

7th Standard-Science

Weather, Climate and Adaptations of Animals to Climate

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.

Weather

It may be defined as the day to day condition of the atmosphere at a place with respect to the temperature, humidity, rainfall, wind speed, etc.

Elements of Weather

The temperature, humidity, rainfall, wind speed and other factors are called the elements of the weather which are described below:

1. Temperature

The weather is mainly affected by the sun that produces heat and raise the temperature. The sun provides light as well as heat on the earth. It is necessary for the production of energy. The < heat from the sun is absorbed by the earth's surface, oceans and atmosphere which plays an important role in determining the weather of any place.

Therefore, it is clear that change in weather is caused due to the sun because the changes occurring in 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 freezed into crystals of ice and comes 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.

Note: Rainfall is generally measured in millimetre. The instrument that is used to measure the rainfall is called rain guage. It is a measuring cylinder with a funnel kept on its top which collects the rainwater. The rainwater collected in the measuring cylinder gives the measure of rainfall.

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. The humidity is measured by the instrument called hygrometer which consists of two thermometers.

The bulb of one thermometer is wet and the other is dry.

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).

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.

Climate

'The average weather pattern taken over a long time, is called the climate of that place.' Different places in the world have different types of climate. The annual record of long term average temperature and rainfall at a particular place is called climate chart. It gives an idea about the climate at a particular place during a specific period of the year. The major factor which determines the climate of a place is called latitude (imaginary lines on earth).

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.

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 (e.g. Kerala).
- 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.

Climate and Adaptation

The ability of an organism to develop certain features which improve the chances of its survival in the environment in which they live, is known as adaptation. Animals are adapted to survive in the conditions in which they live. In other words, an adaptation is a trait of an organism that has been favoured by natural selection.

Adaptations are of three types:

(i) Structural adaptations Adaptation of special body parts of an organism that helps it to survive in its natural habitat, e.g. skin colour, shape, body covering.

(ii) Behavioural adaptations Adaptation of special ways in a particular organism that helps it to survive in its natural habitat.

It usually occurs in response to some external stimuli, e.g. frogs and bear undergoes hibernation or winter sleep during hard winter season.

(iii) Physiological adaptations Adaptation of body systems presents in an organism that allows it to perform the certain biochemical reaction, e.g. warm-blooded animals are able to keep the constant body temperature.

Animals that live in a very cold or hot climate must possess special features to protect themselves against extreme cold or heat. The features and habits that help an animal to adapt to their surrounding are a result of the process of evolution. According to their habitat animals adapt themselves. These animals may be grouped as polar region and tropical rainforest animals.

The Polar Regions

The polar regions as the name suggest are situated near the poles, i.e. north pole and south pole. The countries that belong to the polar regions are Canada, Greenland, Iceland, Norway, Sweden, Finland, Alaska in USA and Siberian region of Russia.

Polar regions show' extremely colder climate which is covered with snow and remain cold for most part of the year. In this region, the sun does not set for six months and even does not rise for other six months. The temperature goes down below -37°C , during winters in polar regions. The ground remains frozen most of the year and water becomes available only during the short summer when snow melts. Mosses and short lived flowering plants grow in these regions.

Animals living in these regions are adapted in different ways to cope with the conditions of temperature, light and moisture and also according to the availability of food in that region. Polar bears and penguins are the animals that live in polar region. Besides these whales, seals are the other animals are also found in polar regions. Some fishes, foxes, musk oxen, reindeer and birds also live in polar regions.

Adaptations in Polar Bear

Polar bear is a large and white bear that lives in the north polar region of the earth. The polar bear mainly feeds on fishes and seal and can survive in the extremely cold climate of polar regions due to the following adaptations:

