e.g. Rajasthan).
- North-Eastern India has wet climate (e.g. Assam) and receives rain for a major part of the year.
- Kerala- very hot and wet
- Kashmir- moderately hot and moderately wet
- Rajasthan- high temperature during most part of the year

Factors that Determine the Climate

- The several factors that determine the climate at a place are
- **Distance from the sea** Climate of a place varies according to the closeness of the sea. The places that are near the sea, are moderate (not too hot nor too cold), e.g. Mumbai, Chennai. While the places that are away from the sea have extreme climate, having very hot summer or too cold winter, e.g. Delhi.
- **Altitude or height above sea level** Climate also varies according to the altitude. The higher altitudes are cooler, e.g. Himalaya.
- **Humidity** It also determines the climate of a place. Kolkata and Kerala have high humidity, while. Rajasthan and Haryana have low humidity.

So, what's the Difference between Weather and Climate?

- The difference between weather (day to day conditions) and climate (long period of time) is a measure of time.
- The difference between weather and climate is that weather consists of the short-term (minutes to months) changes in the atmosphere
- Weather is what conditions of the atmosphere are over a short period of time, and climate is how the atmosphere "behaves" over relatively long periods of time.
- Weather cannot force adaptation in organisms but climate change can force adaptations in organisms.