Board – CBSE	Class – 7	Topic – Wind storm and cyclon

- **Winds** - When the air moves in a flow in a particular direction, it is called wind.
- **Air Exerts Pressure**
- **Why does a tin can with hot water, when cooled down with freshwater, distorts its shape?**

Can with hot water being cooled

Air Exerts Pressure

As freshwater is poured over the hot can, the steam condenses and converts into the water. This results in reducing the amount of air that is present in water. As a result, the air pressure outside the can becomes more than the air pressure inside the can. This results in compressing of the can. Therefore, it is proved that air exerts pressure.

- **Flow of Air**

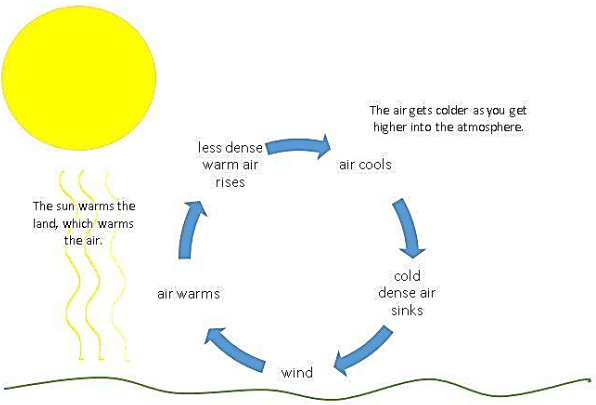
  When the speed of the wind increases, it lowers down the air pressure. Therefore, we can say that air flows from a region of high pressure to low pressure.
- **The speed of Air/ Winds**

  The speed of air or wind depends upon the difference between the pressures of the two regions. If the difference between the pressures increases, the speed of the air also increases.
- **Hot Air and Cold Air**

  When the air is heated, it expands. As a result, it occupies more space and becomes lighter in weight. Therefore, we can say that warm air is light in weight, and cold air is heavy.
- **Why does smoke move in an upward direction?**

  Smoke is hot air. Hot air is lighter; hence it moves in an upward direction.
- **How does convection in air occur?**

When the hot air in a region rises, the pressure becomes low in that region. As a result, the colder air fills its place. This is how convection in air occurs.



Convection in Air

- **Generation of Wind currents due to uneven heating of the Earth There are two situations where winds on Earth generate:**

1. **Uneven heating between the equator and poles causes the north-south winds**
   - We know that the Earth is divided into circular lines called latitudes that specify the North-South position of a place on the globe.
   - Also, the equator is a latitude that is perpendicular to the axis of the Earth's rotation.
   - The regions that are close to the equator receive maximum sunlight on the Earth.
   - Hence the air in these regions is generally warm. The warm air, therefore, rises above and the cold

   Air from the latitude around the equator moves in that place.
   - Similarly, cold winds from the North and South poles move towards the equator, and the neighbouring latitude and the circulation of winds take place on the Earth.
   - You might observe in the figure above the direction of the wind is not exactly from north to south or from South to North. This diversion in the direction of winds occurs because of the Earth's rotation.

The wind flow pattern because of uneven heating on the earth

The flow of Winds on Earth

- **Uneven heating of land and water causes monsoon winds on Earth which bring rainfall**

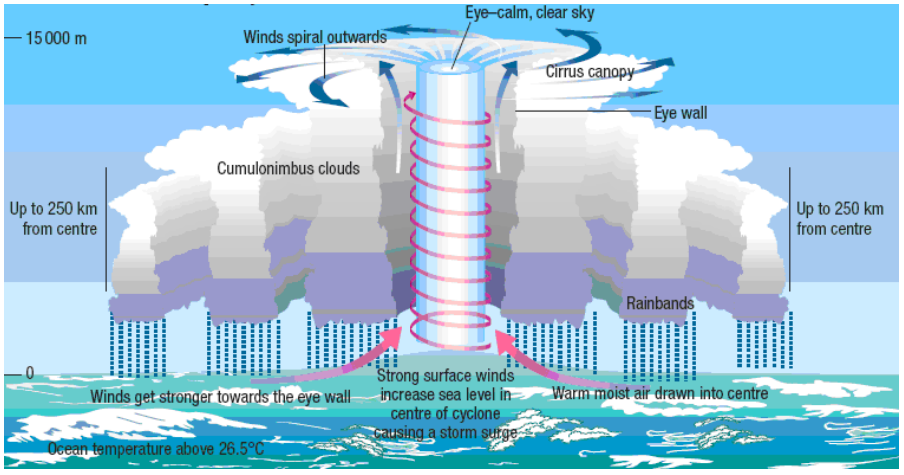
- The land near the equator gets warmer in the summer season, and its temperature generally remains higher than the oceans.
- As a result, the air above the land rises, and the cold air from the oceans moves towards the land. These winds are called **monsoon winds**.
- Since these winds come from the ocean, they carry water with them. Similarly, the winds in the winter season move from the land towards the oceans.

- **Thunderstorms and Cyclones**

  Although monsoon winds are important for agricultural purposes and in regulating the temperature conditions of a place, sometimes excess rainfalls and strong winds can lead to natural disasters such as thunderstorms and cyclones.

