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FACULTY OF ENGINEERING AND
TECHNOLOGY

Lecture-34

Natural disaster-part 2



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Subject : Environmental Studies and Disaster Management

Course: B.Sc. Ag. (1st year)

Subject Code: PPY-211

Semester: IInd sem.

Cyclone

- **Cyclones** are the most intense storms on Earth.
- A cyclone is a system of winds rotating counterclockwise in the Northern Hemisphere around a low pressure center. The swirling air rises and cools, creating clouds and precipitation.
- There are two types of cyclones: middle latitude (mid-latitude) cyclones and tropical cyclones.
- Mid-latitude cyclones are also called **extratropical cyclones** and are the main cause of winter storms in the middle latitudes.
- Mid-latitude cyclones move eastward with the westerly winds. These 2-5 day storms can reach 1,000 to 2,500 km (625 to 1,600 miles) in diameter and produce winds up to 125 km (75 miles) per hour.
- They can cause extensive beach erosion and flooding.



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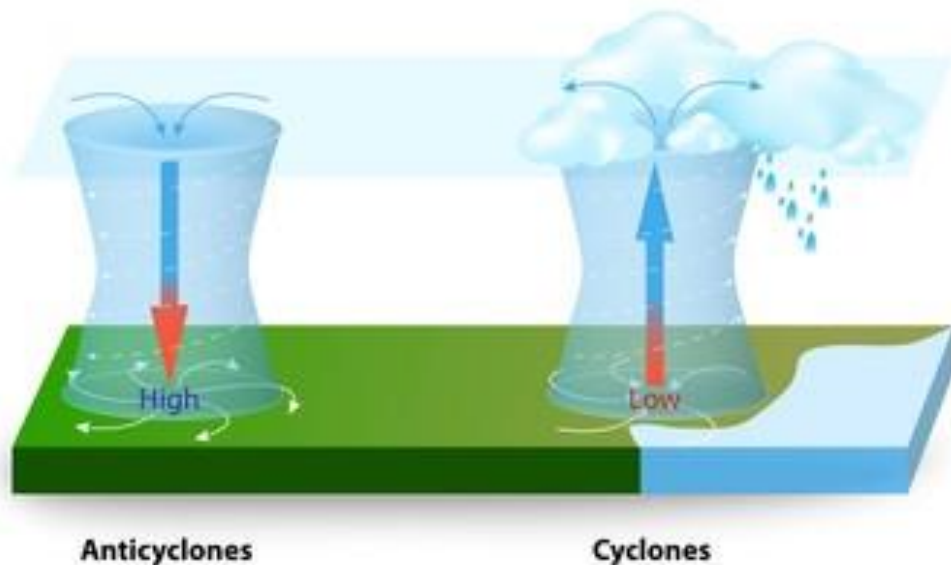
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- Tropical cyclones are also known as hurricanes in the North Atlantic and eastern Pacific oceans, typhoons in the western Pacific Ocean, tropical cyclones in the Indian Ocean, and willi-willi's in the Australia.
- Hurricanes arise in the tropical latitudes (between 10° and 25° N) in summer and autumn when sea surface temperature is 28° C or above. At this temperature the air begins to rotate around the low pressure (counterclockwise in the Northern Hemisphere and clockwise in the Southern Hemisphere). The warm seas create a large humid air mass that rises and forms a low pressure cell, known as a tropical depression. As the air rises, water vapor condenses, releasing energy from latent heat. If wind shear is low, the storm builds into a hurricane within 2-3 days. Hurricanes have high winds with the relatively calm eye where air rises upward.
- Hurricanes move with the prevailing winds. In the Northern Hemisphere, they originate in the trade winds and move to the west. When they reach the latitude of the westerlies, they change direction and travel toward the north or northeast. Hurricanes may cover 800 km (500 miles) in one day.

- High winds, heavy rainfall and storm causes huge damage. Hurricanes typically last for 5 to 10 days. Over cooler water or land surface, the hurricane storm weakens.
- An **anticyclone** is the opposite of a cyclone. An anticyclone's winds rotate clockwise in the Northern Hemisphere around a center of high pressure. Air comes in from above and sinks to the ground. High pressure centers generally have fair weather.



CYCLONES AND ANTICYCLONES



Heat waves

- A heat wave is a long period of hot weather, at least 86° F (30° C) for at least 3 days in cooler locations but much more in hotter locations.
- A heat wave is a period of excessively hot weather, which may be accompanied by high humidity, especially in oceanic climate countries.
- The World Meteorological Organization, defines a heat wave as 5 or more consecutive days of prolonged heat in which the daily maximum temperature is higher than the average maximum temperature by 5 °C (9 °F) or more.
- Severe heat waves have caused catastrophic crop failures, thousands of deaths from hyperthermia, and widespread power outages due to increased use of air conditioning.
- A heat wave is considered extreme weather that can be a natural disaster, and a danger because heat and sunlight may overheat the human body.
- Heat waves can usually forecasted to issue warning and prevent losses.