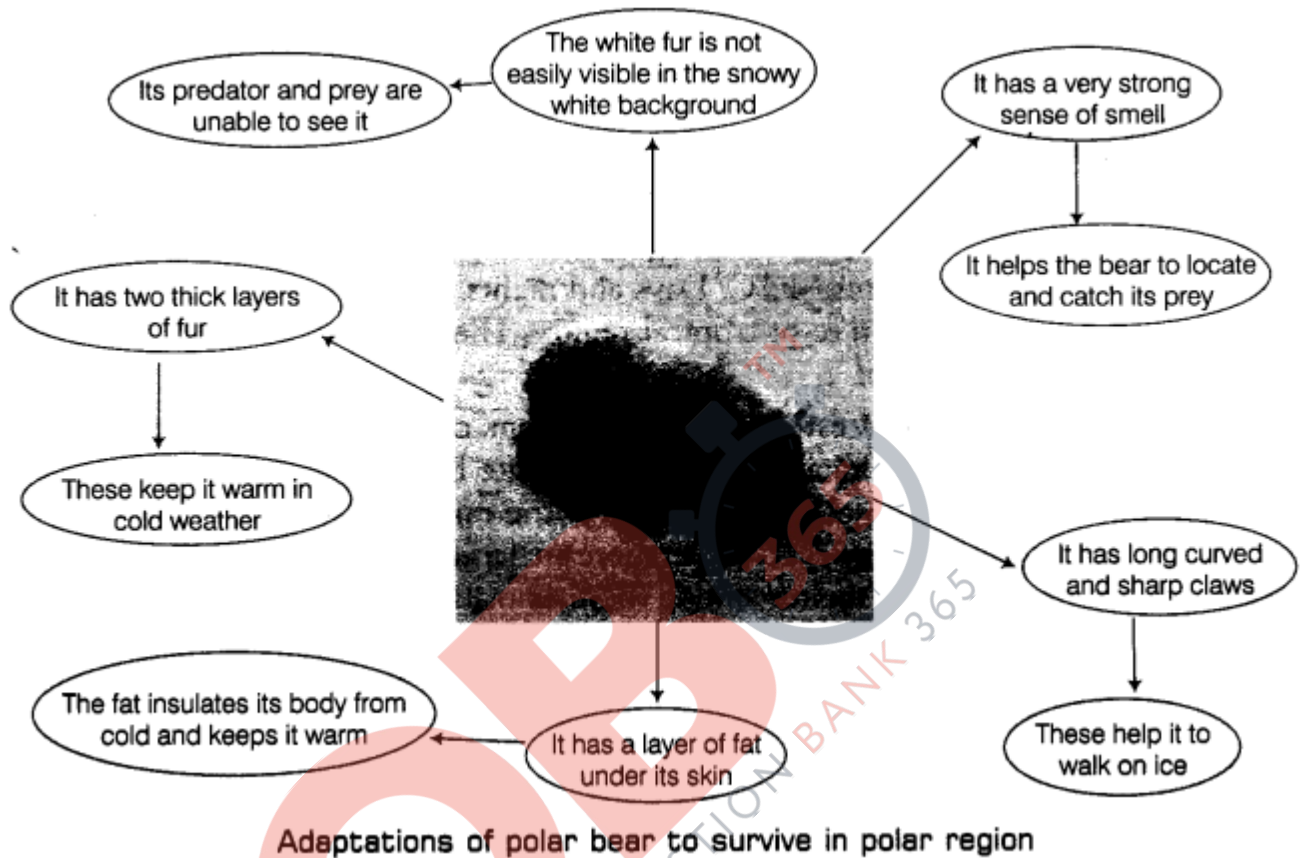
(i) Their body is covered by a thick coat of white fur. It helps them to blend with their surrounding snow white background and cannot be noticed by their predators. Beneath the fur is a thick coat of fat which insulates the body from cold and keeps the bear warm.

(ii) A polar bear is a good swimmer which has wide and large paws that help it to swim. These paws also help bear to walk on the snow easily.

(iii) They have a strong sense of smell so that they can locate their prey easily. They also possess small ears to keep the body surface area to the minimum and reduce the heat loss from the body.

(iv) The thick layer of fat beneath the skin also stores food in winter when food is scarce.

This stored food (fat) also helps the mother polar bear to survive in the winter when they undergo hibernation beneath the snow with their newborn cubs.



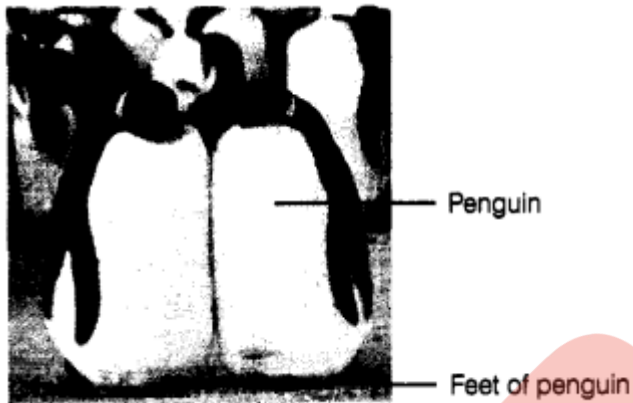
Adaptations in Penguins

Another well-known animal living in the polar regions is the penguin which can survive due to the following adaptations:

- (i) These are black and white in colour which merges well with the white background of ice and snow.
- (ii) They have thick skin and a thick layer of fat below their skin which protects them from extreme cold.
- (iii) They possess a streamlined body, flipper-like wings and webbed feet

which make it a good swimmer. This adaptation helps penguin to catch fish as prey.

They live together in large numbers and huddle together to keep themselves warm.



Migration

Migration is the seasonal journey taken by different animals or birds to escape the extreme climatic condition and the search of food, e.g. Siberian cranes migrates towards warmer region in the autumn by travelling several thousands of kilometers. They are seen in the . Bharatpur, Rajasthan and Sultanpur, Haryana and sometimes in wetland of North-East and other parts of India. Migratory birds / sometimes travel as much as 15000 km to escape the extreme climatic condition of their habitat.

These birds fly high where the wind flow is helpful and cold conditions allow them to disperse the heat generated by their flight muscles. These birds have a built in sense of direction and know in which direction they have to travel. Some birds use landmarks to guide them. Some birds are guided by the sun during daytime and by stars during night.

Some birds can use the magnetic field of the earth to find the direction. Besides birds some fishes, insects and mammals also migrate seasonally in search of more hospitable climates.