- **Thunderstorms**
  - An event in the environment in which strong winds blow accompanied by heavy rainfall, thunder and lightning is called a **thunderstorm.**
  - Thunderstorms occur in hot and humid tropical regions mainly. This is because these regions generally have higher temperatures which cause winds.
  - When they move upwards, these hot winds also have water vapour within them, which freezes and falls on the Earth as rain.
  - The rainfall and rising air create lightning in the air accompanied by sound, and as a result, thunderstorm occurs.
- **Precautions that one should take during a thunderstorm**
  - One should not take shelter under an isolated tree during storms and lightning. Instead, one can take shelter under a small tree if near a forest area.
  - One should not lie on the ground.
  - One should not use or carry an umbrella that has a metallic rod.
  - One should stay away from windows and doors at that time.
  - One should not take shelter in an open garage, metal shed, or storage shed.
  - It is advisable to take shelter in a car for a bus.
  - One should not stay in the water. People should try to move inside a building as soon as possible.
- **Cyclones**
  - Clouds are formed due to water vapour in the air.
  - As the water turns into vapour, it takes up the heat from the atmosphere.

- When the water vapour turns into clouds and falls back as raindrops, the same heat is released back into the atmosphere.
- This heat warms up the air around the raindrops, and the warm air starts rising.
- This leads to decreasing their pressure in the region.
- So, the air from the surroundings takes the place of the warm air. This cycle continues until the rain falls.
- As a result, a very low-pressure region is created, and strong winds start revolving in that low-pressure region. This is the condition of a cyclone.
- The formation of a cyclone depends upon different factors:
    - the temperature of the place
    - the wind speed
    - the direction of the winds
    - the humidity of the place

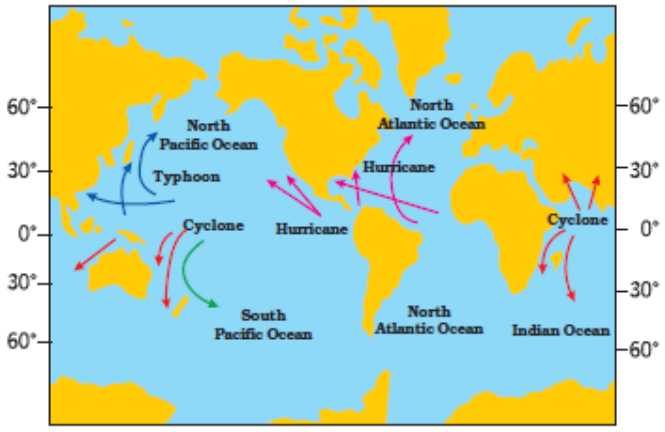


Formation and Structure of A Cyclone

- **Structure of a Cyclone**
    - A cyclone is a rotation of air in the atmosphere at the height of around 10 to 15 km.
    - The centre of the cyclone (also called the **eye of the storm)** is a clean area where there are no clouds but only light winds.
    - This area ranges from 10 to 30 km in diameter.
    - The **cloud region** lies around this eye and has a diameter of around 150 km.
    - The cloud region has high-speed winds blowing at 150 to 250 km per hour accompanied by heavy rainfall.

- The first indication of a cyclone can be observed when strong winds start flowing and pushing away the water from the shores.

- **The destruction caused by a cyclone**
  - Cyclones can result in extremely high waves in the sea or ocean because of the low pressure. These waves can be 3 to 12m high.
  - When these high waves hit the shore, it results in the destruction of life and property to a great extent.
  - The soil of the area also loses its fertility after a cyclone.
  - Floods can appear if rainfall continues for a longer duration.
  - High-speed winds in the cyclone affect the telephonic communication lines, uproot trees, damage houses and cause loss of life.
- **Other names of a cyclone**
  - **Hurricane –** American continent
  - **Typhoon** – Japan and the Philippines



Different types of Cyclones

- **Tornado**
  - A tornado is a weather condition when a cloud having a dark funnel shape reaches the ground.
  - The diameter of a tornado can range from one meter to several kilometres.
  - Tornadoes can be formed within cyclones as well.
  - In a tornado, winds blow at a high speed of 300 km per hour.
  - The funnel-like shape of a tornado sucks everything that comes near it at the base because of the low pressure exerted by the winds.
  - It then throws the things upwards. Hence, tornados can be devastating.

- **Protecting yourself from a tornado**
  - To protect oneself in a tornado, one should take shelter in an underground room with no windows.
  - If in a room with windows, one should close them and hide under a table or a workbench.
  - One should bow down on the knees protecting their neck and head using their arms.

- **Safety measures for cyclones**
  - There should be a cyclone forecasting service that can want the people of a particular area that a cyclone can hit.
  - The speed of winds plays a major role in predicting any calamity like cyclones; hence, wind speed in coastal areas should be measured regularly. **Anemometer** is a device that can measure the speed of the wind.
  - The warnings should be communicated rapidly to the citizens, ships that are sailing in the sea, government agencies, and fishermen.
  - Along with this, cyclone shelters should be built in coastal areas, and agencies should be appointed to help the people at the time of calamity.

- **How individuals can protect themselves from cyclones**
  - One should not ignore the warnings given by the weather forecasting team. If you can, you must move to safe places and carry all your important belongings with you.
  - One should not drive on roads that have standing water as they might be damaged.
  - One should keep all the emergency numbers with themselves so that they can seek help when required.

- **What to do if you are living in a cyclone hit area**
  - The water in such a region can be contaminated. Hence one should make sure if the water is safe and only then drink it.
  - One should stay away from power lines for electrical switches of any kind.
  - One should stay at home or at the shelters and should not move out unnecessarily.
  - One should not put unnecessary demands on the rescue team and should co-operate with them.
  - One should help each other in such a situation.

- **Role of Technology in predicting and protecting from the cyclone**
  - The satellites and radars have made it possible to predict cyclones ahead of time to take appropriate preventive measures accordingly.
  - There are now several national and international organizations that monitor cyclone-related issues.
  - Generally, a cyclone watch or a cyclone and alert is issued every 48 hours in advance if a storm is expected in an area.
  - Then a cyclone warning is issued before 24 hours. This warning is then broadcasted in the area after intervals of half an hour or 1 hour.