- Heat waves form when high pressure aloft (from 10,000–25,000 feet) that strengthens and remains over a region for several days up to several weeks.
- This is common in summer in both Northern and Southern Hemispheres.
- Summertime weather patterns are generally slower to change than in winter. As a result, this upper level high pressure also moves slowly. Under high pressure, the air subsides (sinks) toward the surface, warming and drying adiabatically, inhibiting convection and preventing the formation of clouds. Reduction of clouds increases shortwave radiation reaching the surface. A low pressure at the surface leads to surface wind from lower latitudes that brings warm air, enhancing the warming.
- Instead, the surface winds could blow from the hot continental interior towards the coastal zone, leading to heat waves there, or from a high elevation towards low elevation, enhancing the subsidence and therefore the adiabatic warming.

Effects of heat wave

- **Hyperthermia**, also known as heat stroke. It becomes common problem during the periods of sustained high temperature and humidity.
- **Heat edema** results in transient swelling of the hands, feet, and ankles and is generally secondary to increased aldosterone secretion, which enhances water retention. The heat edema usually resolves within several days after the patient is adjusted to the hotter environment. No special treatment is required, however, wearing support stockings and elevating the affected legs can minimize the edema.
- **Heat rash**, also known as prickly heat, is a maculopapular rash accompanied by acute inflammation and blocked sweat ducts. The sweat ducts may become dilated and may eventually rupture, producing small pruritic vesicles on an erythematous base. Heat rash affects areas of the body covered by tight clothing. If this continues for a duration of time it can lead to the development of chronic dermatitis or a secondary bacterial infection. To prevention heat rashes it is advised to wear loose-fitting clothes. In case of occurrence of heat rash chlorhexidine lotion is applied to remove any desquamated skin.

- **Heat cramps** usually develop in people performing heavy exercise while sweating profusely and replenishing fluid loss with non-electrolyte containing water. This may lead to hyponatremia that induces cramping in stressed muscles. Rehydration with electrolytes provides rapid relief.
- **Heat syncope** is related to heat exposure that produces orthostatic hypotension. Heat syncope result from intense sweating, which leads to dehydration, followed by peripheral vasodilation and reduced venous blood return in the face of decreased vasomotor control. Management of heat syncope consists of cooling and rehydration of the patient using oral rehydration therapy.
- **Heat exhaustion** may even resemble heat stroke, with the difference being that the neurologic function remains intact. Heat exhaustion cause excessive dehydration and electrolyte depletion and symptoms may include diarrhea, headache, nausea and vomiting, dizziness, tachycardia, malaise, and myalgia.
- In addition to physical stress, excessive heat causes **psychological stress**, to a degree which affects performance
- Heat waves during drought may also results in bushfires and wildfires.
- Heat waves can also cause roads and highways to buckle and melt, water lines to burst, and power transformers to detonate, causing fires.

Cold waves

- A **cold wave** is a weather phenomenon that is renowned by a cooling of the air.
- The precise criterion for a cold wave is determined by the rate at which the temperature falls, and the minimum to which it falls.
- This minimum temperature is dependent on the geographical region and time of year.
- A cold wave can cause death and injury to livestock and wildlife. Exposure to cold mandates greater caloric intake for all animals, including humans, and if a cold wave is accompanied by heavy and persistent snow, grazing animals may be unable to reach needed food and die of hypothermia or starvation.
- Cold spells are associated with increased mortality rates in populations around the world. More deaths occur during a cold wave than in a hot wave, though the mortality rate is higher in undeveloped regions of the world.
- Extreme winter cold often causes poorly insulated water pipelines and mains to freeze.
- Even some poorly protected indoor plumbing ruptures as water expands within them, causing much damage to property and costly insurance claims.

- Demand for electrical power and fuels rises dramatically, even though the generation of electrical power may reduce due to the freezing of water necessary for the generation of hydroelectricity.
- Some metals may become brittle at low temperatures. Motor vehicles may fail when antifreeze fails or motor oil gels, producing a failure of the transportation system.
- Fires become even more of a hazard during extreme cold. Water mains may break and water supplies may become unreliable, making firefighting more difficult. The air during a cold wave is typically denser and thus contains more oxygen, so when air that a fire draws in becomes unusually cold it is likely to cause a more intense fire.
- Cold waves that bring unexpected freezes and frosts during the growing season in mid-latitude zones can kill plants during the early and most vulnerable stages of growth, resulting in crop failure as plants are killed before they can be harvested economically. Such cold waves can cause famines.