The Tropical Rainforest

The tropical region lies near both the sides of equator line on the earth. These regions are hot but get plenty of rainfall. Therefore, this region is humid. Even in coldest month, the temperature is generally higher than about 15°C. During hot summers, the temperature may cross 40°C. Days and nights are almost equal in length throughout the year. Tropical rainforest is the important feature of tropical region. These regions are rich in vegetation and large diversity in animals is also seen in this region.

In India, tropical rainforests are found in Western Ghats and Assam, other countries of the world like South, East Asia, Central America, Malaysia, Indonesia, Brazil, Republic of Congo, Kenya, Uganda, Nigeria and Central Africa also have tropical rainforest. The major type of animals living in the rainforest are monkeys, apes, gorillas, tigers, elephants, leopards, lizards, snakes, birds and insects. Since, there are large number of animals found in these regions. There is an intense competition for food and shelter among these animals. So, the animals are adapted in such a way that they eat different kinds of food and live in different kinds of places to overcome competition for food and shelter respectively. The adaptations in different animals living in tropical rainforests can be discussed as follows:

Adaptations in Red-eyed Frog

The red-eyed frog lives on trees in tropical rainforest.

They have sticky pads on their feet that help them to climb trees. It does not live in water and has a green back and a creamy underside. It has big and bulging bright-red eyes and it is a nocturnal. It sleeps during the day and becomes active during night and feeds on the insects present on the tree.

The bulging eye of frog protects it from its predator. The sudden opening of big and bright-red eyes frightens the predator for a while and in the meantime the frog gets time to jump to a safe place. The green colour of the frog helps it to hide within the green leaves of the tree and helps it to protect from predators.

Adaptations in Monkey

The monkeys living in tropical rainforests have long tails for grasping branches. Their hands and feet are adapted in such a way that they can easily hold the branches of trees. The eyesight of monkeys is very good which helps them in leaping between the branches to escape from their predators. Monkeys eat fruits, seeds, leaves, root and insects as their food which is present in abundance in tropical rainforest.

Adaptations in Lion-Tailed Macaque

It is also called as beard ape and lives in the rainforest of Western Ghats in India. It has silver-white mane which surrounds the head from the cheeks down to its chin which is the specific characteristic of this animal. It is called lion-tailed because its tail is like that of lion having bunch or tuft of hair at the end.

They spend most of their time feeding in the upper canopy of trees (i.e. arboreal animal). It mainly feeds on fruits, seeds, young leaves, stems, flowers and buds. They also can eat insects present under the bark of the tree. Since, it is able to get sufficient food on trees. It rarely comes down on the ground and spends a major part of its life on the tree. It is a good climber with its hand and feet adapted to hold the branches of trees firmly.

Adaptation in Toucan

Toucan is a bird, which is found in tropical rainforest and which possesses a long strong and large beak. This bird is adapted for tropical rainforest in several ways. It is a colourful bird which possesses a strange beak. It lives most of the time in the holes of big trees.

The long and large beak helps Toucan to reach the fruits attached to the ends of even thin branches of tree that are weak enough to support its weight. It is an adaptation of this bird to get the unreachable fruits. Its large beak also helps in temporary storage of fruits which is collected by Toucan. These possess feet that are adapted for grasping the branches of trees firmly. Toucan can change the colour of its feather, so as to get mixed up with the surrounding and they are not easily noticed by predators and remain safe.

Adaptations in Lion and Tiger

These are also called as big cats and are carnivore which eat only flesh of other animals. These have following adaptations to survive in tropical rainforest:

- They have thick skin and skin colour helps them to camouflage (ability of the animal to match their surrounding, e.g. chameleon, butterfly). The yellow brown colour of lion and black stripes of tiger helps them to hide in the forest by blending with the surroundings. It helps these carnivores to catch their prey.
- They have strong sense of smell which helps them to locate their prey.
- They also develop sensitive hearing capacity to find its prey.
- They have eyes in front of their head which enable them to have a correct idea of the location of their prey. They also have good eyesight.
- Their strong legs help them to run fast and long, sharp and strong claws in front of their legs help them to catch and tear their prey.

Adaptations in Elephant

Elephant is a well-known animal of Indian tropical rainforest. These are plant eaters and are adapted in many remarkable ways to survive in tropical rainforest. These adaptations can be discussed as follows:

(i) The elephant has a long trunk which is used as nose and has a strong sense of smell. It also helps elephant to pick up the food. The long trunk is also used for breathing. It can reach up to the branches of trees and help it to eat tree leaves. It is used for sucking water from lakes or rivers (drinking).

(ii) The elephant possesses tusks (long pointed teeth) that are used in tearing the bark of trees which the elephant loves to eat as food. It also helps elephant to fight their enemies and protecting themselves.

(iii) The elephant has large ears that help it to hear even very soft sounds and can sense the danger. It also helps the elephant to keep it cool in the hot and humid climate of the tropical forest.

(iv) The feet of the elephant is large and round which help it to provide good stability and also prevent it from sinking into soft ground due to its heavy weight.

